Culture and Conservation in the Sacred Sites of Coastal Kenya

By

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Thesis submitted for the degree of Doctor of Philosophy in Biodiversity Management

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December 2014

Declaration

I declare that this thesis has been compiled by myself, and that the work presented has been done by myself and has not been accepted in any previous application for the award of degree in any university. All quotations have been distinguished by quotation marks and sources of information have been specifically acknowledges by reference to the authors.

Emma Shepheard-Walwyn

Dedication

I dedicate this thesis to my wonderful family who have stood by and supported me throughout all the years that have led me to this point. Their unwavering faith in my ability to achieve all that went into creating and producing this thesis, drove me on even when I had lost faith in myself. To them I owe all that I have managed to acomplish and what sanity I have left.

Abstract

The Mijikenda sacred natural sites (SNS) contribute towards Kenya's East African Coastal Forest ecosystem. This ecosystem is highly biodiverse and important to the conservation of many rare and endemic species. The SNS are therefore thought to be very important to biodiversity locally and globally, as well as playing a significant role in the preservation of the local traditional culture. Whilst it is known that the SNS contain coastal forest, there are no accurate estimates on the amount, nor are there assessments of habitat diversity within the sites and no systematic surveys have been done in the past 20 years. In addition, degradation of the sites has been described, but the level of encroachment and amount of forest loss has not been measured. A major driver of the degradation and deforestation of SNS is thought to be cultural change, leading to a decrease in the adherence to traditional practices, and loss of knowledge and respect for local customs. The existing management of the SNS is based on the traditional laws associated with the SNS; enforcement is left to local Kaya Elders, and it follows the assumption that the Mijikenda are a homogenous and culturally static group. As such it is thought that changes in culture and values systems may be undermining the successful conservation of the sites. However, again, whilst changes within the local communities surrounding the SNS have been described, no research has been done on how such changes may have altered the attitudes and values of the local people in this region, or what impact this may have on the preservation of the SNS.

The aims of this thesis are to: measure the amount of costal forest within the Mijikenda SNS; to assess if the habitat heterogeneity within the sites; investigate their potential for biodiversity; measure the amount of forest loss within the sites, and the amount of encroachment that they suffer from; understand the current attitudes and values of the local communities towards the SNS, their culture, and conservation; compare current attitudes and values to what would be expected traditionally; investigate the use of resources from the Kayas by the local communities; and, in light of these questions, assess the efficacy of the existing management plan in light of the current landscape in which the SNS are located and any changes in local culture, and associated values.

The results show that the Mijikenda SNS contain a substantial proportion (1.4%) of Kenya's coastal forest. Due to their habitat heterogeneity and habitat features, as well as being some

of the only forest habitat within a degraded landscape, they are important to both local and global conservation, including the possibility to maintain viable populations of rare and endemic species. Whilst the rate of forest loss within the SNS was found to be significantly lower than forest loss outside the sites, almost all sites were undergoing encroachment, degradation and forest loss. The local communities were found to be diverse, with different demographics, attitudes, values and behaviours. There has been a significant departure from the traditional culture, including a decrease of participation in traditional practices, a lack of adherence to customary laws, and a loss of traditional knowledge. The SNS were found to be important for resources to the local communities; however, extraction is not being monitored or managed for. In addition, ongoing developments in the region could pose a significant threat to the SNS. This research provides the first set of accurate estimations of coastal forest within the sites, and the range of habitat heterogeneity and potential contribution to biodiversity they make. It also offers the first set of accurate measurements, of the extent of encroachment, and forest loss, that a number of sites on the north coast have undergone. In addition it provides some of the only large-scale social data associated with the Mijikenda SNS. This thesis shows that whilst some of the threats to the sites, and changes in local culture have been observed in the past, none have been accounted for in the current management plans associated with the sites.

The management of the SNS needs to be redesigned to account for the changes within the local communities and the surrounding area, as well as addressing the threats that the SNS face. Management should be created on a site-by-site basis, to work with all stakeholders in the area, and must encompass the changes which are happening within the region. In addition, interventions to address conflicts within communities, provide alternative access to resources, and to improve transmission of knowledge, need to be put in place to aid communities in protecting the SNS. Management of the sites must be done jointly by the local people, the government, and NGOs, with the local communities predominantly having autonomy over the protection of the sites and their culture.This research contributes to the understanding of the roles that SNS play in the conservation of biodiversity; and the issues that arise for the conservation of traditionally managed sites of communities undergoing cultural change. It will help to provide information which can be used to address the management of the Mijikenda SNS as well as SNS and community conserved areas around the world.

Acknowledgements

I would like to thank my supervisor Peter Bennett, and Stuart Harrop, who both took a chance on me and my project. I want to thank them both for their support, guidance and belief in me, and for helping me turn a small idea into a PhD. I also want to thank Peter for sticking by me throughout the many manifestations of this project, through all its ups and downs, and for believing I could do this all along (even when I was not so sure myself). I would also like to thank Zoe Davies for her advice, guidance, Skype chats and hugs that were much needed along the way. Without the three of them this project would not have been possible and I hope I will have the opportunity to continue working with them all in the future. In addition I would like to thank Martin Dalimer and Tom Roberts for their fantastic advice and for helping me through the transition into social research. Furthermore, I am so grateful to Dave Roberts for always being there for me to turn to when I needed it.

My thanks go to all the staff at the North Coast Coastal Forest Conservation Unit (National Museums of Kenya) for agreeing to be my affiliate institution and for all the help and support they provided. If it had not been for their knowledge, skills and help this project would not have been possible. In addition they were a joy to work with, and I hope I will get the opportunity to do so again in the future. In particular I would like to thank Anthony Githitho for his sage advice throughout my project, and Lawrance Chiro who felt more like a co-worker than an assistant. I want to thank Chiro for all his hard work and the dedication that he put in to helping me achieve my project. I will always remember our trips to the Kayas, and feel lucky to have been able to do this work with you. I would like to thank all the Kaya Elders, my field staff and the community members who took part in this work. Without them there would be no data, so to them I am forever grateful for their kind cooperation and wonderful hospitality. I also want to say a big thanks to Peter W for all his help and hard work. It was such fun working with you, I am so grateful for all that you did, and for uprooting yourself to help me out. I would also like to thank Paul S for helping me to develop my

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Chapter 1: Introduction

1.1 Conservation and Culture

1.1.1 The progression from game reserves to culture focused conservation

Contemporary conservation has developed from a western concept which originated in the nineteenth century. Adams (2004) states that the first moves towards what we would consider as conservation today, came from the elite hunting communities in the United Kingdom and North America who sought to halt the significant decline in numbers of game in America and in Southern Africa. From these roots, there arose what Adams (2004: 21) terms as the "age of preservation", starting with the development of game reserves. Not long after, conservation began to extend beyond protecting animals for hunting to the idea that people had a duty to protect nature (Adams, 2004; Ladle and Whittaker, 2011). With these changes in the ideologies of conservation came another type of reserve, National Parks (NP). The first NPs, such as Yosemite and Yellowstone in the US were what were known as 'Nature Monuments' (or Naturdenkmal) (McNeely and Schutyser, 2003; Ladle & Whittaker, 2011). Ladle and Whittaker (2011) comment that "The concept of *Naturdenkmal* captured the value that aesthetic and intellectual contemplation of nature is integral to the biological and cultural inheritance of many peoples". They note that the creation of nature monuments spread across Europe and the world. These sites were formally protected, with set boundaries and separate from people. In fact, despite previous habitation by native Indians (who were moved to create the national parks), the absence of human presence was considered to be what made the national monuments in the US valuable (Ladle & Whittaker, 2011).

The concept of keeping humans away from nature in order to protect it has now come to be known as 'Fortress conservation'. Hutton *et al*. (2005) highlight that so called 'Fortress Conservation' is based on a number of concepts, which include the perception that people are responsible for the destruction of nature and therefore protecting nature is best achieved when people are kept separate from it. This perspective was not unfounded; Brandon *et al*., (1998: 415) state that "[v]irtually all threats to biodiversity result from human actions". These attitudes supported conservation based on barriers, which involved the designation of Protected Areas (PAs), which kept nature safely in and people out. Many of the PAs created throughout the twentieth century involved the re-location of indigenous

communities, they often allowed only limited access for scientific or management purposes, no extractive/consumptive use was permitted, and for some sites, very limited eco-tourism (Ongugo *et al.*, 2002; Adams, 2004; Hutton *et al.*, 2005; Coad *et al.*, 2008; Okech, 2010).

Both Adams (2004) and Berkes (2007) argue that the main approach in the conservation movement of the twentieth century was the creation of PAs. According to a report by Bertzky *et al.* for UNEP-WCMC (2010), in 2010 PAs covered 12.7% of the world's terrestrial and inland water areas, 1.6% of the global ocean area, 4% of all marine area under national jurisdiction and 7.2% of all coastal waters worldwide. The strictest designation of PAs by the IUCN is Category 1a. They are defined as: "strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values" (Dudley, 2008 pg2). Whilst PAs played an important role in biodiversity conservation in the twentieth century and continue to do so today, as Alcorn (1993) highlights, there were, and still are many conflicts and issues associated with this approach to conservation. There has been significant opposition to the treatment of local communities associated with the creation and management of PAs which came not only from the indigenous populations themselves, but also researchers within the humanities (Infield, 2001; Adams, 2004; Berkes, 2007). Krueger (2009) observes that the translocation of people to form PAs caused controversy and opposition such that from 1948 onwards, international charters highlighting the issues of forced relocation of indigenous people (such as the Universal Declaration on Human Rights) were beginning to be developed. However, whilst relocation of individuals is a major issue associated with the creation of PAs, it is not the only reason for conflict with local communities (Krueger, 2009).

The main types of conflicts that occurred in the early stages of PA formation, and continue to take place today, are what O'Leary *et al.* (2004) term as 'downstream disputes'. These are disputes associated with the compliance or enforcement of environmental governance. In the case of PAs, from the beginning local communities had disputes based on access, use of resources, costs associated with living next to PAs (such as crop destruction and depredation by wild animals from within the PAs), and limits to development in an area surrounding a national park (Ongugo *et al.*, 2002; Archabald and Naughton-Treves 2001; Allendorf *et al*, 2006; Coad *et al*., 2008; Krueger, 2009; Okech, 2010; Eniang, 2011). For example, Okech (2010) notes that many of the people in East Africa, including Kenya, are pastoralists and

their activities have been interrupted by the development of PAs. PAs have resulted in the demarcation of land that was once pastoral land being solely used for wildlife and tourists, which in turn has led to conflicts with the local pastoral communities (Okech, 2010). Ongugo *et al.*, (2002) also noted conflicts between more settled communities and the PA on Mount Elgon, Kenya. It was found that that the local people in the region often conflict with the management of the national park when they are prevented from collecting resources which they rely on for subsistence (Ongugo, 2002). According to Adams (2004), these observations began to influence conservation management, practitioners started to take into account the social impact of existing and new conservation approaches, and these changes went on to shape how PAs were created and run across the world.

Due to controversy around the treatment of indigenous people in relation to conservation management, a new approach known as 'Community Based Conservation' (CBC) evolved (Hackel, 1999; Adams, 2004; Coad *et al.*, 2008). CBC sought to improve the relationships between PAs and the communities that lived around them. Hackel (1999) describes CBC as "a response to both alienating protectionist policies of the past and to the economic concerns that many rural people face" and that "[i]n its purest form, CBC would change the relationship between rural people and governing agencies". These new attitudes became much more prominent in the 1970s and led to projects such as COBRA (Conservation of Biodiverse Areas) in Kenya; Mwalunganje Community Based Tourism project in Kenya; CAMPFIRE (Communal Areas Management Programme for Indigenous Resources) in Zimbabwe; and joint management approaches like the Pacific Rim National Park on Vancouver Island, Canada (Hackel, 1999; Adams 2004; Manyara and Jones, 2007; Frost and Bond 2008). By the 1980s many conservation projects rejected the traditional top-down approaches, such as strict PAs, as they were viewed as having failed in achieving effective solutions to allowing development alongside conservation, and in some cases were seen to have failed in effectively achieving sustainable conservation (Brandon *et al.*, 1998; Adams, 2004). The focus shifted to CBC, especially integrated development and conservation projects (ICDPs), which became the most common type of CBC by the end of the twentieth century (Hackel, 1999; Infield, 2003a; Adams, 2004; Manyara and Jones, 2007).

There have been a diverse array of approaches which have been labelled as CBC and their uptake and success has been varied. By the start of the 21st century numerous authors including Hackel (1999), Goldman (2003), Infield (2003a) and Berkes (2007) argued that the

success of many economically based CBC projects had either been questionable, or had failed despite early success. For example, whilst noting the valuable lessons that can be learned from it, Frost and Bond (2008) note that the CAMPFIRE programme in Zimbabwe has had very variable levels of success across the different Districts and communities it works with. In addition Mutandwa and Gadzirayi (2007: 336) found that in the area they conducted their research "the local community considers that no significant changes have occurred to their livelihoods" since the implementation of CAMPFIRE and they suggest that this approach to conservation is not achieving full participation from the communities. Mshale (2008) states that since the implementation of the JUKUMU CBC project in Tanzania, it has not helped to improve people's attitudes and practices to conservation; agreements that the government made during the establishment of the project have not been met; human-wildlife conflict has increased; and there is both poaching and encroachment into the wildlife management area. Both CAMPFIRE and JUKUMU highlight some of the problems that have been associated with CBC. These issues, and the fact that many CBC projects had only a limited level of success, led many conservationists to conclude that CBC was not the cure-all for conservation it was once seen as, and this led to another shift in the perception of how conservation should be conducted.

Whilst some, such as Terborgh *et al.*, 2002, took the perspective that a return to barriers-based conservation was required, others argued that another new approach was needed. This is because, along with the social issues noted above, the efficacy of PAs and 'back to barriers conservation' to preserve biodiversity has been bought into question, due to the lack of representation of different ecosystems worldwide, as well as the continued degradation and loss of biodiversity within sites (Spellerberg, 1992; Barber *et al.*, 2004; Venter *et al.,* 2014). There is also a range of literature which indicates that many PAs are unlikely to be able to protect species, as habitats and distributions alter under climate change (Dudley, 2003; Hannah *et al.,* 2005; Trivedi *et al.*, 2008; Araujo, 2011; Tengö and von Heland, 2011). In addition, it has been observed that PAs are unable to effectively address the threat of infectious disease spread to both wildlife and humans (which is likely to increase with climate change), and in some cases may actually increase the risk of diseases spreading (Barber *et al.,* 2004; Bengis, 2005; Thomson, 2009; Huq, 2011; Treanor *et al.,* 2011). These issues therefore bring the suitability of PAs and barriers based conservation further into question.

Foley (2003) notes that the scientific approach in conservation and environmental policy, which underpinned barriers-based conservation, was often seen as an elitist white male 'Anglo'-European attitude which was being imposed on other cultures and communities, and conservation needed to take account of local understandings and perspectives. This culture-specific approach is supported by Adams (2004) who stated that "the way we understand nature depends on who we are" (pg233). Furthermore, it has been argued that if people are engaged with and value nature and its protection, this will lead to more effective, and better supported, conservation approaches (Kellert, 1996; Jepson and Canney, 2003; van Klinken and van Hoff, 2004; Miller, 2005). However, Jepson and Canney (2003) asserted that much of the human connection with nature and conservation has been lost in many areas of the world, and that to engage people in conservation a more values-based approach is needed. They argued that by focusing on the aesthetic and ethical values, links between conservationists and the general public would be re-established, and this would enable more effective conservation on the ground.

Along with the perspectives that we needed to find better ways to engage the public with conservation, there were also arguments emerging on the physical benefits that people gained from the environment. For example, Kellert (1996) posits that there is a basic need for people to have a relationship with nature and we are physically, emotionally and intellectually dependant on nature and biodiversity. In addition, Greiner and Stanley (2013: 4) state "[h]uman wellbeing is fundamentally linked to the state of the natural environment". This kind of thinking led to new approaches to conservation being more holistic, attempting to incorporate different cultures, knowledge and value systems. In the Declaration of Belem (produced at the first International Congress of Ethnobiology, 1988) it was stated that local indigenous specialists should be recognised as proper authorities with regards to their specialties and should be consulted about all projects which would affect them, their resources and their environments.

The engagement with local knowledge was not thought to be just for the benefit of the local communities. Indigenous knowledge of biological diversity has shaped intangible practices and processes and resulted in a diverse range of tangible products, such as medicines, dyes and building materials (Hoekstra, 2010). To date, there is a wealth of knowledge on plant diversity that is still guarded by local indigenous culture, which may in the future prove to be vital (Hoekstra, 2010). In addition it has been noted that local ecological knowledge can be

useful and provide a unique source of data for conservation (Turvey *et al.*, 2010). Goldman (2003) argues that understanding and incorporating local knowledge could help to better achieve both the ecological and social goals of conservation projects. Dove *et al.* (2005) also state that conservation is likely to be more successful if those implementing it look for local practices (already in existence) which serve a conservation function and building upon these, rather than bringing in new activities and concepts.

However, traditional knowledge and values do not stay constant over time. Turvey *et al.*, (2010) highlight that the lack of communication between generations can cause a situation where knowledge and practice is based on a "shifting base-line" and this can result in the loss of knowledge about past species. They state that often a decrease in fauna can match a decrease in the local knowledge about fauna, and that once species are lost, they can be forgotten by local communities (Turvey *et al.*, 2010). For example, in their study they found that the decrease in knowledge of the Yangtze freshwater megafauna, such as the Baiji (*Lipotes* vexillifer) coincided with population declines of those species. They argue that these findings suggest that once species stop being encountered by local communities on a regular basis, they are forgotten by those individuals (Turvey *et al.*, 2010). Due to the way in which local knowledge changes and adapts over time, its importance for the protection of cultural heritage, the possible contributions this knowledge can make to scientific understanding, and potentially the implementation of effective conservation management, they argue that the preservation of traditional knowledge as a goal should be supported in future conservation projects (Turvey *et al.*, 2010).

It was also argued that in the early twenty-first century the values of nature are not just utilitarian, or based on the perceptions of western scientists. Byers *et al.*, (2001) argue that it is vital that those implementing the conservation of nature recognise that non-material uses of species and the environment are legitimate uses and must be taken into consideration. The concepts of incorporating different cultural values and perspectives became a significant viewpoint in the new approach to conservation. For example, Yamin (1995) noted that the relationship between people and nature is socially and culturally dependant and therefore the reasons for conserving biodiversity vary across different cultures and societies. Infield (2001) also argued that allowing cultural practices may help to create powerful links between local people and conservation areas and promoting cultural values may provide a counterbalance to economic pressures on wildlife and the landscape.

1.1.2 Culture and Conservation

In this research 'culture' is defined as "the distinctive ideas, customs, social behaviour, products, or way of life of a particular nation, society, people, or period" in accordance to the Oxford English Dictionary (OED, 2014).

In light of the interest in new, more holistic, approaches to conservation the focus of how local cultures may influence conservation management has become a key area of interest in the conservation literature over the past few decades. Cultures have evolved over time alongside the evolution of the natural environments that surround them, and cultures have been altered and shaped due to the environment in which people live (Mishler, 2001; Smith, 2001; Global Diversity Foundation, 2010; Marton-Lefèvre, 2010; Tengö and von Heland, 2011). It has been observed that in a number of places there are positive correlations between cultural and biological diversity, and between threatened cultural diversity and species extinction risk (Sutherland, 1993; Maffi, 2001; Mishler, 2001; Smith, 2001; Maiero & Shen, 2004; Maffi, 2005). For example Maffi (2005) highlights that there is a significant positive correlation between richness of biological diversity and cultural diversity in Mexico, Central America and Equatorial Africa. As well as the connection between biological and cultural diversity, there is a large body of literature which describes the manner in which cultural differences affect how people interact and view nature. For example, Rist *et al*. (2003), argue that in traditional cultures, interactions with nature can be derived from the way in which society and nature have developed together. Selin (2003: XIX) states that "[a] society's views on nature and the environment arise from and reflect its cultural beliefs and customs".

The nature and landscapes intrinsic to a culture can be reflected in local stories, songs and traditions (Nabhan, 1998). This can result in a reverence, respect, awe, fear and connection with the natural world including aspects which individuals themselves may never have come across but are embedded within their culture. For example, the O'odham Indians in the Arizona desert have a respect and connection with the ocean and sea birds which are embedded in their culture even though many individuals may never have seen the ocean (Nabhan, 1998). Vercsey (1980) theorises that culture fundamentally arises from environmental relations, and notes that some indigenous societies, are recorded as having respect and reverence for nature. However, the relationships between the cultures of

indigenous peoples and nature are complex, and Viveiros De Castro (1998) argues that the distinction between 'nature' and 'culture' is not as clear for some indigenous groups as it is for many western societies.

In some cases the stories, mythologies and understandings result in what could be thought of as an affable connection. For example, Vercsey (1980: 19) describes how the Ojibwas Indians of North America believed "that their environment was a world of beings with souls", and that they were part of an animate universe which they must respect. He discusses the religions of native American Indians, and how their cultural understandings of people being connected with nature leads to what he describes as their love and respect for the natural environment. Highlighting the reverence that the American Indians have for nature Vecsey (1980: 26) quotes Smohalla, a founder and prophet of the North American Indian Daydream-movement, as follows: "You ask me to plough the ground. Shall I take a knife and tear my mother's breast? Then when I die, she will not take me to her bosom to rest". In contrast, many of the mythologies and cultures of indigenous communities also reflect a more harsh and turbulent side of their relationship with nature. For example, the Inuit legend of Sedna talks of a woman whose fingers were cut off and was left to drown in the sea. In the legend her fingers turned into seals, whales and walruses and she became the mother of all sea creatures. Whilst the details of the myth vary, they all follow a similar plot. Sedna is feared by many Inuit communities, and she is attributed with bringing great storms as well as being able to prevent successful hunting unless she is appeased (Burland, 1965; Seidelman and Turner, 1993). The stories, myths and legends of indigenous groups lead to diverse and multifaceted relationships with nature. However, Berkes *et al.* (1995: 281) state that "self-interest is the key to biodiversity conservation by indigenous communities". They note that that whilst indigenous communities do achieve conservation, and their relationship with nature is more holistic, they do so not out of an altruistic mind-set, but in order to survive.

Despite the specific manifestations of the different relationships, these examples all highlight the connection between cultural practices and the natural environment. Tengö and von Heland (2011) argue that when dealing with communities who have cultures that are so intertwined with nature understanding these links and the feedback between the environment and culture are essential for the conservation of biodiversity and the protection of ecosystem services.

Brown (2003) asserts that conservation is a social and political process, and argues that it is important to incorporate "different understandings, meanings and values of biodiversity, the environment and nature" for what Brown describes as 'real people-centred conservation'. Along with noting that cultures play a part in how people interact with nature, some authors such as Dove *et al*. (2005) argue that indigenous communities have helped to support biodiversity through cultural practices, and the removal of those communities, and/or the ceasing of their traditional practices can have a negative effect on biodiversity. For example, it has been observed that before European settlement, both Australian Aboriginals and American Indians engaged in burning boreal forests which led to a diverse habitat mosaic within the landscape which in turn promoted high levels of biodiversity in these areas. In addition these small-scale burning events kept fuel levels low preventing large-scale uncontrollable fires which also help to maintain biodiversity (Lewis and Ferguson, 1988; Selin, 2003). Another example, given by Berkes and Davidson-Hunt (2006), is the Bora people in the Peruvian Amazon, who undertake small levels of burning to stimulate a renewal cycle which helps to increase the available nutrients and the patch can be used to cultivate plants. This system would then lead to a regeneration of the forest patch, but now with an increased number of species, due to the incorporation of the planted species (such as bananas) which can continue to be used by the indigenous community. Berkes and Davidson-Hunt (2006) note that when traditional practices of small-scale burning were banned in Yellowstone national park, this led to a catastrophic event in 1988 where almost half of the park was burned down. These examples show that whilst customary practices were developed over time to help communities survive, such traditions can help support biodiversity, and that stopping such activities can have negative effects on biodiversity.

A significant way in which cultures influence how people interact with nature is through their belief systems. Sponsel (2007) argues that "Religion [spiritual beliefs] can be the most powerful influence on the worldview, values, attitudes, motivations, decisions, and behaviours of individuals, groups and societies" and that "whatever someone regards as sacred or spiritual is more likely to be revered and protected". Negi (2010) posits that many different cultural activities and rules including those associated with religion and belief systems can strengthen the relationships between people and nature. Often indigenous people's connection with nature and the sustainable use and management of their resources is underpinned and dictated by their spiritual beliefs and values (Rist *et al*., 2003). For example in Ghana the spiritual beliefs of the Akan tribes influences how they view and

interact with nature (Sarfo-Mensah and Oduro, 2007). One of the beliefs that the Akans hold is that the local Earth-gods reside in natural features such as tree clumps, large rocks and ponds, with a preference for clumps of trees. Due to this belief, for the Akans, trees hold particular spiritual potency. They also believe that mother-earth is one of their most important gods, and she is known by many Akans as Thursday-born. It is therefore understood that Thursday is the day of rest by mother-earth, and therefore no one is allowed to hunt in the bush, or farm, on a Thursday (Sarfo-Mensah and Oduro, 2007).

Another example of how spiritual beliefs influence peoples behaviours towards nature is through taboos. Taboos are described by Anthwal *et al*. (2010) as: "unwritten, orally transmitted traditional and social rules that regulate human behaviours". Taboos can play an important role in protecting species, sites and ecosystems (Jones *et al*., 2008; Anthwal, 2010; Ormsby, 2012). In their paper looking at how traditional beliefs contribute to biodiversity conservation in the Himalaya region of Uttarakhand in India, Anthwal *et al*. (2010) highlight how taboos play a role in people's interactions with nature. They state that "there are a number of plants, animals and lakes that are regarded as sacred" and that with reference to these "no felling or exploitation was carried out". Jones *et al*. (2008) note that in Madagascar there are a number of taboos associated with which species (of plants and animals) can be harvested, and when (either in the species life-history, or at what time of year). Examples of these taboos are that weaving materials and bamboo must not be bought into the village before the rice is harvested, tailless tenrecs (*Tenrec ecaudatus*) should only be harvested April – May, and certain species, such as lemurs in the family Indiridae, are forbidden from being hunted at all (as they are believed to embody dead ancestors). There are also taboos based on the behaviours of some species. Since they are believed to feed on the bodies of dead ancestors it is strictly forbidden to eat carnivores such as the fosa (*Cryptoprocta ferox*) (Jones *et al*., 2008). Spiritual and cultural taboos can help to contribute towards conservation, and Jones *et al*. (2008) found that in Madagascar the "[s]trict taboos offered real protection to threatened species, such as the lemur *Propithecus edwardsi* and the carnivore *Cryptoprocta ferox*".

1.1.3 Sacred Natural Sites
Along with social taboos, another significant way in which traditional cultures and belief systems can help to preserve biodiversity is through the protection of cultural and spiritual natural sites. In this study the term sacred natural sites (SNS) is taken to mean any natural or

semi-natural sites which are observed by indigenous and/or traditional peoples, or by mainstream religions or faiths, as sites having historical, cultural, religious, or spiritual significance. This definition will therefore incorporate what are termed as both cultural natural sites (CNS) and SNS within the existing literature. There are many SNS around the world, as diverse as the countries and cultures which they represent (Dudley *et al.*, 2005, Bhagwat and Rutte, 2006, Dudley *et al.*, 2009, Palmer and Finlay, 2003). These include sites which have been physically altered by those who hold them to be sacred due to burial grounds or constructions of monuments, which are known as semi natural sacred sites, or those that have been less actively altered, such as areas that are preserved and set aside due to their spiritual significance (Jeanrenaud, 2001; Dudley *et al.*, 2005, Bhagwat and Rutte, 2006, Anthwal *et al.*, 2010). Due to their use, the composition and/or structure of these sites has been altered in comparison to the surrounding landscapes, and they have been found to hold different types and levels of biodiversity (Dudley *et al.*, 2005, Dudley *et al.*, 2009, Bhagwat and Rutte, 2006; Berhane *et al.* 2013).

One of the first studies of the importance of SNS to conservation was published by Gadgil and Vartak in 1976. It was a study of sacred groves within the Western Ghats in India. They estimated that the sites originated in the hunter-gatherer era circa 600 AD and have been protected due to their spiritual significance to the local people ever since. They concluded that the sites were important to biodiversity, especially due to the increasing levels of deforestation within the region, and that many held rare and important species not otherwise found within the area. Since this study there has been a large number of articles which have gone on to highlight the importance of SNS across the world as refuges for biodiversity, for containing rare and endemic species, and due to the ecosystem services which they provide (see Table 1. 1 for a brief description of a number of these studies). For example, graveyards on Pemba Island, Tanzania, are important roosting sites for the vulnerable Pemba flying fox (*Pteropus voeltzkowi*) (Robinson *et al.*, 2010). In Ghana the Malshegu sacred grove is important for seed dispersal, helps to ensure that the water-Table remains high in the area, and protects the local village from wind, rainstorms, bushfires and climatic hazards (Dorm-Adzobu *et al.*, 1991). In northern Ethiopia, sacred church forests, which are often located at the tops of hills, help to prevent soil erosion and are reservoirs of biodiversity in significantly altered landscapes (Wassie *et al.*, 2010). In Garhwal Himalaya, India, the sacred groves are important reservoirs for ecological and genetic diversity and for the provisions of medicinal plants (Anthwal *et al.*, 2010). In addition to their importance for

Table 1.1: List of some of the research on sacred natural sites, the ecosystem and taxa they focus on as well as the ecosystems services the SS are noted as providing

Author	Date	Country	Location	Ecosystem	Taxa	Ecosystem Services Provided
Gadgil and Vartak	1976	India	Western Ghats	Wet evergreen, Semi-evergreen forest	Plants	Resource use (e.g. fuel and medicine), Biodiversity conservation, Cultural and spiritual services
Dorm-Adzobu *et al.*	1991	Ghana	Malshegu	Guinea Savannah open-canopy forest of broad-leaved trees	Plants and fauna	Water regulation, Protection from extreme weather, Biodiversity conservation, Cultural and spiritual services
Deb *et al.*	1997	India	Western Midnapore District	Sal coppice forest patches	Avifauna	Biodiversity conservation, Cultural and spiritual services
Decher	1997	Ghana	Accra Plains	Dry forest and dry semi-deciduous forest	Rodents and bats	Biodiversity conservation, Cultural and spiritual services
Burgess *et al.*	1998	Kenya and Tanzania	East African Coast	East African Coastal Forest	Plants, mammals, birds, invertebrates	Biodiversity conservation, Cultural and spiritual services
Githitho	2003	Kenya	Coastal Kenya	Coastal Forest	Plants and Fauna	Resource use, Biodiversity conservation, Cultural and spiritual services
Mgumia and Oba	2003	Tanzania	Wanyamwezi	Brachystegia (also known as Miombo) woodland	Plants	Biodiversity conservation, Cultural and spiritual services
Bhagwat *et al.*	2005	India	Western Ghats	Wet evergreen, Semi-evergreen forest	Plants	Landscape heterogeneity, Biodiversity conservation, Cultural and spiritual services
Aerts *et al.*	2006	Ethiopia	Central Tigray	Afrotropical Highland open forest	Avifauna	Cultural and spiritual services
Das *et al.*	2010	India	Mawphlang, East Khasi Hills	Moist tropical and humid subtropical forests	Frogs	Biodiversity conservation, Cultural and spiritual services

Metcalfe *et al*.	2010	Kenya	Three Sisters Cave Complex, Kwale District	Cave and Coastal Forest	Plants; Mammals; Invertebrates	Resource provision, Flood Prevention, Biodiversity conservation, Cultural and spiritual services
Ormsby and Bhagwat	2010	India	Western Ghats and Meghalaya (review	Multiple (forests sites)	Plants	Resource use, Biodiversity conservation, Cultural and spiritual services
Wassie *et al*.	2010	Ethiopia	North Gonder	Afromontane forest	Plants	Resource use, Biodiversity conservation, Cultural and spiritual services
Bhagwat	2012	India	Western Ghats	Wet evergreen, semi-evergreen forest	Plants	Landscape heterogeneity, Biodiversity conservation, Cultural and spiritual services
Ormsby	2012	Ghana	Tafi-Atome and Boabeng-Fiema	Savannah Woodland	Monkeys and plants	Recreation, Resource use Biodiversity conservation, Cultural and spiritual services
Berhane *et al*.	2013	Ethiopia	Northern Ethiopia	Afromontane forest	Plants	Landscape heterogeneity, Biodiversity conservation, Cultural and spiritual services
Robinson *et al*.	2013	Tanzania	Pemba Island	Native and secondary coastal bush vegetation	Flying Fox (*Pteropus voeltzkowi*)	Biodiversity conservation, Cultural and spiritual services
Ray *et al.*	2014	India	Multiple (review)	Multiple	Plants, Birds, mammals, amphibians, invertebrates	Water conservation, soil conservation, climate regulation, landscape heterogeneity, Biodiversity conservation, Resource use, Cultural and Spiritual values

biodiversity, their ecosystem services based on the extractive resources they provide, and the regulating services they contribute (such as prevention of soil erosion, water maintenance, and protection from climatic events), all SNS are important for cultural ecosystem services. The Millennium Ecosystem Assessment defines cultural ecosystem

services as: heritage values, cultural identity, spiritual services, inspiration, aesthetic appreciation and recreation/tourism (MEA, 2005).

Many semi-natural (those with monuments and/or manmade alterations such as burial grounds) and natural sacred sites have been protected for hundreds of years (Gadgil and Vartak, 1976; Githitho, 2003; Dove *et al.*, 2005; Dudley *et al.*, 2005; Bhagwat and Rutte, 2006; Nyamweru *et al.*, 2008). Examples of these include: Tammealuse sacred grove and Hiiemagi sacred forest hill in Estonia; Poilão Island in Guinea Bissau; Sacred groves in the Western Ghats, and the Uttarakhand region of Himalaya, in India (Kaasik, 2008; Catry *et al.*, 2002; Gadgil and Vartak, 1976; Anthwal *et al.*, 2010). Due to their importance to the global protection of both cultural and biological heritage, a number of natural and semi-natural sacred sites have been designated as World Heritage Sites. These include: the sacred sites and pilgrimage routes of the Kii Mountain Range in Japan; a number of the sacred Mijikenda Kaya forests in Kenya; Sulaiman-Too Sacred mountain in Kyrgyzstan; and Osun-Osogbo Sacred Grove in Nigeria. There are also a number of other SNS which are currently under consideration for designation as World Heritage sites (UNESCO, 2014).

As well as developing alongside and in response to one another, cultural and biological diversity are under threat by some of the same forces (Maffi, 2005). Maiero and Shen (2004) highlight that the threats which face cultural and biological diversity have predominantly come from globalization. These threats include the invasion of dominant groups, the loss of knowledge, and the risk of extinction of small populations. For plant and animal species, dominant invasives, which outcompete native species and create monocultures, are a significant threat to biodiversity (Vilà and Weiner, 2004). Maiero and Shen note that colonisation and empire building had a similar effect on indigenous communities, reducing their cultural and linguistic diversity by encouraging local populations to adapt to the new "mainstream" society and adopt their languages, effectively creating a cultural monoculture, and the pressures of cultural conformity still occur around the world today. They also highlight the issue of the loss of knowledge which can affect biodiversity in two main ways. First the loss of knowledge about particular species which need to be protected may influence their conservation (Brito, 2004). Secondly, loss of knowledge and experience of nature in general (especially through urbanization) can have a negative impact on people's relationship with nature which can lead to decreased engagement with biodiversity conservation (Chawala, 1998; Turvey *et al.*, 2010). For indigenous communities, the loss of

knowledge can lead to the loss of traditional cultures, practices and languages (Sutherland, 1993; Maffi, 2001; Mishler, 2001; Smith, 2001; Maiero & Shen, 2004). Maiero and Shen observe that the majority of the world's languages and unique cultures are held by small fragmented groups which are under threat of extinction, in a similar way to small fragmented populations of threatened species (Pimm *et al*, 1988; Purvis *et al*., 2000). Both cultures and species, which have small populations and are isolated, are under threat from external pressures, such as encroachment, and have a reduced ability to pass on information (either cultural or genetic) to future generations, and therefore are at risk of being lost forever (Pimm *et al*, 1988; Purvis *et al*., 2000; Maiero & Shen, 2004). For example, Maffi (2001) notes that in Mexico the traditional Tenejapan language is not spoken fluently by younger generations, and with the loss of their ability to understand the language, they are losing the knowledge of the use of some of the medicinal plants. As a number of the people are not aware of the uses of the plants (which was once wide-spread knowledge), many people are taking out these plants from their homesteads, believing them to be weeds. Whilst the removal may currently be at a small scale, it is possible that these plants could be cleared from farmlands, and undergo local extinction, as the language and knowledge it portrays have been lost.

Although globalisation, modernisation, and development are often the goals of many governments, they can result in the degradation and destruction of heritage in many areas (Hoekstra, 2010). The role of conservation is not only to mitigate the threats to biodiversity but to support processes which sustain it (Dove *et al*., 2005). Hoekstra, (2010: 63) argues that "modern technologies, lifestyles, cultures and economies are unsustainable because of their distance from nature", this is because any activity which increases the separation of people and nature increases nature's vulnerability (Cronon, 1996 in Dove, 2005). Therefore, it has been argued that conservationists have a responsibility to limit the increase of separation and where possible strengthen the ties of people and their natural environment alongside development (Dove *et al*., 2005). Gomez-Baggethun *et al*. (2010), note that the strict protection in landscapes dominated by cultural landscapes can disrupt the transmission of traditional ecological knowledge if resource users and their practices are excluded from conservation areas. Infield (2001) asserts that promoting the protection and continued availability of natural resources may stimulate both national and local interest in conservation.

Maffi (2005) argues that the maintenance of biological and cultural diversity, where the two are intertwined, cannot be done by a top-down approach, but ultimately this must be done by local communities whose cultures, languages, lands and surrounding natural environments are being threatened. It has been argued that for systematic conservation planning to be effective, integrated habitat management approaches must be used in order to give adequate weight to different uses of landscapes, and adequate planning processes must address ethical issues as well as scientific ones (Sarkar and Illoldi-Rangel, 2010). Gomez-Baggethun *et al*. (2010) note that conservation areas can help to protect traditional ecological knowledge and cultures as well as biodiversity. However, it is not enough to simply take information about traditional cultures and religions and to try to merge them with conservation management approaches. The Cross Cultural Foundation of Uganda (2009), states that it is vital to engage and work with traditional communities and institutions when seeking to incorporate cultural and spiritual values into conservation management.

Due to the inextricable links between culture and conservation, and the importance of SNS to conservation, as well as the joint threats that they face, it has been argued that it is important for conservation to take a more holistic approach in areas with culturally important sites (Maffi, 2005; Infield, 2001; Dove *et al*., 2005; Dudley *et al*., 2005; Sarkar and Illoldi-Rangel, 2010). By incorporating cultural values and ideologies into conservation management, conservation may have more value to local communities and by supporting the protection of cultural heritage; it might be possible to ensure more effective, valuable, and sustainable biodiversity conservation. Therefore, it has been reasoned that, by incorporating local communities and their cultures into existing conservation management, and integrating community conserved areas, such as SNS, into the conservation landscape, this will help to strengthen and better achieve both biodiversity conservation and human-welfare goals (Karanth & Defries, 2010). However, although noted by many organisations, and included within global agendas, Infield (2001) argues that the role of cultural values in increasing local support for conservation has not yet effectively been put into practice in the field.

1.1.4 Measuring biodiversity of sacred natural sites

The value of SNS can be viewed in a number of different ways. To date much of the research on SNS and their contribution to environmental conservation has been based on the levels of biodiversity that they contain. Biodiversity itself can also be valued in different ways,

primarily by the number and variety of species in an SNS, as well as by their contribution to potential ecosystem services. Bowker *et al.* (2013) state that a greater level of biodiversity is needed in order to maintain the multifunctionality of an ecosystem, and therefore its ability to provide ecosystem services. This underlies the viewpoint of basing the value of the biodiversity that an ecosystem contains on its capacity to provide a range of services.

Whilst there have been many studies over the past few decades which have looked at the biodiversity value of SNS using direct measures of the diversity of plants and animals (See Table 1.2), for a number of cultures there are strict rules and regulations associated with their sacred sites which hinder or prevent such measurements. For example, there may be

Table 1.2: Studies which have conducted field surveys in sacred sites

Author	Year	Country	Taxa	Survey Technique
Gadgil and Vartak	1976	India	Plants	Enumeration of present plants
Robertson	1987	Kenya	Plants	Transect and Enumeration
Robertson and Luke	1993	Kenya	Plants	Observation and Enumeration
Decher	1997	Ghana	Rodents and Bats	Mist netting, Mark-recapture
Deb	1997	India	Avifauna	Ground survey – direct sighting
Burgess *et al.*	1998	Kenya	Plants	Ground Survey
Mgumia and Oba	2003	Tanzania	Plants	Quadrats
Anderson *et al.*	2007a	Kenya	Colobus Monkey (*Procolobus rufomitratus*)	Systematic sweep survey
Anderson *et al.*	2007b	Kenya	Colobus Monkey (*Procolobus rufomitratus*)	Line Transect
Das *et al.*	2010	India	Frog: Leptolalax (Anura: Megophryidae)	Ground survey and collection
Kibet	2011	Kenya	Plants	Random nested plot survey

issues regarding how information is recorded. Photography within SNS may not be allowed, therefore preventing camera trapping, or there may be rules as to how plants and animals are treated within the site, preventing collection techniques such as gassing or pitfall traps for measuring insect diversity. Examples of places where photography of sacred places/items is not allowed include, the Temple of the Emerald Buddha in Thailand, in the ancient (and holy) Hopi village First Mesa, Arazona (Gulliford, 2000), certain places in Uluru-Kata Tjuta National Park in Australia (Wild and McLeod, 2008) and within the central clearing (the most sacred part) of Kaya Kauma in Kenya (Shepheard-Walwyn, pers. obs, 2012). In Daocheng, according to the Tibetan cultural taboos, the killing of all animals including insects is not allowed (Wang *et al.*, 2012), therefore, gassing techniques and/or pitfalls would not be allowed, especially within the Sacred Groves (SG).

In addition to limitations on data collection for species, one of the major constraints to performing unbiased and comprehensive surveys is that many SNS contain restricted or no-entry zones. In a number of communities entering certain areas of the SNS is not allowed, either for any individuals, or for particular sets of individuals (Wild & McLeod, 2008). For example: in the Uluru-Kata Tjuta National Park in Australia non-native men are not allowed to enter the Men's sacred site; in the Chewa SG in Malawi only initiated men are allowed to enter outside of times of funerals and ceremonies (Wild & McLeod, 2008); in sacred forests in Androy, Madagascar non-native people are not allowed to enter the forests (Tengö and von Heland, 2011); and in a number of the Mijikenda sacred Kaya forests in Kenya there are areas where non-Mijikenda people and/or people from particular sexes are not allowed to enter (for example men may not enter areas specifically for women). Such limitations to access and entry must be adhered to and respected when working in SNS; however, they prevent the ability to conduct full randomised surveys of a whole site for habitats and many species.

These restrictions limit the type of research that can be conducted, and therefore alternative approaches need to be taken. There are a number of methods which can be used to measure an approximate value for biodiversity of sites. One of the most widely used proxies which is very important in the study of biogeography and is used to support decisions for conservation management is the Species-Area-Relationship (SAR) (Ladle & Whittaker, 2011). The SAR was first described by MacArthur and Wilson (1963) (which they term the Fauna-Area Curve) in the following way: "As the area of sampling A increases in an ecologically

uniform area, the number of plant and animal species *s* increases in an approximately logarithmic manner". MacArthur and Wilson argue that the size of an area can be used to calculate the diversity of plant or animal species. They note that the parameters for the calculation vary among the different taxa, but the efficacy of the model for a range of taxa including land and freshwater birds of Indonesia and the islands of Sahul Shelf in New Guinea was demonstrated. Whilst there are a number of limitations to this concept (such as its oversimplification of the varying processes which influence the number of species in a given area), and there has been huge controversy around its use and application (Triantis *et al*, 2008), it has been researched in great detail and is a commonly used approach for predicting species diversity in conservation research (Gerstner *et al*. 2014).

It has been shown in a number of studies that patch size of reserves, and/or habitats, correlates with species diversity and the survival of particular types of species (Woodroffe & Ginsberg, 1998; Benchimol & Peres, 2013; Berhane *et al*. 2013). For species that have large range sizes, such as large bodied carnivorous mammals and birds, the reduction in habitat area results in an increase in the risk of extinction based on threats associated with ranging beyond their habitat, either due to an inability to survive beyond their habitat, an inability to cope with disturbances which are found at the edge of habitats, or direct conflict with competitors or humans beyond habitat boundaries (Woodroffe & Ginsberg, 1998). In addition to reduced edge-effects at larger sites resulting in potentially greater survival, larger sites also often have greater habitat complexity, are more stable and can support larger populations (Fahrig, 2003; Hill and Curran, 2003). Additional complexity within sites helps to contribute to higher levels of biodiversity, and may provide a number of niche habitats for specialist species. Also, the stability of larger sites and their ability to hold larger populations makes them not only more likely to hold greater biodiversity, but also it is possible that some rare and endangered species may be less vulnerable and have a lower risk of extinction compared to those found within smaller sites (Berhane *et al*, 2013). Since the size of a habitat patch correlates with the number of individuals that it can hold, another factor which needs to be taken into account, when using patch size as a proxy for measuring biodiversity, is minimum viable populations (MVP).

Harcourt (2002) defines a MVP as "a threshold population size below which a species will go extinct". Although attempts have been made to create general MVPs for a range of taxa, it has been argued that single MVPs are not reliable or particularly useful for effective

conservation management planning (Harcourt 2002; Flather *et al.*, 2011). This is because, as noted by Flather *et al.* (2011), many factors affect extinction risk beyond population number, including life-histories of the organism as well as environmental issues such as habitat availability. They state that "populations of equal size will vary greatly in their extinction risk depending on their life histories, long-term population growth rates, habitat quality and current threats". Large bodied-taxa have much bigger MVPs than small-bodied ones (Harcourt, 2002). For example Harcourt (2002) notes that for primates in Indonesia the ranges of MVPs are from 50 (for small primates such as slow loris (*Nycticebus*)) to over 100,000 (for larger bodied primates such as orang-utan (*Pongo*)). However, even though general MVPs across all taxa are not possible, much work has been done on generating MVPs for different taxa and these values can help to inform conservation management of habitats and species. It is also possible to combine habitat size information and MVPs to estimate biodiversity levels in certain areas. If habitat area is known then it is possible to estimate the number of individuals for a given species that the habitat can hold, which can then be compared to the MVP of that species (or taxa if species information is not available) to estimate if that habitat patch can hold a viable population (Harcourt 2002). Therefore it is possible to estimate not only if a species is likely to exist in that patch (based on habitat type), but if a viable population is possible to occur within that area (based on MVP).

Whilst the research on SARs may suggest that large sites are always best for preserving greater levels of biodiversity, this may not be the case. In addition to habitat size, other factors can be taken into account to assess potential biodiversity. If comparing one large site to a small site, it is likely that the large site may hold a greater level of biodiversity; yet, Berhane at al. (2013) argue that if looking at habitat area, a number of small sites are likely to hold more biodiversity then one large site of the same total area. However, it is dependent on the type of biome that a site is found in, as this will have a significant impact on the potential levels of biodiversity when making comparisons between different sites (Gerstner *et al.* 2014). The reason that a number of small sites may contain more biodiversity than one single large one is because they will be spread across a landscape and therefore may cover a greater number of geographic features and habitat types than one single large patch (Berhane *et al.*, 2013). In addition, when referring to SNS, these sites are likely to have existed for hundreds of years, with significantly less disturbance than the surrounding environment, therefore SNS, even when only very small, are often found to hold a greater level of biodiversity than expected, and they have been found to contain rare, endangered and

historical species found nowhere else within the landscape (Githitho, 2003; Bhagwat & Rutte, 2006; Berhane *et al*., 2013). SNS have therefore been noted as biodiversity refuges in degraded landscapes (Githitho, 2003; Bhagwat & Rutte, 2006; Anderson et al., 2007a; Berhane *et al*., 2013).

However, there are a number of issues which may affect the biodiversity within habitat patches. Level of isolation can have an impact on the potential for species richness. Increased isolation can result in decreased levels of biodiversity. This is because there can be greater pressures on isolated patches, which include biological pressures such as reduced levels of recruitment, and anthropogenic pressures such as hunting or encroachment (Benchimol & Peres, 2013; Berhane *et al*. 2013). The level of pressure that a site is undergoing will also have a significant impact on potential biodiversity within patches (Benchimol & Peres, 2013). The use of the areas surrounding sites may also impact species, especially at the boundaries of sites that will directly impact species located at the edge (Lindenmayer and Fischer, 2006; Benchimol & Peres, 2013). Issues such as compression effects may also be seen, especially in areas where sites are actively used by people (either for extractive, or non-extractive purposes). The combination of habitat fragmentation, use of surrounding landscapes, and use within sites may reduce viable habitat within natural sites even further. This therefore would compress species populations into limited space within the sites, and the overall carrying capacity of the site may be reduced (Kelle *et al.*, 2012)

Whilst habitat size is most widely used, it is important to be aware of other factors which have a substantial impact on potential biodiversity, and to take these into account when estimating biodiversity levels. These include geographical features such as elevation, topography; environmental factors including habitat composition and climate; and anthropogenic influences, such as the level of pressure on a site, the level of support that the conservation of a site has from local people, and the ways in which the site is used (for example for cultural practices). All these elements will influence the type and levels of biodiversity within particular sites (Fahrig, 2003; Hill and Curran, 2003; Benchimol & Peres, 2013; Berhane *et al*., 2013).

1.1.5 Role of culture and spirituality in the Millennium Ecosystem Assessment

The connection between culture and spirituality with biodiversity and its associated conservation needs has been highlighted by many organisations and in a number of

international frameworks including the IUCN (Dudley *et al.*, 2005; IUCN, 2008), UNESCO World Heritage Organisation (UNESCO, 2014), Birdlife International (Birdlife International, 2014), Fauna and Flora International (Infield, 2012), The Assisi Declaration (ARC, 1986), the Convention on Biological Diversity (CBD, 2004) and the Millennium Ecosystem Assessment (MEA) (MEA,2005). The MEA was of key importance as it gave a detailed analysis of the benefits to culture and spirituality through biodiversity conservation, as well as the benefits to biodiversity conservation through culture and spirituality. It sought to establish a scientific basis for actions needed to enhance conservation and sustainable use of ecosystems and their contributions to meeting human needs (MEA, 2005).

The MEA (2005: 1 & iv) aimed to "provide an authoritative source of information" and was carried out "to assess the consequences of ecosystem change for human well-being and to analyse options available to enhance the conservation and sustainable use of ecosystems". It looked at biodiversity as a way of fulfilling human needs and noted that "biodiversity and human well-being are inextricably linked" (MEA, 2005: iii). Through its focus that "people are integral parts of ecosystems" and that "dynamic interactions exist between people and other parts of ecosystems, with the changing human condition serving to drive, both directly and indirectly, change in ecosystems", it provides a way of conceptualising biodiversity and people in a way that connects people and nature rather than separating them (MEA, 2005: 1).

The MEA highlights the relationship between culture and biodiversity, that culture is an indirect driver of biodiversity change, and that biodiversity provides cultural services. In addition, it highlights the role that SNS may play in poverty alleviation through improved ecosystem services (ES), access to resources and potential alternative livelihoods, or may exasperate it if the management of such sites involves strict prevention of site use. It also notes that the protection of SNS may provide a possible contribution to international conservation and development agreements. One of the main focuses of the MEA (2005: 1) was to look at potential ES that biodiversity provided, which they defined as the "benefits that people obtain from ecosystems" and the potential direct and indirect drivers that may alter or limit such services. It therefore notes that the preservation of biodiversity is important to the conservation of ES.

The MEA (2005) divides ES into four categories: Promoting Services, Regulating Services, Cultural Services and Supporting Services. Each type of service provides different benefits that contribute to human well-being. Some of the benefits provided by the different services are outlined in Table 1.3. The MEA (2005: 6) notes that the loss of biodiversity is important culturally "because biodiversity has cultural values" and that "people from all walks of life value biodiversity for spiritual, aesthetic, recreational and other cultural reasons". It highlights the fact that due to the connections that people have with biodiversity culturally, the loss of biodiversity can have negative impacts on social relations and lead to the degradation of cultural practices and norms, therefore indicating the importance of biodiversity for social and cultural reasons as well as any utilitarian values.

The interactions between drivers (direct and indirect), and biodiversity loss, are complex and no single conceptual framework covers all these interactions, and even though the MEA provides a good basis for understanding the relationships between culture, spirituality and biodiversity, there are many issues with its interpretation and presentation of these interactions and relationships.

Table 1.3: List of ecosystem services provided by nature according to the MEA

Provisioning Services	Regulating Services	Cultural Services	Supporting services
Food	Regulation of climate	Recreation	Soil formation and retention
Water	Flood prevention	Aesthetic enjoyment	Primary production (photosynthesis)
Timber	Disease control	Knowledge systems	Nutrient cycling
Fibre	Waste control	Sense of place	Water cycling
Wood	Invasive species resistance	Spiritual fulfilment	Production of atmospheric oxygen
Fuel	Water quality (water purification)	Education and inspiration	Provision of habitat
	Herbivory		
	Pollination		
	Seed dispersal		
	Pest regulation		
	Natural hazard protection		
	Erosion regulation		

1.1.6 Issues with the current perspectives of culture in conservation

The first problem with much of the representation of the interactions between culture, belief systems and biodiversity conservation, including within the MEA (2005), is the oversimplification of the relationship and many of the factors associated with it (Sponsel, 2007). Selin (2003) notes that sometimes the current concept of indigenous people can be over-simplistic and idealistic, perceiving them as living in perfect harmony with nature, and warns that this is not accurate or helpful when designing conservation management approaches. In addition, Foley (2003: 45) states that "[t]here is more than just one worldview and interpretation" and the way that people view and interpret the environment is not simple, every perspective contains multiple truths and multiple meanings. It has been argued strongly that past conservation plans could have achieved greater success if local people (and their values and cultures) had been incorporated into conservation programmes (Brncic *et al.*, 2007, Bayliss-Smith *et al.*, 2003, Willis *et al.*, 2004). However, it is important not to underestimate the complexity of the cultures, attitudes and values of local people.

The second major issue with frameworks such as the MEA is the issue of definitions and categorisations (see table 1.3). Whilst at first these classifications seem relatively simple to follow, when put into practice there is overlap between the classifications for certain services. For example if a community believes that a forest is important because it is where they go to pray for rain – is this a cultural or a regulating service? The role within spirituality places it in the cultural realm; however it is done to achieve a regulating service – to get rain.

Beyond the ambiguity of the definitions of how the services are classified are the definitions of some of the services mentioned within the cultural services. For example, 'spiritual fulfilment' is not a clear-cut and obvious concept, nor is 'sense of place' or 'inspiration'. In fact all of the cultural services highlighted are equivocal and open to very broad interpretations. While this is necessary in order to make an international document relevant to all regions, it results in very vague and general terminology open to varied understandings, and therefore making it less relevant in practice and application on the ground. It is not only the cultural and spiritual aspects that have varied definitions. Even terms which people believe they understand have many different interpretations, including 'human wellbeing' and 'environment' (Rapoport, 1982; Greiner & Stanley, 2013). Rapoport (1882: 21) makes the point that "meanings, like the environments that communicate them, are culture specific and hence culturally variable". Therefore, if even common words and phrases have different

meanings for different cultures, it is difficult to understand how more elusive and ambiguous terms associated with cultures and beliefs can be generalised comprehensibly in international documents.

In addition to issues with definitions, there are also problems with how more liberal viewpoints within conservation are taken into account and included within new frameworks and management approaches. Often in the literature the differentiation between 'tangible' and 'intangible' values of ecosystems are synonymous with 'real' and 'imagined' values (Kanowski and Williams, 2009). This division often results in the perception that the tangible values are more legitimate and 'scientific' whilst the intangible values are viewed are less valid, obscure and at worst trivial. Kanowski and Williams (2009) argue that this contrast in perceptions is not helpful and it is fundamentally flawed. They suggest that the so called "imagined values" that indigenous communities have for nature are as real as the tangible benefits and values that people may obtain, and therefore must be taken as seriously when considering the uses of sites that may be managed for conservation.

Unfortunately, there are problems with measurement and quantification when incorporating more metaphysical concepts into conservation. Kanowski and Williams (2009: 344) state that "Spiritual experience has been characterised as 'ineffable', i.e. too great to describe, let alone measure". They note that the "cultural and spiritual significance of forests are much less amenable to quantification or classification, in part because they are deeply subjective"…"it is very challenging to recognise the spiritual and cultural values of forests in ways that are both meaningful for the values represented and that are compatible with assessment systems that emphasise quantification and objectivity" (Kanowski and Williams, 2009: 343 & 344). Therefore, recognising spiritual as well as scientific values of the environment, presents a set of inconsistencies which defy simple resolution (Kanowski and Williams, 2009); however, a solution to these paradoxes is required to achieve effective conservation management which combines science with local cultural and spiritual values.

Along with problems of conceptualisation, definition and incorporation of cultural and spiritual values, is the concept of the community. In many papers and international conventions, such as the MEA, the 'community' is seen as a static, spatially small, homogenous group, who act and think in the same way (Agrawal & Gibson, 1999; Bresnahan 2010). This perception is inaccurate and undermines the internal differences and processes

within communities such as their relationships with external factors, and the variability that comes with development and evolution of cultures (Agrawal & Gibson, 1999). Issues with spatial definitions of communities arise because within one area different communities may exist. An indigenous traditional community may live in the same area as migrants who have moved into the area. Defining a community on location therefore does not allow for the movement of people and the variety within set spatial areas that comes from such processes (Agrawal & Gibson, 1999). Furthermore, viewing communities as static, homogenous groups is based on at best idealistic, and at worst faulty, understandings of communities. As discussed above, communities and their cultures are dynamic and adaptable. They change as the world around them changes, and the individuals within the community change based on personal experiences (Agrawal & Gibson, 1999; Bresnahan, 2010). Therefore viewing communities as static and homogenous is flawed and unhelpful when trying to accurately take culture and values into account in conservation.

1.1.7 Taking account of local attitudes and values in conservation management

So far the literature discussed has focused on allowing for cultural traditions/practices and utilising traditional knowledge and existing management systems. However, the incorporation of cultures is more than this. It is about taking local perspectives, attitudes and values into account and building management programmes based on these. Sheil and Lawrence, (2004: 636) note that "conservation is ultimately not a science but a societal goal… that must include voices other than those of scientists alone".

To date much of the 'values' associated with the environment have been economically based, but it has been argued that, to think that those are the only values is incorrect. There are many values which when "understood, recognised and respected" are of great value to the support of conservation, these include aesthetic, spiritual, cultural, traditional, and a sense of identity (Infield, 2003b). The key to their significance in conservation management is in the understanding, recognition and respect for them and how they will influence the conservation that is being done. Incorporating the attitudes, values and views of local communities can help to improve conservation and make it more relevant to people's needs (Karanth & DeFries, 2010; Sheil and Lawrence, 2004). Working to involve local attitudes and values therefore requires an understanding of them and therefore research into them. Understanding peoples values helps to not only highlight their lifestyles, but also the relationships between their cultures and their natural environment, as well as the

relationship between religion and science and how these relationships are understood by that community (Kanowski and Williams, 2009).

Understanding peoples' cultures, attitudes and values is not only important for understanding how to incorporate them into conservation management plans, but also in helping to understand and predict human behaviours. Behaviour is often explained and/or predicted based on people's attitudes, values and motives (Gagnon Thompson & Barton, 1994; Grob, 1995; St John *et al*. 2010). It is not enough to simply know what people say they will do, often even implicit and not entirely conscious values will influence people's attitudes and therefore affect their behaviour (Grob, 1995). Along with personal values and attitudes of individuals, 'group membership' – who they associate with, where they obtain their cultural norms – will also affect an individual's attitudes and behaviours (Grob, 1995; St John *et al*. 2010). This is because social norms, taboos, and perceptions of how they are viewed by their peers, will affect an individual's attitudes and values, and therefore how they will behave (Grob, 1995; St John *et al*. 2010). So, understanding how the community functions, such as educational systems and religious affiliations, as well as individual personal opinions and values will help to explain attitudes and behaviours.

It is important when looking at attitudes and values to make sure that specific behaviours are being focused on, and the specific attitudes and values associated with those behaviours (St John *et al*. 2010). To date a lot of the work that has been done on attitudes and values in conservation has been very general, but "general attitudes do not successfully predict specific behaviours" (St John *et al*. 2010: 665). It is possible that people may hold a general attitude towards conservation (it is good), or a behaviour (deforestation is bad); however, they may partake in specific activities which contradict these attitudes (cutting wood from local forests for charcoal). This is because there are actors that affect behaviour (Kühl *et al.*, 2009). Therefore when looking at attitudes, values, and behaviours of local communities, it must be done in a focused way looking at more specific actions (St John *et al*. 2010).

Taking account of local attitudes and values will help to understand the issues of local complexity, and develop definitions as they apply to the local community, as well as helping to predict the behaviours of the community. This will lead to better integration of local culture and values into conservation management approaches, and should lead to better and more sustainable protection of biodiversity and cultural heritage.

1.8 Linking together the issues within culture and conservation

In the above sections, I have outlined a number of areas and associated issues within the literature which focus on culture and conservation. Whilst on first reflection, these components may seem disperate, in practice they are all interconnected and impact the way in which conservation is not only discussed within the literature, but how it is achieved. The history of westernised conservation allows us to understand how attutudes of the original western 'conservationists' may underlie much of the conservation that is done today. In addition, it brings to light the similarities and differences between the formal approaches to conservation and intrinsic conservation management that has been practiced by indigenous and traditional communities across the world as part of their cultures.

In this thesis, I examin how different aspects of both more 'formal' westernised conservation approaches, and traditional conservation management are influencing the current conservation of the Mijikenda SNS. I investigate the limitations of both approaches with regards to the preservation of the sites, and discuss how combining the two may be important for their protection. To ground the work within known international frameworks, to investigate their applicability, and to bring to light issues within perspectives and terminologies that are presented in these agendas, a range of data are analysed with reference to the MEA's list of ecosystem services. Modifications for the perspectives and terminology within the MEA framework (and other international frameworks) are then suggested.

Whilst SNS are always important to local cultures, and are often important for biodiversity, it is essential to assess the latter to evaluate if their conservation is of value to the preservation of biodiversity. However, as discussed above, due to their importance to traditional cultures, and the rules and regulations that apply, it is not always possible to use standard biodiversity evaluation techniques. As the SNS studied in this thesis contained culturally sensitive areas, remote approaches to evaluating the potential of the sites for biodiversity were used. Along with assessing the importance of the assessed SNS for local and global biodiversity, this research also provides a standard methodology to compare the potential importance of SNS to biodiversity across Kenya and world wide. Through the mapping and analysis of the SNS for biodiversity, the importance of the interactions of local communities with the SNS is highlighted in this thesis. Therefore there is a significant social component to the research.

In light of the need to understand local attitudes and values towards their own culture and conservation, in this thesis I investigate the attitudes and values of the Mijiieknda and local populations surrounding the SNS. I analyse the complexity of local perceptions, beliefs, attitudes and values, and discuss how the opinions of local people may affect the conservation of both the traditional culture and the SNS. In addition, the complexity of beliefs and values, as well as the contradictions between attitudes and behaviours are highlighted and discussed with reference to their potential impact on conservation of the traditional culture and SNS.

1.2 Mijikenda people of coastal Kenya and their Sacred Forests

1.2.1 Introduction

One key region for biodiversity conservation, where culture and conservation are intertwined is the coastal forests of Kenya. The forests are part of the East African coastal forest ecosystem which is recognised as being one of the main global priority conservation regions (Githitho, 1998, Matiku, 2003, Azeria *et al*., 2007). They are also the location of a number of SG and forests of the Mijikenda. Known as the 'Kaya forests and sacred groves' they are a network of SNS stretching along the entire coast of Kenya which are significant sites to nine of the main tribal groups of the coastal region known collectively as 'The Mijikenda'. The Kayas (Makaya in Swahili) are considered to have played a significant role in the conservation of biodiversity, and it has been argued that the preservation of these sites is inextricably linked to the preservation of the unique and important biodiversity of the region (Githitho, 1998, Matiku, 2003, Githitho, 2003).

1.2.2 Importance of the Kenyan Coastal Forests for global biodiversity conservation

The coastal forests of Kenya are part of the "Zanzibar-Inhambane Regional Mosaic" and are part of the "Eastern Arc and Coastal Forests of Tanzania-Kenya" biodiversity hotspot (Burgess *et al*., 2000; NMK, 2008). They are "a heterogeneous group of isolated evergreen or semi-evergreen closed-canopy forests within sixty kilometres of the Indian Ocean and usually on small hills rising to not more than six hundred metres" (Githitho, 1998). The forests lie on ancient coral reefs which have been exposed due to a drop in sea levels. Therefore the forests beds consist of limestone rocks covered by shallow soils. This has resulted in the tree species found within the coastal forests becoming highly specialised, and due to their uniqueness, they support a number of rare and endemic species (Burgess *et al*., 1998; Metcalfe *et al*., 2010). The coastal forests are home to 782 endemic species within eight

biological groups, which are strictly endemic (Burgess *et al*., 1998) and the coastal forests of Kenya contain a number of these endemic plants and animals as well as some species specifically endemic to the Kenyan coastal forests (Githitho, 1998). The proportion of endemic species found within the coastal forests is high for all species groups (Burgess *et al*., 1998) and these coastal forests contain the highest number of endemic plant and vertebrate species per unit area in the world (Matiku, 2003; Myers *et al*., 2000). Along with being home to many endemic species, the forests contain more than half of Kenya's rare plants. WWF and National Museums of Kenya have also recorded that the coastal forests of Kenya contain a high level of species diversity, especially with regards to the plants found (Githitho, 2003).

The East African coastal forest extends from the South of Somalia, through Kenya down into Mozambique. The stretch of forest within Kenya contributes towards approximately 20% of this biome (Metcalfe *et al*., 2009) and is considered to be highly important to biodiversity conservation globally. The total distance of the East African costal forest that remains is thought to be about 787 km^2 (Younge *et al.*, 2002); however, at present there are no reliable estimates for the current intact contiguous canopies of the forests, or the extent of forest loss over recent history. The forest was once a continuous mosaic of thickets, woodland, bushland, grassland and the unique coastal forest (Anderson *et al*., 2007a); however, it now consists of a number of small remnant patches dotted along the coastline (Githitho, 2003; Metcalfe *et al*., 2010). This reduction in habitat cover is predominantly due to anthropogenic disturbances (Githitho, 2003; Anderson *et al*., 2007a; Metcalfe *et al*., 2010).

The importance of the coastal forests for biodiversity has been observed for over three decades, and specific conservation strategies have been in place since the 1980's. The knowledge and understanding of the significance of these sites, and the importance of their conservation has increased as knowledge of coastal forests systems has grown. A number of detailed species analyses have been conducted in the area and have confirmed the importance of these sites for biodiversity conservation (Matiku, 2003). Along with being highly important for global biodiversity, the forests are also important carbon sinks, and are therefore globally important for climate change mitigation (Matiku, 2003). As with many coastal forests, they also provide a number of ecosystem services at the local, national, and international scales including watershed management, economic value both for resources and as one of Kenya's main tourist destinations and they are likely to provide potentially unexploited pharmaceutical resources (Matiku, 2003).

The effective conservation of coastal forest depends on the protection of non-gazetted and unmanaged forest areas, as well as state protected sites (Matiku, 2003, Metcalfe *et al*., 2010). This is because "critical biodiversity is found outside protected areas", which has been attributed to a combination of both ineffective institutional organisation, and lack of detailed information on Kenya's coatal forest (Matiku, 2003: 12). Although the coastal region has undergone major transformation through development, and is an important centre for tourism, there are still large levels of poverty in the area and the number of people is continuing to rise (Matiku, 2003, Metcalfe *et al*., 2010). It is often the case that in areas of high biodiversity within the tropics, the local population are the poorest with the lowest educational levels (Gupta & Sinha, 2001). The coastal forests are essential to the survival of many local people and provide food through wildlife harvesting and grazing for livestock, timber and fuel wood extraction, and medicinal plants, as well as being important for spiritual and cultural values (Matiku, 2003). As such, the forests are under high levels of pressure, with many threats, including: over-exploitation; over-grazing of livestock; and most importantly unsustainable deforestation (Matiku, 2003; Githitho, 2003; Anderson *et al*., 2007a; Anderson *et al*., 2007b; Metcalfe *et al*., 2010). The threats to the forests are due to a number of factors, in particular: poor planning; poor decision making; ineffective laws; poor institutional organisation; increasing population numbers; poverty; a lack of alternative means of livelihoods; poor regulation of resource use; loss of cultural values and respect; insufficient institutional capacities both at a local and national scale; as well as gaps and weaknesses within the policies in place that are meant to be protecting the sites (Githitho, 2003; Matiku, 2003).

In addition to these problems, increased demand for land for development (including for tourism, such as large hotel developments), agriculture and mining (mainly for minerals, such as titanium, iron ore and lead, as well as stone) has resulted in high levels of deforestation of the forests, and an increase in pollution levels (Matiku, 3003; Anderson *et al*., 2007b). Although necessary for development, mining poses a major threat to the coastal forests, at present there are no penalties for damage to habitats or biodiversity from mining activities and there are no incentives for companies to reforest areas when they leave. This must change if conservation is going to be effective, alongside development in the coastal region (Matiku, 2003). The impact of such activities to some species has already been noted, and it has been shown that forest loss alone is having significant effects on the numbers of primates in the area (Anderson *et al*., 2007b). The loss of forests and resulting damaging effects will

continue to be seen at even greater levels if the destruction is not stopped. Both local and surrounding communities will be left with areas suffering from loss of biodiversity, water regulation, land productivity as well as dealing with extensive soil erosion and increased levels of pollution (Githitho, 2003). This, in turn, will all have negative impacts on biodiversity conservation, national goods and services (which can also have a global impact), in addition it will negatively affect the livelihoods and quality of life of local people and neighbouring communities, especially those most vulnerable such as the very poorest in the areas (Matiku, 2003).

Land tenure is also a major issue and is causing significant obstacles for effective conservation. The Mijikenda Elders are left with the responsibilities of managing the SNS (NMK, 2008); however, the communities do not own the sites, the state does. It is not easy to encourage people to look after land that they do not own, so in order to ensure local communities have significant interests in the conservation of the coastal forests, it is important that they have their ownership of community and private land acknowledged (Matiku, 2003). Along with the social implications, it has been suggested that the coastal forests of Kenya are one of the top concern areas for habitat loss, and if the rate of habitat destruction continues at the existing rate, the loss of biodiversity in the area could be devastating (Brooks *et al.*, 2002). The coastal forests of Kenya have undergone extensive levels of exploitation and destruction, and have been reduced to small patches of forests, which are effectively acting as a series of small island patches of forest. The patches of remaining forest vary in their protection, and range from unprotected sites to nationally protected areas. Of these patches the Mijikenda Kaya forests (protected by local people as SNS), have become important reservoirs for biodiversity along the largely deforested coastal region (Metcalfe *et al.*, 2010, Anderson *et al.*, 2007a).

1.2.3 Kaya Forests

There are over sixty Kaya forest patches (Nyamweru *et al*, 2008) along the coast of Kenya that have been identified in the Districts of Kwale, Mombasa, Kilifi, and Lamu (Figure 1.1).

Figure 1.1: Coastal Districts of Kenya (TFCG, 2006)

Current estimates approximate the amount of Kenya's coastal forest within the SNS from 0.98% (Burgess et al., 1998) to 10% (Githitho, 1998, 2003). However, these calculations are not based on field measurements. They use data on the total areas of the SNS based on anecdotal evidence of the cultural boundaries. The disparity between the studies is due to the number of sites that are included in their estimations. To date there are no estimations based on actual field measurements of the forests within the sites, therefore the true extent is unknown. The sites are known to exist on a range of state owned, public and privately owned land (Githitho, 2003). There are some Kayas and SGs, however, that have not been documented and whose protection status and condition are unknown. These unrecorded sites may contain rare species and are likely to be important for the conservation of biodiversity in the region (Metcalfe *et al.*, 2010).

The history of the Kayas, especially through local accounts, appears to be a mix of both fact and myths. The locations of the Kayas can be clearly explained by local people, and there are often indicators of historic use. The origins of the Kayas, however, are not clear and there is speculation from some archaeological studies that the occupation of the sites can often be

dated back beyond the time identified by local legends (Githitho, 2003). Despite the lack of knowledge about the origins of the Kayas, their continued existence to today is as a result of their importance to the Mijikenda ethnic groups, especially due to their cultural and spiritual values (Githitho, 2003). Many of the Kayas have been preserved as sacred places and burial grounds, led by village and ritual Elders. Kaya means 'home' and the main part of the Kaya forests is the central clearing in the forest which is the metaphorical (and sometimes historically literal) home of the community (Spear, 1978; Githitho, 2003).

It was traditionally thought that the forests surrounding the Kaya homesteads protected the Kayas and their inhabitants (Spear, 1978). It was believed that if the forest was destroyed or cleared the Kaya (homestead) would perish. Nowadays, Kaya forests that have been cut down lose their cultural and spiritual significance. This was seen for example at sites in Kwale District (Figure 1.2), which were cut down by colonial administrations (Khalil *et al*., 1992). Today, the word Kaya is used to refer to the sacred forests surrounding where the original homesteads once were, and the area where the homesteads were located is known as the central clearing. Whilst both "Kaya" and "Kaya forests" are often used interchangeably, normally "Kaya" refers to the whole area (including the forest, the central clearing, and all the sacred places within), whereas "Kaya forest" refers to just the surrounding forest.

The Kaya forests are now believed to protect the ancestral spirits of the Mijikenda people, and they are still held sacred (Nyamweru *et al*, 2008). Different Kayas have different spiritual and cultural associations. In a number of Kayas, a talisman, known as a Fingo (considered to be a powerful protector), is buried in the central clearing of the Kaya. Burial grounds are also associated with the central clearings and many generations of the community may be buried within the clearing; however, there are often also specific burial grounds within the forest away from the central clearing. The ancestral spirits are considered to live within the heart of the Kaya in the central clearing. Great leaders were often kept separate from other burial grounds and these sites are also considered to be sacred and act as shrines. In some Kayas, distinct land formations, such as caves or rivers, and old trees can also have ritual and spiritual importance (Githitho, 2003).

In addition to the main Kayas, there are also a number of SG, caves, rivers and springs in the area. The cultural, spiritual and social associations assigned to these forests and other sites have led to their protection. By protecting the sites for their spiritual and cultural values this
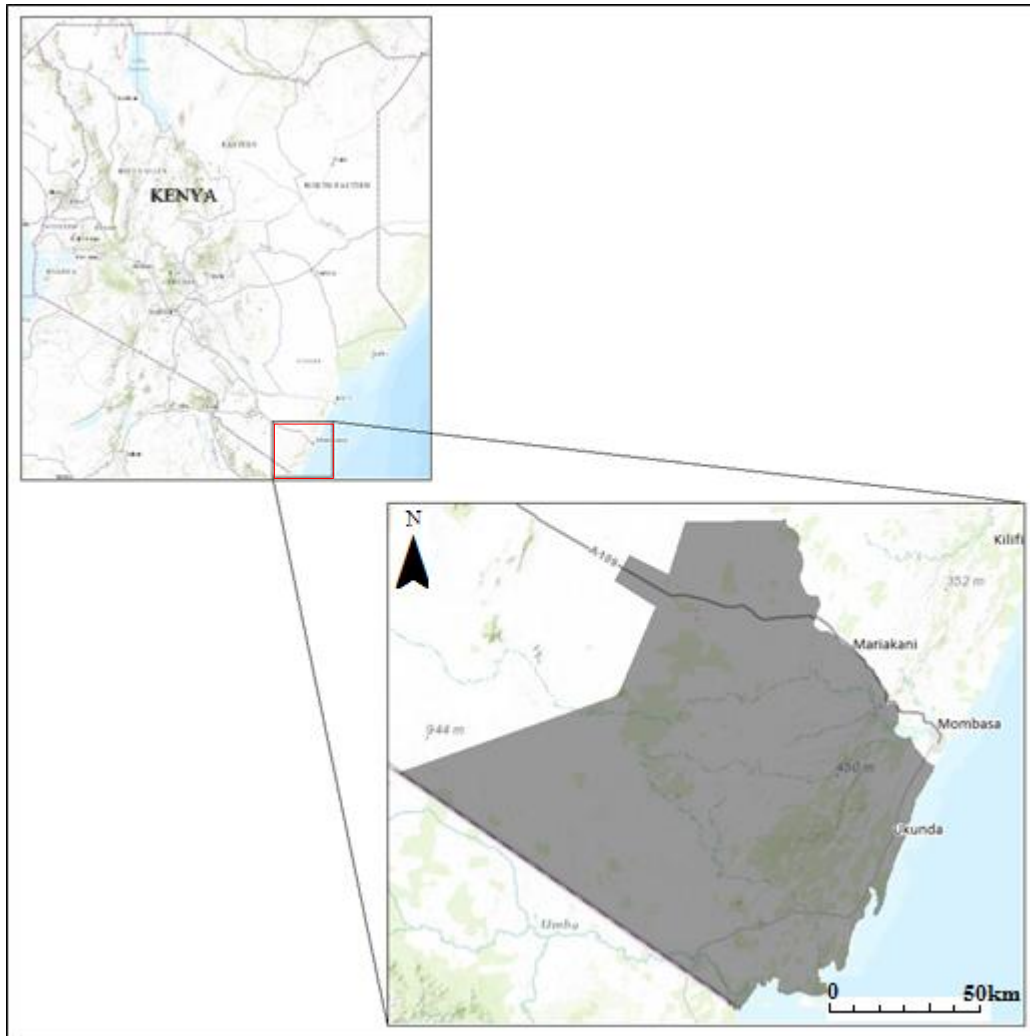
Figure 1.2: Kwale location (map developed from Google Earth in ArcGIS)

has also led to the conservation of the habitats and species they contain (Githitho, 2003, Metcalfe *et al.*, 2010). The Mijikenda SNS, including non-gazetted sites, play a significant role in the conservation of Kenya's costal biodiversity (Metcalfe *et al.*, 2010). Whilst not created for the protection of biodiversity, it has been argued that in some areas, SNS like those of the Mijikenda, may be better protected, and hence more effectively conserve the biodiversity they contain, than formally protected areas (Dudley *et al.*, 2010; Metcalfe *et al.*, 2010).

The primary objective of traditional management of SNS is to maintain their separation and sanctity, including the control of use of the sites (Verschuuren *et al.*, 2010). The traditional local management of the Kayas and other SNS conform to this; control includes the prevention of the use of undefined routes into the Kayas, which may result in the trampling

of vegetation or the disturbance of secret sites; prevention of the removal of, or destruction of vegetation, especially the cutting down of trees which is strictly forbidden; and under no circumstances is blood to be shed within the Kayas (Githitho, 2003). Respect for living organisms, especially uncommon animals or large snakes is expected within the Kayas, and if people came across such animals they are to be left alone. The control of the Kayas is obtained through the social norms and rules of society as well as strong spiritual beliefs, and is enforced by Kaya Elders. Access to the sites was open to all members of the communities, including women and children. However, there are restricted sites within a number of the SNS. People are allowed to visit the sites for personal contemplation, reflection and worship, or they can be visited under the guidance of Elders for rituals and ceremonies (Githitho, 2003).

The rules associated with these sites have resulted in the preservation of their associated biodiversity. For example, the Three Sister Cave complex in the Kwale District which is culturally and historically important has been protected by the local people and has become a reservoir for biodiversity, and contains a high number of rare species (Metcalfe *et al.*, 2010). However, these rules require an adherence to, and respect for the social and cultural norms and practices, which normally requires a single common cultural identity and a community who share the same values, experiences, belief systems and an acceptance for the authority of religious systems and specific figures within the community (Githitho, 2003). Githitho (2003) argues that, due to an increase in alternative cultures, and as a result of changes in society and economic circumstances, there has been a loss in traditional knowledge, adherence to, and understanding of traditional values of the Mijikenda sacred sites.

Although they are still used for rituals and ceremonies, in some ways, the Kayas themselves became "cultural museums" from the time the Mijikenda society shifted away from their residential unity (Spear, 1978: 45). Along with the changes in cultural values, more formal approaches to education have been put in place across Kenya (Githitho, 2003; Otanga and Nyandusi, 2010, Government of Kenya, 2013). There has also been a greater government emphasis on the move away from perceived witchcraft and traditional practices, which in turn may have also led to a decrease in respect for elders and a loss of respect and knowledge of local cultures (Githitho, 1998; Matiku, 2003; Githitho, 2003). The SNS are also suffering from similar threats to those facing the other patches of coastal forests, such as increased

pressure from larger human populations, timber extraction, clearing for agriculture, mining and development, and increased levels of pollution (Githitho, 2003; Anderson *et al.*, 2007; Metcalfe *et al.*, 2010).

The loss of cultural values and respect is associated with a loss of knowledge of local culture. This is due to the changes in how the communities function, with children going to state-run schools, elders no longer being the respected leaders they once were. The cohesion within the society and the respect for values and traditional social norms has been degraded, resulting in only a small number of individuals holding the knowledge and a reduction in the cultural values and practices (Wanza & Njuguna, 2012). As noted by Wanza and Njuguna (2012) this "[l]ack of traditional, cultural and spiritual knowledge of the importance of the Kayas has… led to poor management of the forests" and in some cases has resulted in their complete degradation.

In the areas where Kayas are found there are also high levels of poverty, with local communities who live at subsistence levels and are struggling to meet their basic needs (Nyamweru, 1997; Githitho, 2003; Matiku, 2003; Nyamweru et al., 2008; SID, 2014). These people must use the resources from the local forests and Kayas for their survival (Githitho, 2003; Matiku, 2003). However, the current infrastructure does not allow these people to use the resources from the SNS legally. Therefore the use is unmanaged and is contributing to the unsustainable extraction of forest products (Matiku, 2003). These threats are resulting in significant levels of destruction of the already small patches of sacred forests, and are damaging both the biodiversity, and the culture in the region; for example Kaya Chonyi, which is an important SNS for the Chonyi Mijikenda group, has been reduced to at least a fifth of its original size due to local agricultural encroachment. The Digo Kayas, which are situated along the beaches in Kwale District, have been greatly reduced and damaged due to planned settlement schemes and intensive development of large hotel complexes (Githitho, 2003).

The literature highlights the importance of these forest patches for both culture and conservation; however, the threats they face, such as encroachment, habitat degradation, loss of cultural knowledge, decrease in adherence to cultural practices, and competition for land use, are increasing in both number and scale (Githitho, 1998; Githitho, 2003; Matiku, 2003; Anderson *et al.*, 2007; Metcalfe *et al.*, 2010; Wanza & Njuguna, 2012). In light of this

knowledge, it is imperative that a compromise is found which allows for the survival of the Mijikenda people, their culture, and the forests themselves (including the biodiversity they contain).

1.2.4 Biodiversity of the Kayas

There have been a number of studies that have looked at the biodiversity of the Mijikenda Kayas. The most comprehensive set of studies were two reports commissioned by the National Museums of Kenya conducted in 1986 and 1988 by Anne Robertson and Quentin Luke. The studies were a set of comprehensive floristic surveys of the SNS, which sought to document the presence of floristic species within the SNS. Since then the majority of the research on the SNS has been small projects focused on between one and three sites, or have focused on a limited number of taxa. In addition to much of the research being on a small scale, all of the projects faced the same difficulties. There are sections of some of the Kayas where it is not permitted to enter, either by any individual, or by those who are not specific members of the community. It has been shown that the SNS contain a substantial amount of biodiversity, including rare and endemic species and that they provide refuges for biodiversity in largely altered, anthropogenic landscapes (see Table 1.4). As the SNS all exist within the same biome of the Zanzibar-Inhambane Regional Mosaic, the potential for species diversity within them is similar (Gerstner *et al.*, 2014). Therefore to measure the difference in potential biodiversity of different sites it would be possible to look at the species-area-relationship (SAR), taking into account site isolation and potential pressure on the sites. These measures may give a useful estimate of the possible levels of biodiversity across different sites and therefore would allow for an estimate of the importance of each site for biodiversity conservation in the region.

Table 1.4: Studies on the flora and fauna of the Kaya forests

Author	Year	Sacred Site	North or South Coast	Taxa
Robertson	1987	Multiple	North and South	Plants
Robertson and Luke	1993	Multiple	North and South	Plants
Burgess *et al.*	1998	Multiple	North and South	Plants
Burgess and Clarke	2000	Multiple	North and South	Plants and Fauna
Lehmann and Kioko	2005	Kaya Muhaka	South	Lepidoptera
Anderson *et al.*	2007a	Multiple	South	Colobus Monkey (*Procolobus rufomitratus*)
Anderson *et al.*	2007b	Multiple	South	Colobus Monkey (*Procolobus rufomitratus*)
Lehmann	2008	Kaya Diani and Kaya Muhaka	South	Lepidoptera
Metcalfe *et al.*	2010	Three Sisters Cave Complex	South	Flora and Fauna
Kibet	2011	Kaya Mudzimuvia	North	Plants
Malonza and Bauer	2014	Kaya Mirima, Kaya Kinondo and Kaya Jibana	North and South	Herptiles

1.2.5 Culture of the Mijikenda people

The Mijikenda consist of nine tribal groups: Chonyi, Digo, Duruma, Giriama, Jibana, Kambe, Kauma, Rabai, Ribe (Spear, 1978; Githitho, 1998; Nyamweru *et al*, 2008). The Mijikenda are a set of tribal people found on the coast of Kenya along with, but different from other tribes along the coast such as the Taita, Pokomo, Waata, and others (see table 1.5). The Mijikenda people settled along the coast of Kenya, after migrating south in the 16th Century. This story of migration, although contested by some researchers (Morton, 1972, 1977; Walsh, 1992; Helm, 2004; Nyamweru *et al*, 2008), is central to the cultural identity of the Mijikenda. It is based on the legend that all the Mijikenda peoples have a single origin, a place called "Singwaya" in Southern Somalia. "The major institutions of Mijikenda life... derive their legitimacy from their Singwaya origins" (Spear, 1978: 17). The people who are now known as the Mijikenda chose this name in the 1940s which means "The nine tribes" to replace Nyika, the name previously given to them by the Swahili, which means 'bush' (Spear, 1978).

Table 1.5: Tribal groups of Coastal Kenya
The information from this table is adapted from information obtained from Enzi Museum (2015); Joshua Project (2015) and Jenkins (2015)

Tribal Group	Mijikenda	Language	Language Origin	Location Origin	Current Coastal Location (District)	Population
Aweer	No	Aweer	Randille-Boni	Lamu,Kenya	Lamu	7,602
Borana	No	Borana	Oromo	Ethiopia	Tana	161,399
Chonyi	Yes	Kichonyi	Bantu	Singwaya, Somalia	Kilifi	148,806
Dahalo	No	Dahalo	Southern Cushitic	South-West Ethiopia	Lamu/Tana	2,398
Digo	Yes	Kidigo	Bantu	Singwaya, Somalia	Kwale	313,288
Duruma	Yes	Kiduruma	Bantu	Singwaya, Somalia	Kwale/ Mombasa	396,667
Giriama	Yes	Kigiriama	Bantu	Singwaya, Somalia	Kilifi	751,531
Jibana	Yes	Kijibana	Bantu	Singwaya, Somalia	Kilifi	35,216
Kambe	Yes	Kikambe	Bantu	Singwaya, Somalia	Kilifi	28,000
Kauma	Yes	Kikauma	Bantu	Singwaya, Somalia	Kilifi	25,851
Malakote/ Ilwana	No	Malakote / Ilwana	Bantu	Somalia (unknown specific location)J	Tana	16,803
Orma	No	Orma	Oromo	Galla, Ethiopia	Tana/Lamu	66,275
Pokomo	No	Kipfokomo	Bantu	Singwaya, Somalia	Tana	94,965
Rabai	Yes	Kirabai	Bantu	Singwaya, Somalia	Kilifi	110,000J
Ribe	Yes	Kiribe	Bantu	Singwaya, Somalia	Kilifi	16,000J
Swahili (group not tribe)	No	Kiswahili	Bantu	Multiple regions	All Coastal Districts	112,000
Taita	No	Dawida	Bantu	Singwaya, Somalia	Taita	312,000
Taveta	No	Taveta	Bantu	Usambara, Kenya	Taveta	20,828
Wataa	No	Wataa	Oromo	Laa/Taita Hills, Kenya	Lamu/Tana	12,582+

The understanding of the commonality within the Mijikenda is not that they are one people "The Mijikenda", but that the historical legend that they come from one place provides a shared identity that is embedded in their culture (Spear, 1978).

Mijikenda is the most general form of identity, but originally the most common form of identity would have been based upon the Kaya which a person belongs to (Spear, 1978). The Kaya refers to the original homestead of the Mijikenda people, on their migration south from 'Singwaya' the different Mijikenda groups created clearings in the forests where they settled. These villages were hidden within the forests to protect the people from other tribes in the area (Spear, 1978; Githitho, 1998; Nyamweru *et al*, 2008). The Kaya an individual is from is originally based on the clan (or sub-clan) that an individual is born into. Usually an individual would take the clan that their father belongs to, and therefore the Kaya which that clan belongs to (Spear, 1978).

The traditional Mijikenda tribes can be divided into groups, either according to their language, location, or cultural traditions.
1. When divided by language they group as follows:
   A) Rabai, Ribe, Jibana, Kauma, Kambe, Chonyi, Giriama
   B) Duruma
   C) Digo

2. When divided by the location of the tribes (Figure 1.3) they can be separated into two groups:
Northern: Rabai, Ribe, Jibana, Kauma, Kambe, Chonyi, Giriama
Southern: Digo, Duruma
When divided by cultural divisions, this predominantly coincides with their location.

3. When divided by culture they group as follows:
Northern: Kauma, Giriama, Chonyi, Jibana, Kambe, Ribe
Central: Rabai and Duruma
Southern: Digo – they are very different from the Northern group. The Digo are not a single group of people, but there are about 4-5 groups of Digo, who are divided between the two main Digo Kayas: Kwale and Kinondo (Spear, 1978).
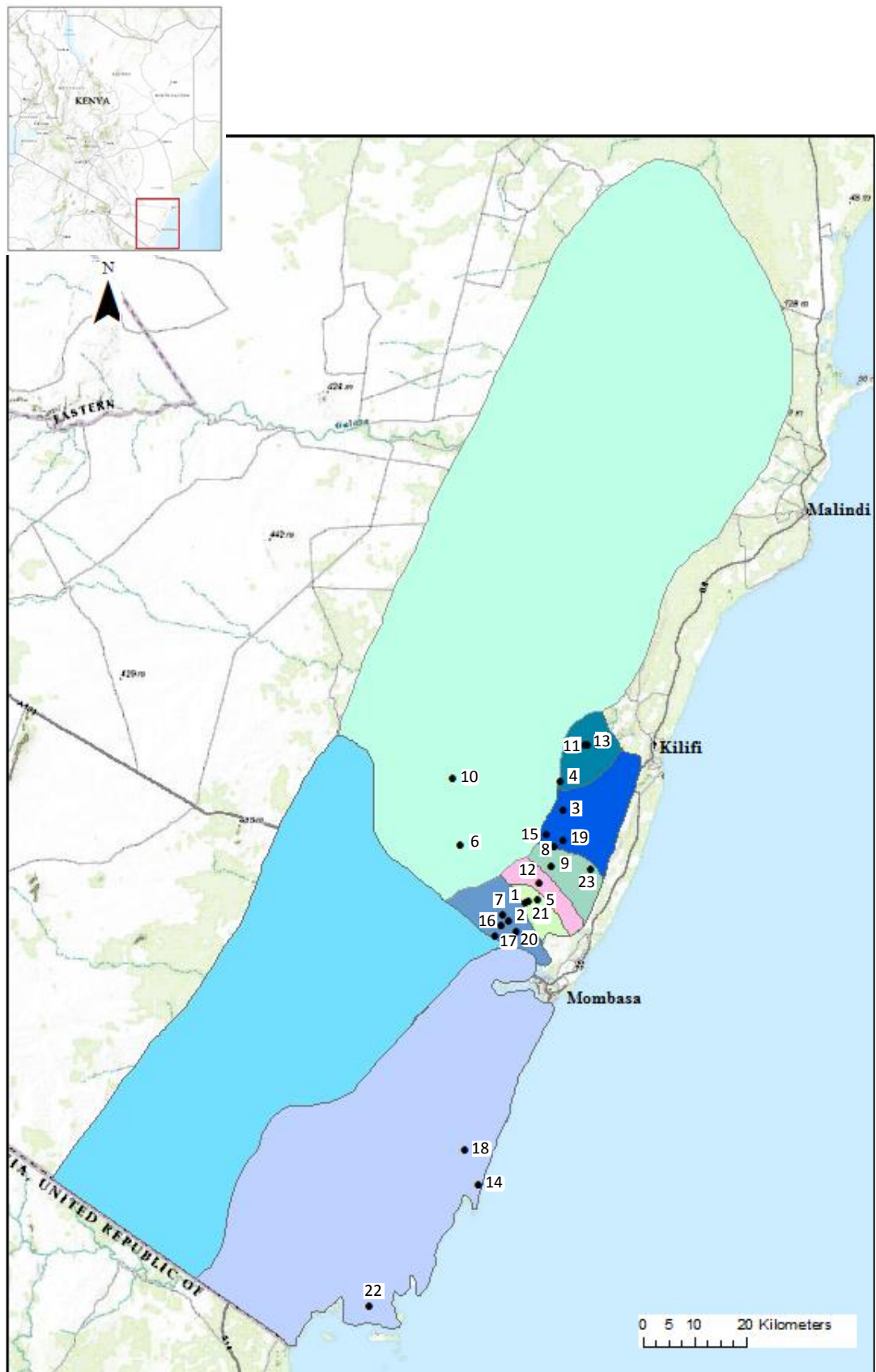
Figure 1.3: Distribution of Mijikenda Tribes and SS (Developed from Udvardy *et al.*, 2008)

Chonyi: ◼ Digo: ◼ Duruma: ◼ Giriama: ◼ Jibana: ◼ Kambe: ◼ Kauma: ◼ Ribe: ◼ Rabai: ◼

SS: 1:Bedida; 2:Bomu; 3:Chasimba; 4:Chivara; 5:Chizani; 6:Chonyi; 7:Fimboni; 8:Fungo; 9:Jibana;
10: Jorore; 11:Kambe-Kauma; 12:Kambe; 13:Kauma; 14:Kinondo; 15:Kizingo; 16:Mudzimuvia;
17:Mudzimwiru; 18:Muhaka; 19:Mwarakaya: 20:Mzizima; 21:Ribe; 22:Three Sisters; 23:Tsolokero

There is a range of traditions across the tribes, some central core traditions which are related to and shared by all Mijikenda people and relate to a shared common history, and then there are separate 'private' traditions which are specific to different clans and sub-clans. Often these individual traditions and rituals were considered to be the most valuable because of the detail and variation within these practices (Spear, 1978). The core traditions were important themselves for the purpose of preserving harmony and unity within the Mijikenda, whereas the individual clan and sub-clan traditions prospered in the diversity and the opportunity to emphasise the distinctiveness and interests of that particular group (Spear, 1978). One of the main traditions of the Mijikenda originally was the formation of age-sets known as "Rikas". The process of forming age-sets was common amongst all the Mijikenda, except the Digo, whose generations were split into two sets – Mweria and Mugwa. For all other Mijikenda tribal groups every 4 years uninitiated boys were circumcised and placed into a sub-rika, once 13 such sub-rikas had been formed they were initiated into the next "Rika". These initation ceremonies took place in the Kayas. The Rika went through childhood, adolescence and adulthood as a group. The senior 3 sub-rikas were the senior elders and ruled for 12 years, then they were succeeded by the following 2 sub-rikas who rules for 8 years and this continued in pairs until all 13 sub-rikas had ruled as senior elders (Spear, 1978).

Each kaya initiated its own rikas, but the ceremonies were held at the same time throughout all the Mijikenda (Spear, 1978). The initiation process involved dances. Initiation for boys meant that they would be able to partake in ceremonies and rituals that no one else was allowed to. For example, only initiated men were allowed to attend ceremonies where the mwana m'kulu drum (a sacred drum) was played. The final stage of initiation was the Kiaro, which was the initiation of men as Elders. It was the most important initiation dance, as during this ceremony important customary knowledge and rituals were passed onto incoming elders. Once inducted the men wore coloured cloth bound with a red belt, carried a long forked staff, and a leather medicine bag (these items denoted their status). It is believed that the last age set to have been initiated was around the period of 1870 (Spear, 1978). Due to the loss of some traditions and practices, such as the age sets, some of the detail and knowledge of the Mijikenda and their culture is also thought to have been lost, as it was only passed on during these ceremonies. Other common ceremonies include rain ceremonies, and whilst all tribal groups conduct rain making ceremonies, the Chonyi were renowned rain makers amongst the Mijikenda. Other ceremonies, such as cleansing

ceremonies, required the sacrifice of livestock, consumption of ritual meals, and drinking of palm wine (Spear, 1978).

The Kayas gained their cultural and spiritual significance through the main ritual symbol the "Fingo" which was buried within the Kayas. The Fingo was buried within a small un-cleared circle of forest in the centre of each Kaya. This was a spiritual talisman which was said to have been bought with the Mijikenda people from Singwaya. It was said to have magical properties and helped to protect the Mijikenda people. The Fingo ranged from a pot filled with medicine to figurines (Spear, 1978). The historical centre of the Mijikenda on the Kenyan coast exists along the ridge which extends from the Shimba Hills to the Kilifi creek (Spear, 1978). The Mijikenda originally settled in six hilltop Kayas, and subsequently three more were built leading to the nine main Kayas found today. Today, the Mijikenda and their SNS are found from the south coast around the Shimoni region, to the Lamu District in the North (Githitho, 2003; Nyamweru *et al*, 2008). The original Kayas would have been home to 1500 – 2000 people and the cultivation on the lower slopes would feed those in the Kaya. Trade was very low and often only in relation to obtaining items required for rituals, or during periods of famine (Spear, 1978).

The period between the late 19th and early 20th century resulted in significant change for all of the different tribes within the Mijikenda. Over this period the social structure within Mijikenda societies, the relationships within the communities, and the meanings of the sacred sites altered. These changes occurred for a number of reasons including: expansion due to trade; emigration out of the Kayas; loss of land to, and suppression by, the colonial English; increase in poverty levels; and local power struggles (Spear, 1978; Bresnahan, 2010). Trade affected the balance of power and the very structure of the Mijikenda hierarchy. Young men amassed large levels of personal wealth and began to contest the elders. The daily actions and decisions were no longer all controlled by the Kaya elders. Although the elders may return to the Kayas for rituals and significant matters, the general activities and decisions were now in the control of the head of the homestead (often individuals who had become wealthy through trade) (Spear, 1972). As people moved away from the Kayas, the organisation, local institutions and rituals also began to decline, and as people dispersed at different times into different areas, this also lead to the decrease in the significance of the 'clan' which had originally been a central part of Mijikenda society. People stopped identifying so strongly with their clan, but instead began to do so with their sub-clan in the

more dispersed settlements of the Mijikenda. The sub-clan now retained the role in regulating social interactions, relations and in more densely settled areas, it also took on the new role of determining land holding groups via the virtue of those who had cleared the land first. Today, sub-clans are inextricably linked to the Kaya, and the sub-clan is the determining factor which dictates which Kaya an individual belongs to (Spear, 1972).

The alteration of Mijikenda society through trade and dispersal led to the development of new norms and practices. However "Kaya membership continued to define ethnicity", but this membership was no longer locationally/residentially defined, but is done so according to lineage and descent (Spear, 1972: 122). Following independence (December 12th 1963), many parents saw the possibilities of an education and enrolled their children in both Islamic and Christian schools. Although originally unpopular due to association with the colonial era, today a number of Mijikenda have also converted to Christianity and Islam (Nyamweru *et al*, 2008). This conversion is thought to be predominantly a result of increased numbers of children attending religious schools which have been built in the region. The incentive for better education and greater opportunities is taken advantage of by mainstream faiths, and through schooling they are able to convert greater numbers of individuals (Personal communication: Chiro, 2011). "Today the Mijikenda are more numerous and more diverse than ever" (Zeleza, 1995: 56-57). The different societies are very dynamic and are influenced by not only the changes in their own society, but changes within Kenya in general (Zeleza, 1995; Bresnahan, 2010). It appears that still today "[t]he Mijikenda struggle to balance the demands of modernisation and traditional culture", and this results in a very dynamic and heterogeneous society, within which even lone individuals experience the conflict of ideals between development and tradition (Zeleza, 1995: 57).

1.2.6 Conservation and Culture in Coastal Kenya

The conservation of the coastal forests is split between a number of organisations. There are three governmental organisations: Kenya Wildlife Service (KWS), Kenya Forestry Service (KFS) and National Museums of Kenya (NMK); and a number of national and international non-governmental organisations (NGOs). The different governmental organisations are responsible for different aspects of conservation; however, all overlap in their conservation of the coastal forests. KWS is responsible for the conservation of wildlife of Kenya; NMK are responsible for the conservation and management of national heritage; and KFS are responsible for the conservation and management of Kenya's forests (Matiku, 2003).

Responsibility for the conservation of the coastal forests is therefore theoretically three-fold. However, rather than resulting in highly effective and strong conservation management and legislation, the alternative approaches and different priorities results in confusion, conflict between departments and poor conservation management of the coastal forests (Matiku, 2003). To date the different organisations have each had some success in trying to conserve the coastal forests, for example KFS has forest reserves in the Shimba Hills and the Arabuko Sokoke Forest, KWS which has more funding and better trained staff is involved in a number of conservation projects in coastal forest, and NMK has managed to get a number of sites recognised as World heritage sites and been involved in research into the social and biodiversity aspects of the forests (Matiku, 2003; NMK 2008).

Forty of the known Kaya forests have been officially recognised under Kenya's Antiquities and Monuments Act, and 11 as World Heritage sites. In 1992 the Coastal Forest Conservation Unit (CFCU) was set up (as a branch of the NMK), with the responsibility of caring for and protecting the Kaya forests in partnership with the local communities (Githitho, 2003). Under Articles 4 and 5, the classification of sites as WH sites is supposed to engage the global community to help provide scientific, technical, financial and artistic support for their protection (Kamel *et al*. 2009). However, with the continued rate of degradation, it is clear the Kayas are not getting enough support.

The local communities protected the SNS for their cultural values, and still thought to value them in this way, therefore it is important to work with them, and incorporate these cultural values into their management, to ensure they retain their value to the local community, so that their conservation continues to be important to them (Githitho, 1998). Although in recent years a number of the Kayas have been brought under the safeguard of national laws, due to weakness in the implementation and difficulties in the enforcement of these laws and associated penalties, it has not provided the level of security that state protection implies (Githitho, 1998). The conservation of the SNS requires a successful partnership between local people and external bodies. Currently the local people lack the means they require in order to be able to cope with the threats that the Kayas face in the present day (Githitho, 1998).

It has been observed that the current control of the sites (under both local and state management), is not as effective as it needs to be for the successful protection of the Kayas. The penalties for deforestation and destruction of the Kayas are not considered to be

particularly strong deterrents, and they are often not enforced. It has been argued that in order to protect the SNSs and the coastal forests in general, tighter laws concerning the use and destruction of these sites need to be put into place, and resources need to be provided so that it is possible to enforce the laws and associated penalties (Githitho, 2003). However, such laws and penalties may directly conflict with the cultures, values and needs of the local people. Therefore there needs to be greater understanding of the local knowledge, values and resource needs, as well as better institutional organisation with regards to the management of coastal forest conservation (Githitho, 1998, Matiku, 2003).

1.2.7 Issues within the existing literature on the conservation of the Mijikenda SNS

There are many issues with the existing literature on the Mijikenda SNS. Much of the ecological and social information is based on out-dated literature and studies. The last ecological study which covered a large number of the sites was done in the early 1990s and the last social analysis was conducted on one community in 1997. Whilst this literature is valuable and provides useful information for understanding the background to this region, data which are in excess of 17 years old are not reliable enough to provide foundations for contemporary management plans because of the many social, cultural and ecological changes that have occurred in this time.

In addition to being based on outdated information, it appears that the conservation management does not reflect the complexity of the Mijikenda communities and "assumes that the Mijikenda associate homogenous beliefs and cultural values to the forests" (Bresnahan, 2010: 119). The literature suggests that the attitudes and values associated with the Kayas as well as how people use them varies considerably within and across the different Mijikenda communities; however, the conservation management does not seem to reflect this. Whilst it has been noted that the attitudes and values of local people need to be taken into account in the management of the SNS, and that management needs to reflect the traditional systems that helped to protected them to date, these two things are not necessarily as cohesive as implied.

There are some SNS which fall within national forest reserves, such as Kaya Kwale in Shimba Hills National Reserve (Spear, 1974), these sites are protected by the guards which are responsible for the protection of the reserve. However beyond the reserves, the SNS which are protected as national monuments, or have no formal protection status under national

laws, are primarily managed according to traditional laws. It is stated in the Nomination dossier for the World Heritage convention that the protection of the Kayas is based on traditional rules and punishments and that "[m]ore often the local villagers will accept this action" (NMK, 2008: 80). This therefore implies that the local people are aware of the traditional rules, and that people will follow them. This is based on the assumption that customary regulations, taboos and practices are followed due to a "longstanding association between the local communities and the nominated sites" (NMK, 2008: 2).

Whilst in theory this management practice reflects the current thinking in the conservation of SNS, in that the protection should be managed by local people according to local values and practices, unfortunately this does not reflect the heterogeneity in the communities and their attitudes and values. The current conservation management approach is based upon a "simplified and uniform narrative… overemphasizing a singular tradition" and which portrays an image "of continuity and uniformity" which is unrealistic and does not take into account the variation and dynamics within the existing Mijikenda communities (Bresnahan, 2010: 138).

In order for conservation management to work, it should not be based on out-dated information and a naïve and idealistic vision of a homogenous "Mijikenda community" who all follow the traditional practices and adhere to a single set of cultural norms and practices. Instead it needs to be grounded by up-to-date information, and acknowledge and understand the diversity of attitudes, values and needs within and across all the different communities in the Mijikenda. The management plan must incorporate both the traditional and contemporary values of the different Mijikenda communities and achieve conservation in line with these without undermining the sanctity of the sites.

1.3 Project Aims and Objectives

This research aims to investigate the current ecological importance of a number of Mijikenda SNS to local and potentially international biodiversity conservation. It will look at the size of the sites and the contribution that they make to habitat diversity and the potential this has for local biodiversity conservation. It will then go on to investigate the social aspects of the sites, examining the current attitudes, values and behaviours associated with the sites, and whether or not this varies from the literature. This thesis will then seek to outline the impact that any changes may have on the conservation of the sites based on the existing

management approaches, and will suggest alternative approaches to achieve more efficient and sustainable conservation of the biodiversity and cultural heritage of the sites.

1.4 Research Questions

1. Is the conservation of the Mijikenda SNS on Kenya's north coast important for the conservation of biodiversity? (Chapter 3)

2. Are the Mijikenda one homogenous group with similar demographies, attitudes, values and perceptions (in reference to traditional customs) as is suggested in the management plan for the SNS? (Chapter 4)

3. Is the way in which contemporary local communities think about and behave towards the Kayas different from what would be expected compared to traditional customs?- If so how does this affect conservation of the SNS? (Chapter 5)

4. Is there a difference across demographic groups as to which individuals perceive themselves as 'users' of the SNS (and does this differ from what would be expected traditionally)? If so when do they claim to use the sites, and how might this impact the conservation of the sites? (Chapter 6)

5. What is the use of plants and animals from the Kayas, does it differ across demographic groups, and how might it impact conservation of the SNS and the species they contain? (Chapter 7)

6. What is the perceived correlation between culture and conservation amongst the Mijikenda, and how might the relationship between cultural knowledge and conservation, as well as attitudes towards conservation approaches affect the management and protection of the Mijikenda SNS? (Chapter 8)

For information on how chapters interrelate, see Figure 1.4.
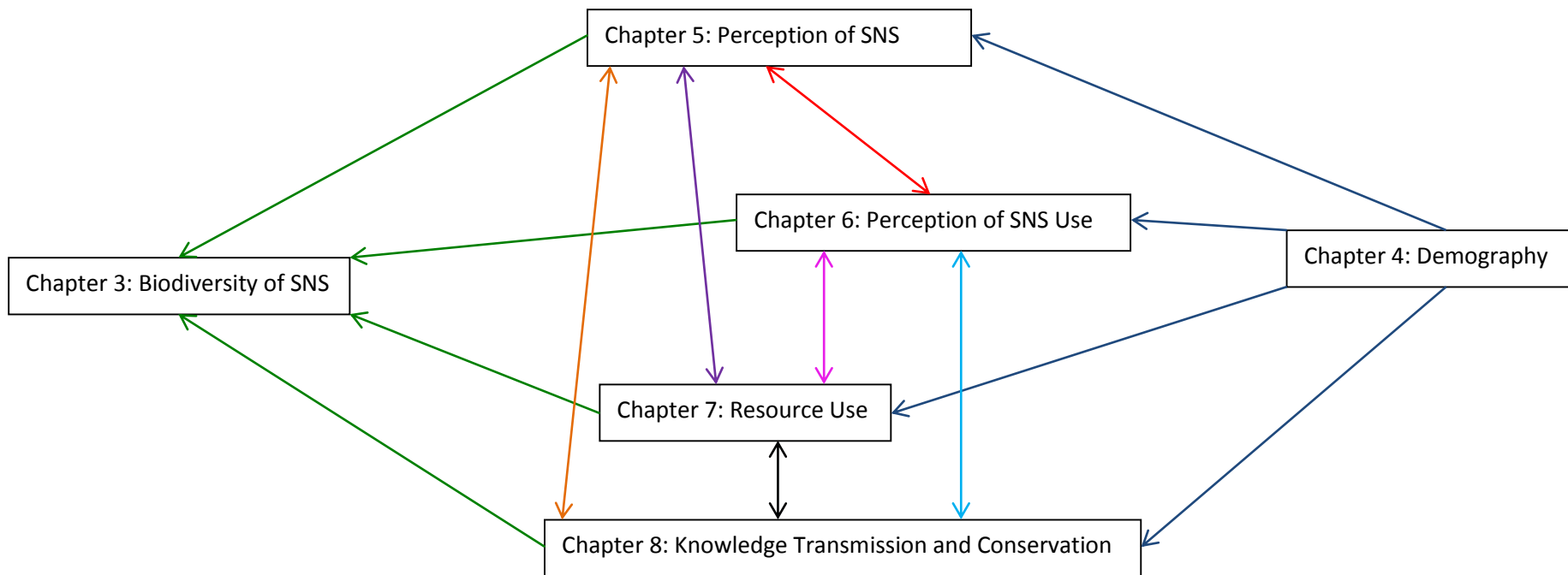
Figure 1.4: Relationships between data chapters

Arrows show the links between chapters. **Green** show that responses given in this chapter were analysed to understand how they may impact the biodiversity, the conservation and/or the management of the SNS; **Dark blue** indicates that demographic factors were used to analyse the information in the chapters to further understand the trends in the data according to different groups of respondents; **Orange** indicates the link between the responses in relation to how people perceive the SNS with how they were taught and/or their attitudes towards conservation of the SNS and traditional culture; **Purple** highlights the link between the responses in relation to how people perceive the SNS and the resources that they use from the SNS; **Red** shows the link between the responses in relation to how people perceive the SNS and whether they perceive themselves as users of the SNS as well as when they use the SNS; **Pink** indicates the link between whether respondents perceive themselves as users of the SNS as well as when they use the SNS and their use of resources from the SNS; **Light Blue** highlights the link between whether respondents perceive themselves as users of the SNS as well as when they use the SNS with how they were taught and/or their attitudes towards conservation of the SNS and traditional culture; **Black** shows the link between the resources respondents use from the Kayas with how they were taught and/or their attitudes towards conservation of the SNS and traditional culture

Chapter 2: Methodology

2.1 Study Site
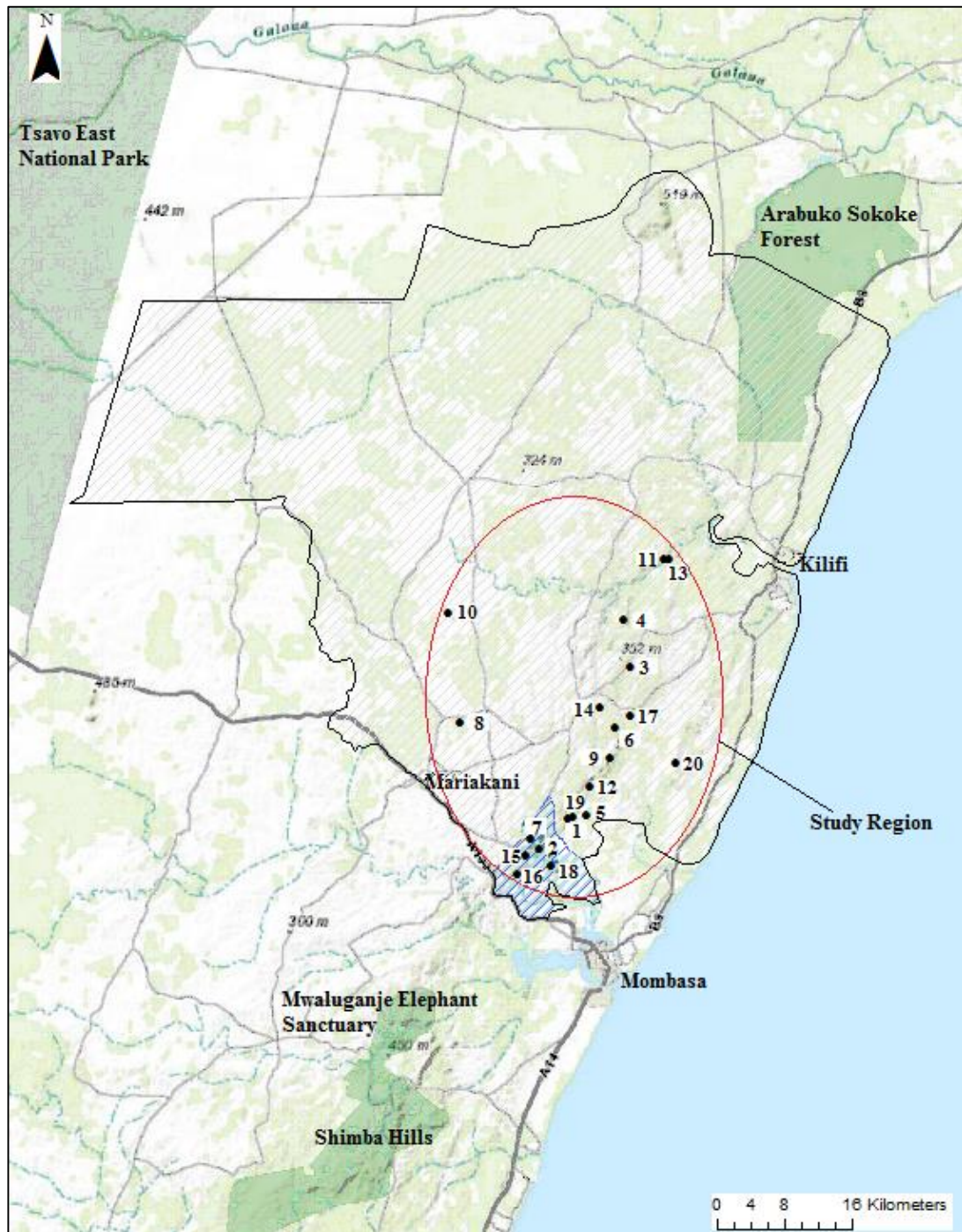
Figure 2.1: Study sites with protected areas and major towns
(Base images from Google Earth, and ArcGIS base map projected in GCSWGS1984)

Kilifi District ☐; Rabai location ▨; SS: 1:Bedida; 2:Bomu; 3:Chasimba; 4:Chivara; 5:Chizani;
6:Chonyi; 7:Fimboni; 8:Fungo; 9:Jibana; 10: Jorore; 11:Kambe-Kauma; 12:Kambe; 13:Kauma; 14: Kizingo;
15:Mudzimuvia; 16:Mudzimwiru; 17:Mwarakaya: 18:Mzizima; 19:Ribe; 20:Tsolokero

The research was conducted in 20 sacred natural sites (SNS) (which are 19 ecological disctinct sites. Two of the sites, although are two sites culturally, are only one site ecologically as they are not separated) and their surrounding villages (within an area covered by the coordinates - Latitude 4°1'10.44"S/Longitude 39°37'33'57"E, Latitude 3°48'29.22"S/Longitude 39°22'40.25"E, Latitude 3°29'14.89"S/ Longitude 39°38'9.00"E, Latitude 3°40'23.92"S/ Longitude 39°52'7.00"E) in the north coast District of Kilifi in Coastal Kenya (Figure 2.1). The sites are isolated patches, situated in the hills and Coastal plains inland from the Indian Ocean. Two sites (Jorore and Fungo) lie slightly further inland in the marginally more arid region beyond the coastal hills (Burgess *et al.*, 1998; Githitho, 2003). The SNS fall within an area considered to be of global importance for biodiversity according to a number of conservation organisations. For example it lies within Conservation International's "Coastal Forests of Eastern Africa Hotspot" and WWF's "Northern Zanzibar-Inhambane Coastal Forest Mosaic" ecoregion (CI, 2014; WWF, 2014).

The SNS are considered to be a vital part of the traditional Mijikenda culture, and due to extensive degradation that has happened in the region they are considered to be of key importance to biodiversity within the area (Githitho, 1998; Burgess *et al.*, 2000; Matiku, 2003; Githitho, 2003; Anderson *et al.*, 2007a; Azeria *et al.*, 2007; Nyamweru *et al*, 2008; NMK, 2008; Metcalfe *et al.*, 2010). The East African coastal forests are home to a range of endemic species (Burges *et al.*, 1998; Metcalfe *et al.*, 2010). A number of the SNS are listed as World Heritage Sites for their importance both to cultural and biological heritage (Githitho, 2003; MK, 2008), and furthermore are listed as National Monuments and Forest Reserves by the Kenyan government; however, some have no formal recognition, and all, including those listed are undergoing continued habitat degradation (Githitho, 2003). Due to their level of importance to cultural heritage, and their potential for biodiversity conservation, the conservation of these SNS is considered to be highly important (Githitho, 1998; Githitho, 2003; Anderson *et al.*, 2007a; Nyamweru *et al*, 2008; NMK, 2008; Metcalfe *et al.*, 2010).

Kenya was decided upon as a location because: 1) It was known that there were SNS in existence (Spear, 1978; Nyamweru, 1997; Githitho, 1998; Burgess *et al.*, 2000; Matiku, 2003; Githitho, 2003; Anderson *et al.* 2007; NMK, 2008; Nyamweru & Kimaru, 2008; Metcalfe *et al.*, 2010; Kibet, 2011); 2) It was known that the populations surrounding these sites were from the tribes that are traditionally associated with the SNS (Spear, 1978; Nyamweru, 1997;

Githitho, 1998; Matiku, 2003; Githitho, 2003; NMK, 2008; Nyamweru & Kimaru, 2008; Kibet, 2011); 3) The management plan was based upon the traditional laws and management systems (Githitho, 2003; NMK, 2008), but forest loss and degradation is still a problem (Githitho, 2003); 4) There is on-going development in the areas and the populations were thought to be potentially undergoing cultural changes (Githitho, 2003); 5) The Mijikenda SNS, and the traditions associated with them, have been studied before, providing information on both the biodiversity and the local culture. Whilst much of this information is over 10 years old, it enables comparison between data collected in this project with that collected in the past, highlighting any changes that have occurred during this time; 6) I had been to Kenya before and worked with the Mijikenda (on the south coast) so was able to start with a basic existing background knowledge.

2.2 Background

Before arriving in Kenya the Coastal Forest Conservation Unit (CFCU) were contacted. CFCU is the governmental sub-department (part of the National Museums of Kenya) responsible for the research and protection of the Kaya forests. When discussing the work with the head of CFCU (Anthony Githitho) and individuals from both the north and south coast offices it became apparent that the project would work best if it focused on the sites on the north coast.

The SNS on the south coast have been the focus of a number of past conservation projects, there has been a large amount of change due to development and some of the sites are now used for ecotourism. In addition a lot of work on the biodiversity, conservation and management of these sites had already been done (Luke and Verdcourt, 2004; Lehmann & Kioko, 2005; Luke 2005; Anderson *et al.* 2007; Nyamweru & Kimaru, 2008; Metcalfe *et al.*, 2010; Kibet, 2011). Hence it was decided that this study would focus on the Mijikenda SNS of the north coast. Due to the safety issues associated with being near the Somalian boarder it was decided that no sites north of Watamu (which is located 112km north of Mombasa) would be investigated. Therefore this study focused on sites in Kilifi District, between Mombasa and Kilifi town. Of the sites in Kilifi District two of the sites which were known about prior to the field surveys were not visited as there were ongoing disputes amongst land owners and it was not possible to get permission to visit the sites from the local community. Although the Elders may have been able to grant permission it was felt that it was not appropriate to visit the sites due to the disputes especially as doing so may have

escalated the disputes further. After the mapping work had been conducted, during discussions with the Elders it became apparent that further SNS exist that are not known outside of the local community (Shepheard-Walwyn pers. obs., 2012). As they were not know about prior to, or during the course of the fieldwork, these sites were not surveyed. In total 19 sites (ecologically) in Kilifi District were mapped.

It is a requirement of the Kenyan research permit (known as a "Student's Pass") that individuals are associated with a Kenyan university or governmental department. It was decided that the best affiliation for this work would be with the National Museums of Kenya through the north coast CFCU department due to the support and expertise they could lend to the project. The staff based at the north coast CFCU office have worked with the communities for over 20 years, and have a good knowledge of the traditions, the forests, and the flora and fauna of the sites. It was necessary for me to have a field assistant at all times during the work, both to help with navigating local customs and languages, but also for safety purposes. It was therefore arranged that Lawrence Chiro of the CFCU office (who is Mijikenda himself) would act at the primary field assistant.

The existing information on the traditions of the Mijikenda people is primarily based on the research conducted by Spear (1978). A more up-to-date social study of the Mijikenda and their attitudes towards and use of the Kayas was conducted by Celia Nyamweru in 1997. The existing botanical information of these sites is predominantly based on work done by Quentin Luke and Anne Robertson. Between 1986 and 1989, Luke and Robertson were asked by the IUCN and WWF to conduct surveys and write reports on the floristic status of the Kayas and their conservation management (Robertson, 1986; Robertson and Luke 1993). Following on from this work, Luke (currently based at the botany department of National Museums of Kenya in Nairobi), has continued to add to the list of plants found in the different Kayas by taking the information from studies that have been done since their original project (all studies should submit a report of their findings to the National Department for Research). Whilst the botanical information gives good anecdotal information of the plants that are known to have been found in the SNS, it is not suitable for analysis itself as it has not been collected in a systematic manner. This information was given to me to support the research being conducted, but not as a suitable tool for analysis of the biodiversity value of the forests.

The research conducted was an interdisciplinary study of the SNS of the Mijikenda in the Kilifi District of Costal Kenya and the values, attitudes and behaviours of the local populations towards the sites. The social aspect of the research constituted an observational case study of rural people who live in the villages surrounding the SNS using questionnaires. The questionnaire was used to investigate, for a range of individuals in the community, the attitudes, values and behaviours associated with their culture, their religions, and the Kaya forests. As with all observational data, the research was based on taking recordings of observations (using questionnaires) with no active intervention or changes of the situations being analysed, as is done in experimental research (Newing *et al*. 2011). Newing *et al.,* (2011: 46) state that "case studies aim at a detailed understanding of the case that has been selected, both for its own sake and in order to add to broader theoretical understanding and generate theories about underlying issues". This work consisted of a cross-sectional case study of the different communities living around twenty sites in the region with the aim to investigate the potential role that the SNS have in the conservation of biodiversity (both locally and globally) and cultural heritage. In addition the study aimed to investigate the changes in local attitudes, values and behaviours towards the SNS and how these may influence conservation. Whilst the research is a case study, it is hoped that the information it will provide will be useful for the conservation of other SNS and community conserved sites around the world with groups undergoing similar social change.

An interdisciplinary multiple methods approach was used to conduct the research with a combination of both social science and natural science techniques (Newing *et al*. 2001). In this study an integrated "interdisciplinary method" was used which is defined as research which uses "ideas… information, methods, tools, concepts, and/or theories from two or more disciplines"… it is "the process used to study a complex problem/issue/question" (Repko, 2012: 4 & 24). One of the core strengths of using interdisciplinary research is the ability to address more complex issues that cross over between subjects (Palmer, 2001; Jones, 2009; Repko, 2012). Palmer (2001: vii & 1) notes that "real world research problems that scientists address rarely arise within orderly disciplinary categories, and neither do their solutions" and argues that interdisciplinary methods allow scientists the ability to "apply more powerful and sophisticated approaches to the questions they ask" when they use interdisciplinary approaches and methodologies. Repko (2012: 3) also states that interdisciplinary approaches allow for a more "coherent understanding of complex issues

that are increasingly beyond the ability of any single discipline to address comprehensively or resolve adequately".

The questions associated with the conservation of the Mijikenda SNS for both biodiversity and cultural heritage cover complex issues and require a combined social and natural sciences approach. However, interdisciplinary research also has weaknesses which are discussed further in section 2.8. The methodologies employed during this project were mapping (conducted via both on-the-ground and remote techniques), and questionnaires. The details of the methodologies used are explained further in sections 2.6 and 2.7.

2.3 Interdisciplinary methods based studies of SNS

An example of projects that have used both social and environmental techniques when researching the conservation of cultural and biological heritage include a joint project by FFI and the Ugandan Wildlife Authority (UWA) in the Rwenzori Mountains, Uganda (FFI & UWA, 2005). In this project questionnaires about the use of the sacred SNS were conducted, in addition they also held a workshop to investigate people's views on the management of the sites, and 15 sacred and cultural sites were mapped out using GPS. The project sought to understand the importance of the SNS to the local community, how they were used and how they felt about the management of the national park (which contains a number of SNS). It also aimed to find ways of ensuring the conservation of the park whilst allowing for cultural practices in line with protected area management guidelines issued by the IUCN (Wild & McLeod, 2008). Another example is the study of the Tandory people of Madagascar and their Taboos and sacred forests conducted by Tengö and von Heland (2011). The study used both interviews and GIS mapping techniques to investigate how various drivers of change, both social and environmental, affect both the traditional culture (with a focus on taboos) and on the conservation of the forests. They sought to highlight the threats that face traditional governance, as well as to investigate the adaptability and resilience of such institutions.

This project will seek to use a similar interdisciplinary approach to understand how people view and use a number of Mijikenda SNS, what the biodiversity potential of these sites are, and how their role in local culture may influence conservation management of these sites.

2.4 Working with the Governmental Department

Although the project was conducted with the help of the CFCU, to ensure that responses were not altered or biased it was important that those who were interviewed knew that the work being done was independent research, and not for, or influenced by, the government or any other parties. This is because respondents may refuse to answer questions, or give misinformation if they feel that it is in their self-interest to do so, or if they aim to give answers that they think those administering the information want (Bernard, 2006; Holmes *et al.*, 2006; Newing *et al.*, 2011; NSS, 2014). Consequently respondents may have felt reluctant to give responses to sensitive questions, or those that were in relation to illegal behaviour, if they thought the information was being collected for the governments, or other organisations. Maffi (2001) noted that in Mexico respondents were reluctant to give biocultural information when they believed they were talking to people working for the government; however, when they were notified that the individuals were independent researchers they were much more open and willing to give information. Therefore, in order to avoid such biases, it was explained in all meetings, invigilator interviews, training days, and in the interviews for data collection that the information collected was for a research project, and whilst it was being conducted with the help and support of CFCU, it was not run by them, nor would they have any influence on the outcomes of the work or be able to connect answers given back to individuals.

All invigilators explained to interviewees that they worked directly for me and not for CFCU or the government, and it was explicitly outlined that whilst the information may be useful to the communities and conservation agencies working in the area, this project was not seeking to make any changes and was not there to provide any sort of 'aid' to the government, local communities or any other interested parties. It was stated (by the participants) on a few occasions in the questionnaires that if I was collecting this information I should find a way to help to protect the sites and not just gather more information. However, it was understood that this work was being done for independent research.

On the completion of the project CFCU, and the Ministry of Science and Technology, will receive a copy of my thesis. All groups of Kaya Elders will get reports relevant to their sites and meetings in the local areas to explain the findings will be held, so that the information collected will be passed back to the communities and those helping to conserve these forests.

2.5 Social Analysis

2.5.1 Questionnaires

Questionnaires have been used to investigate socio-cultural issues associated with the Kayas in the past including a study by Nyamweru in 1997. By using questionnaires, the researcher can ask a variety of identical questions to a large and varied number of participants (Holmes at al. 2006), they allow one to "control the input that triggers people's responses so that their output can be reliably compared" (Bernard, 2006: 251). Questionnaires allow the same questions to be asked in the same order and where possible under the same conditions when interviewing each individual (Newing *et al*. 2011). The preferred method for conducting the research in this project was questionnaires as a large number of individuals in the surrounding communities were to be asked the same questions. The questionnaire also enabled responses across all communities to be quantified and analysed. I wanted to find out if responses would vary among the different communities, and across demographic parameters, as well as within communities when divided into different attribute groups.

The questionnaires were conducted in a face-to-face, home interview manner with invigilators reading out the questions and writing down the responses given (as done by FFI & UWA, 2005 and Snyman, 2013) (Full, blank copies of the English and Swahili questionnaires are located in Appendix One). According to Bernard (2006), there is a higher response rate and more questions are answered when interviews are conducted face-to-face. By doing face-to-face interviews in this way, all people within the community could be interviewed including illiterate individuals. This is important as according to the Commission on Revenue Allocation (2014), 32% of the population in Kilifi District are illiterate and education levels are lower in rural areas (in the region of Kaya Fungo 50% of the population has no formal education) (SID, 2014). Face-to-face interviews also meant that questions could be explained further if needed and could be asked in the local language if the individual did not understand the questions when asked in Swahili (Bernard, 2006; Snyman, 2013).

In addition, face-to-face questionnaires lead by an invigilator ensures that people are unable to skip ahead in the questionnaire – which may have negative impacts on or influence how the individual may respond to the questions (Bernard, 2006). It has been shown that home based interviews can be longer (up to a few hours) (Bernard, 2006), which was important for this study as the questionnaire had many questions. In the past detailed questionnaires have been done in in the area and it was noted that the respondents were happy to talk for a prolonged time (Nyamweru, 1997). Nyamweru (1997) states that "most respondents

answered courteously and patiently throughout" (Nyamweru, 1992: 17). By having the invigilator present, we were also able to know with certainty who answered the questionnaires (Bernard, 2006), and if there were any circumstances that may have affected the responses that an individual may have given (any issues of this manner were noted by the invigilator).

Face-to-face home-based interviews are more suited to the local culture. It was observed during the research that building a rapport, being polite and friendly are all important in the local culture when planning to ask someone questions (especially if they are personal or sensitive questions). It has been shown that a "more conversational style produces more accurate data" (Schober & Conrad, 1997; Krosnick, 1999 – In Bernard, 2006: 256) when conducting interviews. A conversational style was used in our study both due to the local culture and the literature on conducting effective interviews. All of the above reaffirms why home based, face-to-face interviews were the appropriate choice for this research.

It has been noted that home based, face-to-face interviews, are intrusive and reactive, and that it is difficult for interviewers not to lead the individuals in their answers (Bernard, 2006). Therefore it was important to make sure that interviewers knew how to approach people about taking part in the questionnaire, as well as how to conduct themselves, both with regards to appropriate social conduct (acceptable behaviour when in someone's house), as well as how they asked the questions and explained them. All invigilators underwent training (explained in more detail in section 2.6.4), and monitoring to ensure that they conducted themselves and the interviews correctly. Conducting interviews in this manner was both time consuming and costly, as was warned by Bernard (2006). However, this was factored into the project planning.

The questionnaire contained a range of questions investigating the demography of the group, their culture, cultural history, cultural identity, the SNS, as well as their opinions, attitudes and values towards all these factos. A range of different types of questions were used to get different types of information. The questionnaire was laid out in a way that it started with a simpler section, allowing the respondents to become comfortable with the interviewer and answering questions. The initial questions were simple, predominantly demographic questions, which did not involve much requirement for contemplation and were not culturally sensitive. Following the demographic questions, the questionnaire built

up to more complex and/or sensitive questions embedded within other questions in later sections. The questionnaire was structured in this way based on the guidelines set out by Bernard, (2006), Cohen *et al*. (2007) and Newing *et al*. (2011).

The questionnaire had a range of questions which were in different formats including both closed and open questions (Bernard, 2006; Newing *et al*., 2011; Terer *et al*., 2012; Snyman, 2013). It is important to have a range of different types of question so as to use the best method for the different questions being asked. In addition it can be difficult for individuals to answer a large number of very repetitive questions; therefore a range of different questions in different styles makes the questionnaire easier to follow (Bernard, 2006; Cohen *et al*., 2007; and Newing *et al*., 2011). It was also important to observe that some questions work better in a face-to-face interview setting than others (Bernard, 2006). A large number of Likert scales, and many in a row would potentially have been overwhelming for an individual, therefore only a few were asked in comparison to the other types of questions, and they were spread out across the questionnaire (Bernard, 2006; Cohen *et al*., 2007). The variation of question types also helps to better engage the responder and potentially less interesting questions can be mixed in to the questionnaire amongst more interesting ones so as to be able to keep hold of the individual's attention in answering the questions (Bernard, 2006).

By using a range of different ways of asking questions, we were also able to ask some of the same questions in different ways, so as to be able to triangulate the responses and ensure that the information that we were being given was accurate. For example, as well as asking if people use the SNS, they were asked if they used plants and animals from the SNS to find out if people thought of resource extraction as 'using the Kayas'. Using a variety of questions also prevented the individuals thinking that the questionnaires were 'about' any one topic in particular, or thinking that we were trying to illicit particular information on sensitive issues such as rituals, or illegal practices (Nyamweru, 1997). Due to the mix of topics and questions, it was clear to the respondents that the information we wanted was a broad range of information and not driven by any agenda associated with groups active or working in the areas.

Question design is one of the biggest sources of error when conducting questionnaires (McColl *et al*., 2001; Newing *et al*., 2011). Therefore we edited the questionnaire using an

iterative refinement process, in which the question wording, order and layout were repeatedly reviewed and assessed amongst those involved in the questionnaire design, to ensure that the best combination of questions were used and asked in an effective way. Attention was paid to ensure that the meaning of all questions was clear (Holmes *et al*. 2006), so that the questionnaires could be translated correctly into Swahili. We focused on making sure that questions were not vague, did not lead interviewees to give particular answers, did not contain double negatives, confusing language, or jargon, that they did not cover too many topics in one question, that sufficient details were provided to allow individuals to answer of the questions, and that there was no overlap possible in responses (such as in age categorisation). The questionnaires used the following types of questions:

1) Closed Questions

Closed questions were used for questions where the same information was collected across all individuals. Respondents have a limited number of answers from which to choose from (Holmes *et al*. 2006). When using closed questions, the data were quantitatively analysed. In all closed questions an "other" option was provided so that if the prescribed answers did not provide an option that the interviewee felt was correct they could provide their own answer. During the pilot study (which is explained in further detail later in this chapter), the "other" option provided a number of examples that were then incorporated into the listed answers on the final questionnaire.

There were simple closed questions such as opposite response questions (yes or no, male or female) and single answer question (e.g. marital status). There were a number of multiple choice questions allowing for either a single response or multiple responses. Individuals were given a number of possible responses and they had to select either the most appropriate answer, or range of answers depending on the question. All multiple choice questions were tick box questions.

Ranking questions were used in addition to simple closed check lists. As advised in Newing *et al*. (2011), the majority of ranking questions were done in two stages, where individuals answered a question in a multiple answer 'tick-box' approach, or provided a list, and then ranked them in the order of importance/preference/level of use. In some instances, individuals were asked to write a list in ranking order, which required individuals to think

about the order before providing their answer. By getting respondents to rank certain information allows us to understand the information that the interviewees provided in greater detail.

The questionnaire also contained a number of rating scales. Rating scales are different from ranking scales (where people list a number of items in order), in that the individual rates a single item on a numerical scale (Newing *et al*. 2011). The two types of rating scales used in the questionnaire were Likert scales and 5-point horizontal scales.

a) Likert scales allow individuals to rate a comment or statement according to the level to which they believe the information to be true (Newing *et al*. 2011). The Likert scales were formatted so that the scale stretched between 'Strongly Agree' to 'Strongly disagree' with 5 points. By using an odd number of points in the scale this produced a neutral point in the centre of the scale (Newing *et al*. 2011). Using Likert scales allowed direct investigation of how people feel about the Kayas, their management, and certain aspects of the local history, culture and identity.

b) Five point horizontal scales were used for a range of questions. Numerous questions with responses ranging from "Very Important" to "Not important at all" were provided throughout the questionnaires. As with the Likert scales these again had an odd number of responses allowing for a neutral response as recommended by Newing *et al*. (2011).

When deciding on the categories of answers within the closed questions, information from previous studies and input from staff at CFCU were used. When the respondents make use of the Kayas was investigated using closed questions. Information on both time of day and time of year were recorded. Time of day was split into four: morning, daytime/early afternoon, late afternoon/early evening and night-time. The time of year was categorized according to the main dry seasons. The two main dry seasons occur from December – April and August – September, the periods in between see a drop in temperature and both the long and short rains. The long rains occur from April to May/June time and the short rains are in November to early December. The December to early April period also sees the highest temperatures. Therefore time of year was split into i) December – April, ii) April – August, iii) August – September, iv) September – December, with the names of the seasons (i.e. long rains, short rains, etc.) given in the questionnaire.

2) <u>Open Questions</u>

Open questions were used to gain further information on some of the closed questions, as well as sometimes being independent questions. As described by Holmes *et al*. (2006: 38) open questions "do not restrict the information" obtained. This was found to be useful on questions where we did not want to prescribe the answers given (such as words the individual associated with the Kayas), and where we wanted to gather information on the local knowledge (use of animals and plants found in kayas). The open questions were predominantly coded to be analysed quantitatively, some responses to the open questions were used to explain and/or illustrate the information found in closed questions.

Short answer questions were used to allow individuals to provide a short answer to a question or an elaboration on a closed question. Short answer open questions allow individuals to give any response they felt was appropriate; however, the responses to these questions required either, a single word, a few words, or single sentence answers. These responses were either coded and quantitatively analysed, or used to highlight trends seen in the analysis of closed questions.

There was one open-ended open question at the end of the questionnaire. This question asked the interviewee to give any further information or comments. Since it was an open-ended question the individuals could say as much or as little as they wanted in response to this question. This question was asked so that the primary investigator could gain feedback on the questionnaires from the respondents. The primary responses were that the questionnaire was long, and that information obtained in the research should be used to help the community and preserve the sacred sites.

The questionnaire was divided up into different sections to allow the interview to have a more cohesive feel. It also allowed the questions to progress to the potentially more sensitive questions once the responder was comfortable with answering questions. The sections made it easier for the invigilator to conceptualise how the interview was progressing as they moved through the questionnaire. The questionnaire was laid out in a way that ensured it was easy to read, there was enough space to write the information required, and it was logical to work through. Bernard (2006) notes that the attention to layout is important so as to ensure that it is as easy as possible for the invigilators and respondents to follow and complete, as well as to reduce any mistakes in understanding, or recording of the answers.

2.5.2 Preliminary Questionnaire Trials

The preliminary trial of the questionnaire was conducted in the Rabai area. They were piloted by a local man and woman, both of whom were from the area, had diplomas in community development and had experience in conducting questionnaires. The trial led to changes in the questionnaire based on responses given, as well as feedback from the invigilators on what worked and what did not. Once the preliminary questionnaires were done, I used the responses to develop and come up with final questions and formats in the final version of the questionnaire. Whilst we trialled the preliminary questionnaires we tested different approaches to the conducting of the questionnaires. These included one person asking questions and the other writing the answer, the same person interviewing and annotating the answers, and tested the impact of myself being present during the interview. The invigilators said that an individual conducting and annotating the questionnaire on their own was the best approach as they could work through the questions at their own speed, could ask for repetition or clarification of answers where needed, and it led to the interview feeling more cohesive and logical.

The preliminary trials highlighted that I should not be with invigilators while they were conducting the questionnaires. This is because my presence during the interviews created too much of a distraction. Some individuals were not comfortable discussing the questions in front of me, some would give inaccurate answers (it was thought they were giving answers they thought I would want even when the invigilators knew the responses were not true), and some wanted to discuss things other than the questionnaire. It was found that my presence during the interviews resulted in poor answers and caused the process to take significantly longer.

The questionnaire was edited according to results from the preliminary trials and was translated by staff at CFCU before being checked with the final set of invigilators.

2.5.3 Invigilators

Local individuals were chosen to conduct the questionnaire for a number of reasons: 1) Findings from the preliminary trials highlighted that my presence hindered the effective collection of reliable information; 2) Hiring invigilators ensured that more questionnaires could be collected in a shorter timeframe; 3) Using local people ensured that those being interviewed would be more comfortable answering the questions, including more sensitive

questions (Huntington, 2000); 4) It ensured that local people were involved in the research and benefitted from the project.

Invigilators were chosen according to their qualifications, two meetings, and their performance in the training. Potential invigilators needed to have completed Form Four (i.e. having completed senior school) with an average of grade C or above and must have achieved a B or higher in English. Candidates were met twice prior to the training day. This enabled checking of grades (certificates), interviews, ability to check proficiency in English, punctuality and to discuss the work. It was important to ensure that all the invigilators were mature, motivated, willing to undertake the training and work as a part of a team (Bernard, 2006). I also had to be sure that they would be willing to travel quite far (some had to stay overnight to get work done in different villages). All of this was discussed in the interviews prior to the training days so that I was sure the individuals hired would be effective at conducting the work.

In order to conduct the interviews I hired 27 individuals to act as invigilators. Bernard (2006: 266) noted "If studying the experiences of a group of people, or are after cultural data... then getting more interviews is better than getting fewer". With this in mind, I opted to have a larger number of field assistants as with the greater variation in personal experience and the large cultural component of this questionnaire it was important to interview a large cross section of all the communities, and this was only possible through multiple interviewers.

There was a minimum of one female and one male invigilator in each area. A mix of men and women was required to prevent any sex bias on behalf of the invigilators, as well as to deal with any cultural issues – such as women not wanting to be interviewed by a man. Having multiple interviewers does have the potential to lead to greater interviewer error and bias; however it was very important to get the interviews done in a timely manner. When working in developing countries if a long time is taken when conducting field work, there is the risk of running into clashes with major events (both naturally and socially) that may prevent the work being completed (Bernard, 2006), therefore it was important the work was completed as quickly as possible.

In addition, after discussions with a number of local people, it was evident that it was important to have 'local people' conduct the interviews in each area. They noted that

culturally, for the Mijikenda, it is important to know someone who is asking personal information, or if they are not directly known, to have a connection to them. Based on my experience it was observed that the social structure of the communities led to individuals within a location and of the same tribe often knowing one another. However, if not known directly on all occasions, I witnessed that the invigilators were able to make connections with those they were interviewing through family or friends. Therefore the interviewees often felt that they knew something of the person who was interviewing them. In addition it has been found that people are more likely to give information (especially any sensitive information) to a local individual (Huntington, 2000). This may be because there is greater trust of the individual if they are local. Having local invigilators also helped respondents to feel comfortable in the interview, as the person was known to them, or was likely to have a connection to them, so they did not have a complete stranger in their house, and it helped to prevent any issues if the respondent wanted to use one of the local Mijikenda languages.

Some of the issues with using multiple interviewers included difficulty in maintaining consistent positive attitudes (Bernard, 2006). This was helped by forming them into groups according to the area in which they worked so that they could support one another. In addition, payment was made on collection of questionnaires every two weeks, so they had a regular financial motivation. I was also able to be contacted at all times, so if the invigilators were having any difficulties they were able to get hold of me easily. The invigilators contacted me relatively regularly to discuss their progress.

2.5.4 Invigilator training

The first stage of the training day was to work through every question in English. The questions were read out, then explained fully to the group, following which the Swahili translation (that had been written by the staff at CFCU) was read through. A discussion was then had to confirm that everyone agreed that the Swahili wordings of the questions accurately and effectively addressed the original question (from the English version). As outlined in Bernard, 2006, we worked with the invigilators in a "focus group" type setting, in order to discuss the wording of all questions and gain advice on how the questionnaire may come across to the respondents and to ensure that it was constructed and worded in the best possible way. Changes were made so that all invigilators, and the CFCU staff present, agreed that the Swahili version was a correct translation of the questions and responses (and their true meanings) in English. This was to ensure that the questions were phrased in a way

that ensured that their meaning (developed in English) was clear in Swahili (Holmes *et al*. 2006). As highlighted by Bernard, 2006, we ensured that the invigilators were given all the information they needed so that they could answer any question asked of them by the respondents. All invigilators were given notebooks in the training session so that they could take down all the relevant information. They then took these notebooks with them so that they could refer back to the information given to them on the training day. In addition the questionnaires contained detailed instructions as they went through, as well as clear definitions at the start of the questionnaire.

The invigilators wrote all responses down in the language they were given in. This therefore helped to avoid any issues with in field translation or coding (Bernard, 2006), and helped to prevent the interviewers having to cut respondent's answers short so that they could translate and write the information provided as they progressed through the interview. The translation of the responses was done after all questionnaires were conducted. The second stage of the day was a role-play session. First we discussed appropriate ways of conducting questionnaires, including how to choose who to interview, how to approach interviewees, how to explain what they were doing, how to behave whilst doing the questionnaires, and how to conduct the questionnaires. We answered all questions that invigilators had. Then we conducted role plays of introducing one's self (right and wrong ways), how to explain why the work is being done, and how to conduct the interview. Then the invigilators were asked to comment on what was done well and what was done badly. Again all questions were answered. The invigilators then practiced introducing themselves, and interviewing each other. We answered any questions they had at this stage. The final part of the training was to send them out to the local village to do a practice questionnaire on real villagers. Following this we all met together again. We discussed how the invigilators felt that the practice session went, discussed any issues highlighted and answered any final questions. Once everything had been gone through, and all the invigilators felt comfortable that they could conduct the work effectively, the training day was complete and the invigilators were paid for the day and allowed to leave.

During the data collection process invigilators who were found not to be following the instructions, refused to conduct the questionnaires as trained, or were not working to an acceptable standard (repeatedly poor questionnaires or were not doing the work) were fired, in line with Axinn *et al*, 1991:2000 (in Barnard, 2006). Axinn *et al*. 1991:2000 found that

"firing poor interviewers improved the morale of good ones". In this instance I also found that firing poor interviewers (four in total), resulted in better work from the remaining interviewers especially those working in the same team. One individual told me that she was pleased that one of her team members had been let go as she was able to do the work better, was confident in following the instructions and she felt everyone in the team was working together better.

2.5.5 Questionnaire Sampling

The sampling unit in the questionnaires was individual people. The sample size was 1,436 individuals. A set number of individuals (approximately 80 individuals) were sampled in the villages surrounding each of the 20 sacred sites (SS) studied (including Kaya forests, sacred groves and sacred rocky outcrops). The invigilators aimed to get an equal number of men and women from a range of ages (18 and older). When they were given the information about the villages that they would conduct the interviews in, they were also given a list of the number of people to be interviewed based on the populations of the villages (information obtained from the location chiefs – local areas governmental officials). If they were unable to meet the quota, the invigilators would try and visit the villages again at another time. However, sometimes they were still unable to get the exact number of men and women across different age ranges. However, overall a good mix of the sexes and distribution of ages for both sexes was achieved for each site.

Due to inability to divide villages by house number, or on a grid, an alternative systematic sampling system was devised. Invigilators used a 3rd house selection approach (similar to the methodology used by Snyman, 2013 – but using every 3rd house instead of every 2nd house). The 'house' was taken to be a homestead, which is a collection of houses lived in by a family group who share incomes (Snyman, 2013). As invigilators entered an area they visited the first 'house', in the first village, and then every third 'house' in that village. In the next village, they would start at the second 'house' and then every third one from there onwards. In the third village they would start at the third 'house'. Then at the fourth village they would start at the first 'house' again. They would interview the first person of 18 or older that they found at the homesteads that they entered. As they were aiming to meet the age and sex quotas given to them, if the person they met was of the same sex and age as had already been done in previous interviews, they would explain to the person that they met they were trying to get a range of ages and sexes, and ask if someone who fitted one of the

groups that they had not yet interviewed was present. If not, they would proceed to the next house and ask there. If there was someone at the next 'house' for them to interview, they would then proceed with the 'third house' counting from the house where they had conducted the interview.

This method allowed for a randomised stratified sampling approach (Teddlie and Yu, 2007) which was compatible with the sites and villages where the research was taking place, and the resources which were available.

2.5.6 Questionnaire data collection and processing

The questionnaires were conducted between January 2012 and April 2012. During the period of data collection each group of invigilators was visited once every two weeks to check on progress and to check to see that they were conducting the interviews correctly. I conducted visits every few days; however, the sites that were being visited rotated, therefore resulting in each group being visited every two weeks. As I was not able to sit in on interviews, I checked in with invigilators assessing how they went about choosing houses (to confirm they were doing it correctly), discussed their progress with them, and discussed any issues they were having. I was also in regular contact with them via telephone.

Once all questionnaires were done, the closed data was input into an Access (2010, Microsoft) spread sheet. The spread sheet was created in Access (2010, Microsoft). It was developed so that the input pages appeared similar to the formatting of the original questionnaires. The input data were done in this format via the alternative input functions which are possible in the Access database. This programme was used for its functionality and ability to cope with large quantities of data. It was not possible to have all questions on one worksheet, therefore the database was made up of four different worksheets (each with a corresponding table containing all the information), each of which contained a field which was the same across all worksheets, but was unique to each questionnaire. This value was the questionnaire number, and allowed the data in the various tables to be connected. Once all the information was input into the Access (2010, Microsoft) database, it was exported into Excel (2010, Microsoft) for manipulation and then analysed in SPSS (version 21, IBM) (as outlined in section 2.8.1) (Robertson and Lawes, 2005; Peterson *et al.*, 2008; Törn *et al.*, 2008; Schlegel and Rupf, 2010; Field, 2013; Leard, 2014).

The open questions were typed up into Word (2010, Microsoft), and translated by local people who spoke Kiswahili, English, and the local Mijikenda languages. The main issue with translation was with words that had been misspelled/poorly written by invigilators (due to bad handwriting); however, most often, it was possible to make sense of the answers using the sentence as a whole. The information on plants and animals was translated by a member of staff at CFCU as many of these local names were not known by the translators, and the staff at CFCU have knowledge of local botany, and know which plants, animals, and if relevant the species that the individual was referring to. This terminology, although in languages they understand, were sometimes not words that the other translators had come across before. The information from the translated documents was then input into the Excel (2010, Microsoft) database and all questions were coded for analysis.

2.6 Biodiversity Analysis

In this research 20 SNS were studied. As two sites are directly connected, they are therefore one ecological unit, so although they are 20 sites culturally, they function as 19 sites ecologically. The sites included a combination of sacred Kaya forests (Kayas), as well as sacred groves (sacred forest patches that are not Kayas) and rocky outcrops (both noted as sacred groves in this thesis and given the abbreviation SG). The sites are refered to as Kayas (Kaya forests only), sacred sites (SS) or sacred natural sites (SNS). Both SS and SNS may be used to refer to any of the sites.

2.6.1 Preliminary Techniques

A number of methodologies can be used to assess potential levels of biodiversity. In this project based on previous reports on the levels of plant biodiversity, the initial plan was to measure the plant diversity within the SNS. Two common approaches used to measure plant biodiversity are line transects and quadrats (Bullock, 2006). Therefore both of these methods were trialled in the preliminary stages of the research project. The type of transect attempted was the line intercept method (Bullock, 2006). All plants along the transect were noted and measured. The line transects were attempted at two sites, Kaya Kauma and Kaya Chivara. Unfortunately there were a number of difficulties with the methodology. Firstly, although the field assistant had a good botanical knowledge of the region, not all species were known and only local names were able to be given for some plants. While some of these could be translated at a later date, a number could not, and because it was not possible to take samples it would result in a number of unidentified species in the transects. It was

not possible to access all the sites. This was partly due to social customs (where there were no access areas for women, and/or non-Mijikenda people, as noted in chapter 1.1.4), as well a physical limitations due to density of thorny shrubby undergrowth of the forests, and the inability to cut paths (due to the laws associated with the sacred sites). In addition, Kaya Elders must accompany those conducting the research at the sacred sites. As is customary the Elders wear traditional dress of a Kikoy wrap and either flip-flops or bare feet whilst in the sacred sites, and it was considered unsafe for them to be traversing through the dense undergrowth.

When conducting the quadrats, the existing paths were walked, and at selected random points we passed into the bush where it was possible and safe to do so. A quadrat 10 x 10 m square plot was marked using stick markers and string. In the quadrats, all trees above 15cm (girth at breast height) were measured (girth at breast height) and identified. In addition ground cover, slope and canopy cover were measured. The quadrats were done adjacent to existing paths due to similar difficulties that were encountered with the transect trials, namely inability to access all areas of the sacred sites due to customary practices (as noted in chapter 1.1.4) and the inability to conduct them within areas of dense vegetation. This led to the observation that the quadrats were not producing a representative sample of the vegetation within the forests, and as they were only able to be conducted in accessible areas they were often in more degraded sections of habitat. It was therefore concluded that the quadrats would not produce a reliable measurement of plant diversity within the sacred sites.

Due to the issues encountered, line transects and quadrats were deemed to be unsafe, inaccurate and not an appropriate methodology for this study. It was therefore decided that a more remote approach to surveying vegetation diversity was required.

2.6.2 Boundary mapping

To survey the potential biodiversity within the sites, maps of the SNS required. This methodology required boundary maps, which were produced by walking the boundaries of the SNS using Garmin eTrex Geographical Positioning Systems (GPS) to record tracks (i.e. where was walked) and using waypoints to mark significant features (such as entrances to the Kayas). Hopkin (2007) notes that GPS devises have been used to mark socially important sites (such as cultural and spiritual) in the Amazon, Cameroon and the Congo.

The boundaries are known by the Kaya elders and some (those of which are national monuments or world heritage sites) have physical markers (made from concrete) along the boundaries which were noted. If the boundary was departed from (due to inability to follow it because of difficulties such as dense vegetation etc.) then this was recorded with a way point and it was noted (with a way point) when the boundary was returned to, as well as a description of the boundary between the two points (i.e. if it followed a straight line, or a curve etc.). Once sites had been visited the information from the GPS units were loaded into Google Earth and ArcGIS (version 10.1, ESRI) to create boundary maps of the sites.

2.6.3 Habitat Mapping

Mapping of indigenous sites, including the identification of cultural and sacred locations, and their use for land management and conservation has only been undertaken in recent years, especially in developing regions such as Africa (Chapin *et al*., 2005). The interest in such approaches has increased, specifically with reference to the use of such mapping for ecological research. Due to the ability to combine field and remote techniques, it was decided that vegetation mapping would be an appropriate way to assess biodiversity in the sacred sites. Vegetation maps can be used to assess wildlife habitats (Glenn & Ripple, 2004) to assess available habitat for species, and as a proxy for biodiversity in conservation management plans (Ferrier, 2002). In addition, vegetation maps can be used to plot out different types of habitats and determine their area (i.e. patch size), both of which correlate with species diversity and potential survival rates of local populations (Woodroffe & Ginsberg, 1998; Benchimol & Peres, 2013; Berhane *et al*. 2013). Therefore, by mapping out different types of vegetation it is possible to assess the potential biodiversity which each area may contain. Habitat patch size is also important, along with habitat type, for understanding levels of biodiversity. This is because areas of habitat can only hold a finite number of individuals (its 'carrying capacity'), and so the size of the patch will also influence the likelihood of the presence of different types of species (MacArthur & Wilson, 1963). In addition, certain animals require a particular amount of habitat. For example, Woodroffe & Ginsberg (1998) found that species with large range sizes cannot survive in small habitat patches due to increased threats such as conflict with competitors or humans outside of their habitat area.

In this project, digital habitat maps were created using a combination of ground mapping techniques and the digitisation of images from Google Earth (Harris *et al*., 2011; Hu *et al*., 2013) (Images from Cnes/Spot 15 m resolution for Kayas Fungo and Jorore (Images taken 9/3/2012), all other sites Images from Digital Globe with 65cm resolution (Images taken between 1/20/2011 and 21/3/2012), Data downloaded 12/12/2013; For details on dates of images for each site see Table A2.1, Appendix 2). As described by Bullock (2006) ground mapping was conducted using GPS units (Garmin eTrex, accuracy: ± 7m) to mark out boundaries of different vegetation units, with notation of the waypoints and vegetation unit recorded in field books. The vegetation units were classified based on density, height and predominant vegetation type (i.e. shrub/tree). The categories were as follows:

Table 2.1 Habitat Density Categories

	Vegetation Density		
	High	Medium	Low
Amount of bare ground	< 40%	40% – 70%	≥70%

Table 2.1 Habitat Height Categories

Vegetation Height		
High	Medium	Low
> 130cm	46 cm – 130 cm	≤ 45cm

Vegetation types: Rocky/bare ground; Grass; Shrub (below 5 ft.); Tree (above 5 ft.)

These classifications were chosen as they were easy to identify and determine in the field. Based on these categories an example of a vegetation unit would be: 'medium density, medium height shrub area'.

The height recorded was based on the predominant vegetation type within an area, so certain habitats, such as medium density shrub with few trees and/or dense shrub with trees, may obscure the detail of habitat features. This is because habitat height is based on the main vegetation type, in this case shrub, and these areas would therefore be grouped as medium height vegetation, despite the fact there is some high vegetation within the habitat feature. Some areas such as "farmland" and "sparse shrub and trees" do not have one

particular dominant vegetation type, and therefore were classified as areas of mixed vegetation height.

GPS units were used for the ground mapping due to their accuracy (Bullock, 2006), and their comparative time efficiency compared to tape measures (Dauwalter *et al.*, 2006). Although there is some inaccuracy with GPS units, Dauwalter & Rahel (2011) note that they can be used to effectively measure patch size for areas greater than 50m^2, and the smallest patch size in this project is over 1000m^2. As highlighted by Glenn & Ripple (2004: 852) "[m]ost digital vegetation maps used to assess wildlife habitat are developed either from aerial photographs or from satellite imagery". Although there are other methods to create digitised habitat maps, such as automatic classification of satellite imagery using classification software, a combination of ground mapping and manual digitisation of satellite imagery was determined to be the best approach in this project to ensure accuracy.

As noted by Estes *et al.* (2010), most satellite images are not detailed enough (as they are often limited to 30 x 30 m resolution) to classify fine-scale spatial information. However, Google Earth (GE) satellite imagery has a much finer scale resolution so was used in this project. Due to the cultural sensitivity, it was important to confirm with the Kaya Elders that it would be acceptable to them for us to use satellite imagery. They confirmed that this would not violate any of their rules or customs, and we were given permission to use imagery of the sacred sites. GE has been used in previous research to map habitats. For example, Harris *et al.* (2011) used GE to measure and code habitat features and Hu *et al.* (2013) observe that GE is freely available, has a range of geoprocessing tools and can be used in habitat mapping.

Outlines of the different habitats, as well as boundaries of sites and additional features in/around sites were drawn in GE using the "draw path" tool. These features were saved in .kml format which were transformed into shape layers in ArcMap (10.1, Esri) using the "conversion toolbox". Following importation of the outlines, shape files were created using ArcCatalogue (10.1, Esri) and the 'create feature' tool. The lines were followed using the 'trace feature' tool. Once all the different habitat types had been created, the layers were joined together using the 'union' function to create one habitat layer which contained all habitat features enabling the analysis described in Section 2.8.2. Buffers of 500 m were created surrounding the sacred sites using the "buffer" tool to allow for analysis of development surrounding the sites (2.8.2). This size of buffer zone was chosen as it was the

distance between a number of the larger sites and at least half (if not the majority) of the nearest local trading centre, so would take into account the increased development surrounding these sites.

2.6.4 Encroachment and Development

To investigate the level of encroachment within the sites, the area of farmland, disused farmland, buildings (including schools, homesteads and churches), school grounds, and mined areas found within the cultural boundary of the sacred sites were measured. This is a conservative estimate as regenerating vegetation, patches of bare ground (where trees may have been removed) and shrubby areas (which may also be sites where trees have been cut down) may all be sites of encroachment. Development refers to the development surrounding the Kayas (as opposed to encroachment, within them), and comprises areas of buildings (including schools, homesteads and churches), school grounds, mined areas, as well as trading centres and towns. Development was not calculated for Kaya Fungo and Kaya Jibana, due to lower imagery resolution around these sites which prevented the ability to classify buildings and development features (such as mining areas).

2.6.5 Forest Loss

Forest loss is one of the major threats to biodiversity in the region (Younge *et al.*, 2002; Githitho, 2003; Anderson *et al*., 2007a). As such, the rate of forest loss within the sites and in the surrounding areas was investigated. Hansen *et al*. (2013) examined forest loss globally and generated a map with 30 x 30 m pixels. This resource is freely available to use: http://earthenginepartners.appspot.com/science-2013-global-forest/download.html. It was imported into ArcMap (10.1, Esri) and the projections of the layers were verified using known features located on the imported map and base map. Analysis from the forest loss data was based on pixel counts and is further described in section 2.8.2. To assess the area outside the sacred sites for forest loss, a buffer zone around each of the sites was created. The buffer zone was set at 7.5 km (as this is the distance to the coast from the site located furthest east, Kaya Tsolokero). The buffers were created using the "buffer" feature in ArcMap (10.1, Esri). Once the buffers surrounding each site were set they were joined together using the "join" feature in the "create features" tool box. The edges of the buffer zone were connected together to make a continuous outline with all sacred sites clipped from the polygon. The analysis of forest loss "outside" of the Kayas was then conducted using the created buffer

zone as outlined in sections 2.8.2.1 and 2.8.2.2. The area of the SNS used to calculate percentage loss within the sites was based on pixel number (not the field measured areas of sites). This was because forest loss was based on pixel count, and a consistent methodology was required for calculating area to facilitate comparisons of forest loss within the sacred sites and the surrounding area.

2.7 Data Analysis

2.7.1 Analysis of questionnaires

Analysis was conducted in IBM (version 21, IBM) in accordance with Field (2013) and Laerd Statistics (2014) and Excel (2010, Microsoft). Graphs were produced in Excel (2010, Microsoft).

2.7.1.1 Descriptive statistics
Percentages and Histograms:

Percentages and histograms were used to describe basic trends within the questionnaire data. These statistics allow for a general understanding of possible patters within the data and are often used to analyse questionnaire data (Newmark *et al.*, 1994; Campbell, 1998; Fitzgerald *et al.*, 2005; Robertson an d Lawes, 2005; White *et al.*, 2005; Khan and Ali, 2009; Etindem *et al.*, 2011). Percentages were calculated using SPSS (version 21, IBM) and histograms were produced in Excel (2010, Microsoft).

Chi-square and Post-hoc tests:

Pearson's Chi-square goodness-of-fit test was used to test whether responses given by groups within the interviewed population differ from the expected distribution (Field, 2013; Laerd, 2014). Chi square is commonly used to assess questionnaire responses (Balakrishan, 1992; Fitzgerald *et al.*, 2005; Gadd, 2005; Robertson and Lawes, 2005; White *et al.*, 2005; Törn *et al.*, 2008; Etindem *et al.*, 2011). The analysis was performed in accordance with the methods described in Field (2013) and Laerd (2014). For any analysis that violated the assumptions of the test a Monte Carlo Exact test to a 99% confidence interval was conducted. Following the Chi-square test for significant results a Post-hoc Z-test was performed with adjusted p-values using a Bonferronni method (to account for the multiple comparisons) to investigate where the differences occur. Cramer's V analysis was used to investigate the strength of the prediction value of the independent variable on the dependent variable. If

the assumptions of the analysis were violated a bootstrapped analysis was conducted based on 1000 bootstrap samples (unless otherwise stated) to a 99% confidence interval.

White *et al*. (2005) note that over the last decade an increasing number of ecological studies are using questionnaires and social surveys to collect data. Their review of 127 questionnaires in 57 journals highlights that the majority of papers investigating questionnaire data use simple descriptive statistics such as percentages and averages, and univariate statistical methodologies. Simple descriptive statistics are used in this study, along with univariate analysis of chi-square and z-tests. In addition layered chi-square, binary logistic and multinomial logistic regression is used.

2.7.1.2 Regression
Binary Logistic Regression

Binary logistic regression "predicts the probability that an observation falls into one of two categories of a dichotomous dependent variable based on one or more independent variables" (Laerd, 2014). It can be used in questionnaires to explore the probability that respondents will give specific responses to a binary question based on different attributes of the individual, such as age or gender (Robertson and Lawes, 2005; Peterson *et al*., 2008; Gubbi *et al*., 2009; Cross *et al*, 2011). The methodology followed was in accordance with Field (2013) and Laerd (2014).

Multinomial Logistic Regression

To analyse the multinomial categorical and ordinal responses further multinomial regression was used. Multinomial Logistic regression is used in a similar way to binary logistic regression (as detailed above); however, it aims to predict membership to a dependent variable which has more than two categories (Field, 2013). Multinomial logistic regression can be used to investigate responses to a range of survey questions with multiple categorical answers such as list responses and Likert scales, (Schlegel and Rupf, 2010; Tisdell and Wilson, 2012; Arbuckle Jr., 2013; Ojo *et al*., 2013). The multinomial logistic regressions were analysed in accordance to Field (2013).

2.7.1.3 Word Clouds:

Word clouds are a way to visually represent a weighted list of terms. Analysis is conducted on a list of words input into a program, which produces the image. Within the image the

more frequently a word appears within the given list or text the greater its size is in the output (France & Wakefield, 2011; Branch, 2013; Wu, 2013; Richardson *et al.*, 2014). Word clouds are used to visually represent data collected within surveys and questionnaires to indicate how often a specific response is given and highlight the most frequently used words (Singer and Hajibabaei, 2009; France & Wakefield, 2011; Branch, 2013; Wu, 2013; Richardson *et al.*, 2014). The word clouds were constructed in the online software package 'Wordle' (http://www.wordle.net) as done by Branch (2013), Wu (2013) and Richardson *et al.* (2014). The responses given to the questions from all respondents were copied directly from the database into the program. To allow for better visualisations in the image the top 80 words that were mentioned most often were used within the word cloud through the specification options in the program.

2.7.2 Analysis of mapping data

All analysis of the mapping data was conducted in ArcGIS (version 10.1, Esri), SPSS (21, IBM) and Excel (2010, Microsoft).

2.7.2.1 GIS analysis

The GIS analysis was conducted in ArcGIS (version 10.1, Esri) to investigate distances, areas, SNS features (such as habitat type), and forest loss.

Distances and areas

Distances were measured using the ruler function and measured to the nearest centimetre. Areas (in m^2) were calculated using the "calculate geometry" function within attribute Tables.

Extracting features

Extraction of features such as habitats, development features and/or forest loss data from "overlapping features", such as Kayas or buffer zones, was conducted using the "clip" function in the "geoprocessing toolbox" as done by Olfield *et al.* (2004) and Xiang (1993).

Forest Loss

Forest loss was calculated using pixel count. The input layer file of "Forest loss" was clipped using the "clip" function (as done for extraction) for each SNS and the 7.5 km buffer zone

surrounding the sites. Pixels from the dataset were noted with '1' for forest loss at that pixel during the period 2002 – 2012 and '0' for no forest loss. Total forest loss was calculated by multiplying the pixel count by 900m^2 (as pixels were 30 x 30 m resolution).

2.7.2.2 Statistical analysis
Correlation analysis

Pearson's product moment correlation analysis was used to test for associations between the features of the Kayas and areas of habitats, encroachment and forest loss. To meet the assumptions of the test, which is that the data are normally distributed (McDonald, 2014) the data were transformed using either Log$_{10}$, or arcsine transformations for proportional data (McDonald, 2014). Where data remained non-normally distributed following transformation, non-parametric Spearman's rho rank correlations were used instead (Davies and Nelson, 1994; Pearson *et al*., 1995; Short *et al*., 2005; Carlos *et al*., 2013).

Regression Plots

Least-square regression plots were used (as done by McClanhan and Arthur, 2001) to investigate the associations between Kaya features and habitats in accordance to Field (2013). Regression lines, equations and p-values were produced along with the graphs and where relevant residual analysis was conducted.

Diversity indices

Simpson's diversity index can be used to calculate the level of habitat heterogeneity, and Shannon-Weiner index investigates the how even a community is (Krebs, 1999; Nagendra, 2002; Hill et al., 2005). These two indices help to identify the diversity within habitats (Nagendra, 2002), and it is possible for them to demonstrate different trends (e.g. with a site being highly heterogeneous, but with little evenness). It is therefore important to use both indices together to understand which diversity indicator is more important (Nagendra, 2002). If a site is highly heterogeneous, but has a low level of evenness, this may indicate that although a site has a range of habitats it is dominated by one (or a few). If a site is very even, but has a low level of heterogeneity, it means that there are few different types of habitat, but the areas of these habitats are similar, so one does not dominate. High evenness or heterogeneity scores therefore do not give enough detail alone, so they are done together to get a more thorough understanding of the habitat diversity within a site. The equations used for both indicies were taken from Hill et al., (2005).

Simpson's diversity index (1-D) equation:

$$1\text{-D} = 1\text{-}\sum pi^2$$

Where *pi* is the proportion of individuals in the population belonging to population '*i*'

Shannon – Weiner Index (H') equation:

$$H' = \sum (pi \ln pi)$$

Where *pi* is the proportion of individuals in the population belonging to population '*i*'

Forest Loss

Forest loss was analysed using descriptive statistics. Chi square analysis was used to compare forest loss within the SNS (based on a total count of forest loss/no loss) compared to the surrounding area (calculated for the 7.5km buffer zone).

2.8 Limitations

In a policy paper produced by the Global Development Network (Carr and MacLachlan, 2008), a number of limitations of interdisciplinary projects are highlighted. It was noted that as interdisciplinary projects are broad they lack the depth that can be achieved through a single discipline approach. There is also the potential of a greater risk of projects failing, a clash in methodologies, issues of miscommunication, problems with terminologies used in different disciplines (which can cause confusion). In addition they note such projects they can be more time consuming and expensive, the findings may be disputed more, and there could be a conflict between different paradigms of the disciplines. Finally they argue there is also a complexity in how such projects are evaluated and the applicability or use of the outcomes may be hindered if the complexity of the information produced confuses policy makers and politicians (Carr and MacLachlan, 2008). Robertson *et al*. (2003) also note that there is often a lack of transparency in the methods in interdisciplinary research. They argue that "methods of interdisciplinary collaboration are opaque to outsiders" which limits the replicability and use of such approaches. In addition, it has been argued that through the attempt to cover more concepts, interdisciplinary approaches lose the rigour of single-subject focused work (Benson, 1982). However, those that advocate interdisciplinary approaches often acknowledged that "there is nothing that can replace the valuable knowledge generated through pure, basic research that is anchored in a particular discipline" and note that interdisciplinary work is built upon the foundations of solid disciplinary

research, without which the rigour of the interdisciplinary work would be compromised (CAHS, 2005: 16). Whilst the limitations of interdisciplinary research are noted and need to be adequately addressed, due to the issues being focused on in this work an interdisciplinary approach is required to explore the questions in a comprehensive and effective way.

There are a number of limitations associated when conducting questionnaires. While they allow a large number of people to be asked the same set of questions, and provide data which can be quantitatively analysed, they are limited in their depth and scope. Other methods such as participant observations, open unstructured interviews, and single individual focused studies, are likely to provide much more detailed and in depth information (Bernard, 2006; Newing *et al.*, 2011). However, these methods limit the number of people that can be studied and therefore the scope and generality of the study at larger scales.

The design of questionnaires can lead to bias, and whilst this was taken into consideration, and steps were taken to address the potential issues, it is possible that design errors still occurred. Errors which may have resulted from the design of the questionnaire include: 1) the types of questions that were asked (a number of questions required people to remember information they may have forgotten, may not have known about, or may not have been comfortable talking about); 2) the number of questions (whilst it was noted that people in the region were comfortable with long questionnaires (Nyamweru, 1998), there is still an issue with people not wanting to complete them if the questionnaires are long); 3) there may be limitations due to high non-respondent rates. In this study, it was not recorded how many people refused to answer the questionnaire. Therefore, despite the large number of individuals interviewed, it is not possible to assess if certain groups of individuals were missed from the interviewed population. Hence it is possible that the population interviewed may not be a truly representative sample of the population. From anecdotal information (conversations with staff), it was noted that few people refused to answer, although some did not finish. Whilst some individuals did not finish the questionnaires, their responses have been included in the analysis, so that analysis could be conducted on the sections that they did answer. In addition, there are a number of incidents within the questionnaires where respondents did not answer specific questions; however, it is not known if they did not answer them because the questions were not applicable to them, or if they refused to do so. One issue encountered with regards to questionnaire design was missing questions. For the majority of the analysis, all relevant questions were asked. However, information on

education level was not asked, and as education is known to influence people's attitudes, values and behaviours, this is a major limitation with the questionnaire and the subsequent analysis.

Not answering questions is a type of respondent bias (Crawford, 1997; Bernard, 2006; Holmes *et al*., 2006; Newing *et al*., 2011; NSS, 2014). Respondent biases can occur if respondents either do not answer questions or give incorrect information (either intentionally or unintentionally). Respondent bias is another limitation to conducting questionnaires. Respondents may give incorrect information if they are unaware that they are doing so, if they want to give an answer to a question that they do not know the answer to, if they try to give answers they think that researchers are looking for, and/or for self-preservation (especially with reference to illegal or socially unacceptable behaviour) (Bernard, 2006; Holmes *et al*., 2006; Newing *et al*., 2011; NSS, 2014). Whilst these biases may have occurred in this study, respondents were asked to give information that they believed to be true, were instructed that there were no 'wrong or right' answers, and that we were only interested in the information they would give. In addition, the questionnaires were coded so that individuals could not be identified, and they were notified that the research was being conducted independently, therefore none of the responses would have a negative impact on individuals. As well as addressing these issues in the questioning process, the large number of respondents should ensure that any outlier information which may have been given incorrectly is unlikely to significantly impact the results. However, these outlier responses were accounted for and addressed within the analysis, as it is also possible that these responses, whilst different from the majority were given correctly and may provide important information. Although lack of response was able to be dealt with for most questions through the processes discussed above, it did impact some of the analysis. In particular non-response to the jobs that individuals have prevented any analysis on livelihoods. People may not have answered the question if they did not have a job, or if they did not want to state what their job was. As this was not accounted for in the questionnaire, due to the rate of non-response, effective analysis was not possible.

As well as respondent bias there are also limitations with the accuracy of the invigilators in their recording of the information. For example, it was noted on some questions that the words that invigilators wrote down were not words that the translators recognised, these issues may have occurred if the invigilators misspelled words, or if they misheard the

respondent. However, it may also have been that the word that the respondent used is not one that the translator understands. There were also difficulties associated with handwriting. It is possible that those who were transcribing may have misread what was noted. This problem could have been either due to the invigilator, if their handwriting is poor, or the individual transcribing if they struggle to read the writing. However, whilst it was noted that on the rare occasion those transcribing had difficulty reading the handwriting, this happened very rarely, and in most instances they could work out the words based on the sentence being used. The invigilators were trained to listen to the respondents, were instructed on the importance of their handwriting and were well educated, in an attempt to reduce the problems associated with invigilator error.

Another limitation that occurred due to invigilator error was incorrect information being recorded. This did not happen often, however in one instance this error had an impact on the analysis of the data. Invigilators were supposed to write down the village name that they visited and the nearest SNS. The listed village names (provided by the local governmental area Chief) were supposed to be used, along with the corresponding SNS based on the mapping research. In a large number of cases, the invigilators used local colloquial names for the villages (which are not easily attributed to the official names or area) and they asked the respondent which was the nearest SNS. This resulted in a number of people noting home shrines as the nearest SNS, or incorrectly noting the nearest SNS. This meant that no analysis based on SNS could be done for the social data, resulting in analysis being based on the location, division and sub-district. There were also limitations with some of the answers we received, which only provided limited data. For example, when listing plants and animals used from the Kayas, some individuals could not name the plants or gave answers such as 'there is a medicinal plant that I also use for…', therefore, they had to be grouped according to function rather than name. When discussing uses some of the answers given would have benefitted from further explaination. For example, when stating 'used for tourism', it would have helped to known if this were used for observation, entertainment, pet trade or else. Similarly, some individuals noted uses for 'making money', but did not specify how. Additional information for these responses would have been useful in understanding the impact these practices may have on these species and the conservation of the SNS.

There are accuracy limitations associated with the input of the data obtained from the questionnaires. All information was transcribed from hard copies of the questionnaires and

entered into the database. While all of the questionnaires were either transcribed by me or under my direct supervision so as to ensure the accuracy of the data entry, there is always the possibility of human error. The data entry was validated by randomly checking a number of questions from a range of questionnaires at the end of each day to ensure that answers were input correctly. Whilst the information was always found to have been input correctly in these instances it is possible that due to human error other questions had been input incorrectly. However, precautions against this were taken to the best of my ability. Whilst it is noted that there are limitations with questionnaires and the choice of the type of social analysis conducted, checks were put into place to avoid errors where possible, and it is felt that they were the most appropriate tool to use to address the questions within this research.

The main limitation from the biological methodology used in this study is the use of mapping as a proxy for biodiversity. Whilst there is a range of literature which supports its use in this way (Woodroffe & Ginsberg, 1998; Ferrier, 2002; Glenn & Ripple, 2004; Benchimol & Peres, 2013; Berhane *et al*. 2013), proxies are not as accurate in determining biodiversity levels as would be achieved from more detailed field techniques such as surveys and transects (Sutherland, 2006). In addition, the analysis is only as reliable as the data available from the remote imagery. Whilst the detail available for the majority of sights was very good, there were problems with cloud cover which prevented the mapping of some areas of habitats within a couple of the sites in areas that had not been possible to access. One site, Pangani Rocks, which was not able to be mapped fully on the ground, was entirely covered by cloud. Therefore this site had to be excluded all together from the analysis due to lack of data. Along with cloud cover, issues of image clarity were noted at two of the sites. The images for both Kaya Fungo and Kaya Jorore had lower resolution and therefore fine detail was not possible to detect. Whilst this was not a problem for the habitat mapping within the sites, due to the notes from the ground truthing, the surrounding area was not able to be mapped, in detail. In particular homesteads and other signs of development were not able to be mapped for these sites, so they had to be excluded from the development analysis.

Other limitations arise from the way in which habitats were classified in the mapping. For example, detailed vegetation height information was not collected. Therefore the groupings of habitats according to height were based on the main habitat feature. Areas of shrub with a few trees, were noted as being of a medium height, even though there may have been

some vegetation within the area that were of a high height. This may result in the analysis of the data lacking finer detail of the sites. There are additional limitations with the remotely accessed information, including that obtained from the study by Hansen *et al*. (2013). The data that they used was based on 30 m x 30 m pixel resolution. This therefore meant that the calculations were based on pixel number which may not be as accurate as that obtained through the ground-truthing based mapping. However, if the calculations for percentage forest loss for all sites and the surrounding area were calculated in the same way, this will allow for the comparison across sites, despite any differences in on-ground to pixel-calculated area assessments. It is also noted that when using data obtained from other researchers, especially when not using raw data, it is not possible to check that their calculations are correct. Whilst more accurate methodologies are available, as discussed in section 2.6 such methods would not have been appropriate for the comprehensive surveying of these SNS, and would not have allowed for the comparison of such a large number of sites. Therefore, despite the limitations noted, the methods used were deemed to be the most suitable and accurate based on the constraints of this research.

Chapter 3: Biodiversity of the Mijikenda sacred sites of Kilifi District

3.1 Abstract

The Mijikenda sacred natural sites (SNS) make up part of the East African Coastal Forest ecosystem which is of high importance to global biodiversity conservation. While a number of studies note the importance of these sites for certain species, a comprehensive analysis to assess multiple sites for their importance to biodiversity has not been done, and a number of sites on the north coast have not been surveyed. Estimates for the extent of the coastal forest within the SNS and the role the SNS play in conserving biodiversity in the region are both limited and outdated. In addition, while forest loss, development in the areas surrounding the sites, encroachment and degradation of habitats within the SNS are thought to be major threats to the sites, they have not been quantified. This study sought to map the habitats within and surrounding the SNS, in order to investigate their potential for biodiversity in the region and to analyse the scale of the threat that development and encroachment may pose. The results show that the SNS vary in size and contain numerous habitats. They have undergone a slower rate of forest loss than the surrounding area. As such, they are likely to continue to be important refuges and "stepping stones" for biodiversity within the landscape. The SNS surveyed were found to account for at least 1.4% of Kenya's East African Coastal forest. This study provides some of the first accurate assessments of the extent of coastal forest within Mijikenda SNS. The sites are therefore important for biodiversity both locally and globally. However, results also show habitat encroachment is present at nearly all sites, some of which have experienced large amounts of habitat loss. Development is a threat to the sites, and the ongoing building of a tarmac road in the area is likely to increase the pressure on the sites further. The efficacy of the existing management scheme, based solely on traditional customs at all sites, is therefore bought into question in light of the substantial threats facing the sites. Conservation approaches need to be re-designed to account for importance of the SNS to biodiversity conservation and address the threats that they face.

3.2 Introduction

As outlined in Chapter 1.2, the Mijikenda sacred sites lie within the East African Coastal Forest ecoregion, also known as the "Zanzibar-Inhambane Regional Mosaic" (Burgess *et al.*, 2000; UNESCO, 2008), which is an area of global importance and a major priority for

conservation (Githitho, 1998; Matiku, 2003; Azeria *et al.*, 2007). The coastal forests, including the Mijikenda Kaya forests and sacred groves (SG), have a high level of species diversity and endemism and also contain a number of rare species (Robertson, 1986; Robertson and Luke, 1993; Burgess *et al.*, 1998; Githitho, 1998; Myers *et al.*, 2000; Githitho, 2003; Matiku, 2003; Metcalfe *et al.*, 2010). Two of the most commonly referenced studies highlighting the importance of the Mijikenda sacred sites to biodiversity, are the floristic surveys done by Anne Robertson and Quentin Luke in the late 1980s and early 1990s (Robertson, 1986; Robertson and Luke, 1993). As discussed in Chapter 1.1.4 the report conducted by Robertson and Luke (1993) was important because it studied a range of Mijikenda Kayas and sacred sites, from both the north and south coast, and created an inventory of plants found within them. Their study found that a number of the Kayas and other SNS contained rare and endemic species, and this report has gone on to be the basis for much of the subsequent research done on the biodiversity of the Kayas. Since this work, the majority of studies have focused on either particular species (e.g. Angolan colobus monkey (*Colobus angolensis palliates*); Anderson et al, 2007a), or on a limited number of sites (e.g. one site; Edwards, 2007; Kibet and Nyamweru, 2008; Kibet, 2011; Chiawo, 2012; three sites; Lehmann and Kioko, 2005; Metcalfe et al., 2010). Much of the research in recent years has been done on a number of SG and Kaya forests on the south coast and only a few in the north (primarily the Rabai Kayas). Anderson et al., (2007a) state that there are *"very few patches of coastal forest left"* in the Kilifi and Mombasa Districts on the north coast. This perception of the limited amount of coastal forest may be one of the reasons why more comprehensive studies of the SNS of the north coast have not been undertaken. In contrast, the study by Robertson and Luke (1993) highlights the potential importance of the sites on the north coast for rare and endemic species. However, their report is now over 15 years old, and a more up-to date review of the importance of the north coast SNS of the Mijikenda is needed.

At present there are no accurate estimates of the extent of coastal forest within the Mijikenda SNS. Estimates range from 0.98% (Burgess *et al.* 1998) to 10% (Githitho, 1998; 2003). They vary in the number of sites examined which leads to the disparity between them. Neither study involved measurements of the forest within the sites, but are based on rough estimates of the total areas of the SNS according to their cultural boundaries. While Githitho's (1998, 2003) work is based on a more comprehensive number of sites, it does not account for the various habitats or encroachment within the sites. It is therefore likely that the estimates by Burgess *et al.* (1998) are an underestimation (as it does not include all the

SNS), whereas Githitho (1998, 2003) is an overestimation. This research sought to address this lack of knowledge by providing accurate measurements of the coastal forest within the surveyed sites.

3.2.1 Surveying sacred sites

As mentioned in Chapter 2.7 one issue when conducting comparable biodiversity assessments in SNS, such as the Mijikenda Kayas and SG, is limited access. As highlighted in Chapters 1.1.4, 2.7.3 and 2.7.4, the local culture associated with sacred sites may mean that people who are not from the community are not permitted to enter sites, or certain areas within them (Spear, 1978; Wild & McLeod, 2008; Shepheard-Walwyn, pers. obs., 2012). Therefore, at locations where such restrictions are observed, it is not possible to conduct biodiversity sampling across the whole of a site. In addition, typical survey techniques which produce robust data for statistical analysis are often time consuming and can result in only a limited number of sites being surveyed (Sutherland, 2006). Vegetation mapping enables an assessment of the sites as a whole, does not violate cultural traditions, and allows for the comprehensive analysis and comparison of a large number of sites (Glenn & Ripple, 2004; Chapin *et al*., 2005; Bullock, 2006). Vegetation maps can be used to demarcate different types of habitats, determine the area covered by each habitat type and as a proxy for biodiversity (Woodroffe & Ginsberg, 1998; Ferrier, 2002; Glenn & Ripple, 2004; Benchimol & Peres, 2013; Berhane *et al.*, 2013). By using remote imagery, combined with on-the-ground surveying techniques, accurate maps can be produced in areas with limited access (Bullock, 2006; Dauwalter *et al.*, 2006; Glenn & Ripple, 2004).

3.2.2 Use of mapping

The size of sites and the range of habitats that they contain can be used as a proxy for determining biodiversity at a site (Chapters 1.1.4 and 2.7.6; Woodroffe & Ginsberg, 1998; Ferrier, 2002; Glenn & Ripple, 2004; Benchimol & Peres, 2013; Berhane *et al.*, 2013). As highlighted in Chapter 1.3 and 2.7.6 the area of habitat patches correlates with species diversity and the survival of particular types of species (Woodroffe & Ginsberg, 1998; Benchimol & Peres, 2013; Berhane *et al.*, 2013). The types and number of species found within a patch, as well as whether or not sites can hold minimum viable populations of those species, is related to many different drivers including habitat diversity within the patch, area of sites, isolation of patches, topography, disturbance, edge effects as well as different pressures that the sites face (Woodroffe & Ginsberg, 1998; Harcourt 2002; Fahrig, 2003; Hill

and Curran, 2003; Berhane *et al.*, 2013). The literature to date notes that the size of the Mijikenda sacred sites vary greatly (from approximately five to 250 ha), as does the range of habitats, terrains and geological features that they contain (Burgess et al., 1998; Githitho, 2003; Anderson *et al.*, 2007a; Nyamweru *et al.*, 2008). Due to this variation, different sites hold different types of plants and animals (Robertson and Luke, 1993; Githitho, 2003; Nyamweru *et al.*, 2008).

By using the mapping techniques mentioned in section 3.2.2, it would also be possible to note the distribution of the Kayas and SG in Kilifi District and gain a better understanding of their position in the landscape matrix. Small forest patches, such as SG, can act as reserves for species that cannot survive in surrounding altered landscapes and, for species which are not restricted to more intact forest, can function as "stepping stones" for biodiversity across degraded landscapes (Harvey *et al.*, 2000; Bhagwat and Rute, 2006; Aerts *et al.*, 2008; Bhagwat, 2012). Lindenmayer and Fischer (2006) define stepping stones as "relatively small patches of native vegetation scattered throughout a landscape". They note that a range of studies have been conducted which assess the use of stepping stones by different animals, including butterflies, birds and bats. It is therefore possible that similar types of animals may use the SNS as stepping stones across the coastal region. As noted by Lebbie and Guries (2008) often "small sacred groves are the only forests that exist as islands in an otherwise agricultural landscape". SNS as small patches of forests within transformed and/or degraded landscapes are observed in Sierra Leone (Lebbie and Guries, 2008), Ethiopia (Berhane-selassie, 2008), India (Bhagwat, 2012) and Kenya (Githitho, 2003; Nyamweru *et al.*, 2008). The Mijikenda SNS are observed as being some of the only forest patches left in a region that is otherwise predominantly agricultural (Githitho, 2003; Nyamweru *et al.*, 2008).

The analysis of the distribution of the SNS and the distances between them will help to provide information on the level of connectivity in the landscape. One driver which will affect the use of the sites as stepping stones is the different dispersal abilities of particular plants and animals. Both the distance between sites and the matrix surrounding habitat patches affects the likelihood of species dispersal between sites (Baum *et al.*, 2004). Some animal species may not be able to travel long distances and require specific habitats which are not found within the matrix surrounding forest patches (Woodroffe & Ginsberg, 1998; Lindenmayer and Fischer, 2006). Alternatively, they may face threats outside of the sites which can limit survival in the matrix (Woodroffe & Ginsberg, 1998; Lindenmayer and

Fischer, 2006). Plant seeds can be dispersed by animal, wind, water and be self-dispersed. Seeds which are consumed by animals, such as birds, may be transported across large distances, whereas self-dispersed species have a limited dispersal range (How and Smallwood, 1982). An understanding of the distribution of sites across the region, and the nature of the surrounding matrix, will help to provide information which can be used to make estimations of the potential of species to cross between sites which is vital for maintaining population persistence, gene flow and the re-colonisation of any vacant patches within the landscape (Baum *et al*., 2004; Lindenmayer and Fischer, 2006).

3.2.3 Forest Loss

In addition to the limited knowledge of the value of the north coast sites to biodiversity conservation, there is also a lack of up-to-date information on the rate of forest loss in these sites and within the region. Understanding the level of deforestation is important as it "is a major cause of environmental degradation" (Iftekhar and Hoque, 2005), and whilst a number of reports and studies note that the SNS (both those with formal protection and those without) are under threat from encroachment, mining and illegal logging, there are no existing estimates for their current rates of forest loss (Younge *et al.*, 2002*;* Githitho, 2003; Matiku, 2003; Anderson *et al*., 2007a; Metcalfe *et al*., 2010). As discussed in Chapter 1.2.6, the sites range in their level of protection; however the management strategy of all sites is based on traditional management (Matiku, 2003; NMK, 2008).

A global map of forest cover change for the period 2002–2012, using 30 x 30 m resolution Landsat data, was recently produced by Hansen *et al*. (2013). Their study defined forest loss as "stand-replacement, disturbance or the complete removal of tree canopy cover at the Landsat pixel scale" (30 x 30 m). The researchers released their research outputs as a freely accessible dataset which can be downloaded and imported into GIS software. The dataset thus provides a suitable tool for analysing the sacred sites of the coastal region and the surrounding areas. One criticism of the Hansen *et al*. (2013) paper was the lack of distinction between tropical forest and plantations (Tropek *et al*. 2014). Whilst this is a valid concern for some studies, as Hansen *et al*. (2014) note in their response, the dataset that they produced is enhanced when integrated with ground truth data and information on forest types. These data were therefore used alongside vegetation maps of the SNS produced in this study.

3.2.4 Encroachment and Development

As mentioned previously, encroachment and activities such as mining within the region are also major threats to Kenya's coastal forest, including the SNS (Younge *et al.*, 2002; Githitho, 2003; Matiku, 2003; Anderson *et al.*, 2007a; Metcalfe *et al.*, 2010). However, while these threats are recognised, little research has been done to investigate the extent of them. Another potential threat to the SNS which has so far been underrepresented within the existing literature is the possible impact of the roads within the region on the sites. Only one report (Younge *et al.*, 2005) mentions that roads may be a threat to the coastal forest ecosystem. There are many studies which highlight the negative ecological impacts that roads can have on sites including road kill, destruction and degradation of habitat, noise pollution, chemical and nutrient pollution (both during the construction of the roads and the vehicles once the roads have been developed), increased numbers of people through improved access to previously remote areas, the introduction of alien species, and alteration of available resources (Leonard, 1989; Forman and Alexander, 1998; Spellerberg, 1998; Trombulak and Frissell, 2000; Coffin, 2007; Laurance *et al.* 2009). Whilst it is true that some species may benefit from roads (such as carrion feeders as food availability rises due to road-kill), more often than not, roads are detrimental to most species and the ecosystem as a whole (Forman and Alexander, 1998; Trombulak and Frissell, 2000; Coffin, 2007; Laurence, 2009).

In the landscape surrounding the SNS there are a number of small dirt roads and "main" dirt roads. Whilst the small dirt roads are used mainly by people, cattle and small vehicles (bicycles and motorbikes), the main dirt roads support all types of traffic such as HGVs and coaches (Shepheard-Walwyn, pers. obs. 2012). Tarmac roads are also being developed in the region, including one which seeks to connect the main Nairobi-Mombasa highway to the Mombasa-Malindi highway on the coast. This connection will be from Mariakani (located 29km northwest of Mombasa) across to a Mavueni Junction on the coastal highway near Kilifi (north of Mombasa). The tarmac road currently extends from Mariakani to Kaloleni (located 20km northwest of Mtwapa), and its further development is intended to allow traffic to pass from the north coast to Nairobi without having to pass through Mombasa, thereby shortening travelling distances and avoiding dense traffic areas (Kenya National Assembly, 1997; Mombasa 411, 2011; Jenje and Marete, 2013; Kenya National Assembly, 2013). This improvement to the road network may have both positive and negative effects on the livelihoods of the local population and biodiversity in the region.

Roads are often important features associated with development (Leonard, 1989; Coffin, 2007; Laurance *et al.* 2009). Whilst development in the region surrounding the SNS could improve the livelihoods of the local population and in turn reduce their reliance on the SNS for subsistence, this may not be the case. There are a number of possible scenarios which may follow the development of the road network in the regions. The most positive one would be that the damage to the sites from the construction of the roads is kept to a minimum, the livelihood opportunities for the local population would improve with infrastructure development, therefore reducing their dependency on the forests for resources and thus relieving some of the pressure on the sites (Leonard, 1989; Kenya National Assembly, 1997; Kenya National Assembly, 2013). While this is possible, the improvement of road networks often increases the number of people in a region and this is likely to be the case within this area (Coffin, 2007; Laurance *et al.*, 2009). Therefore it is possible that the people who benefit from infrastructure development will be those who migrate into the region, and the local population may continue to suffer from poverty (Kamuaro, 1996; Duffy, 2002; Younge *et al.*, 2002; Lindsay, 2003; Laurance *et al.* 2009; Dudovskiy, 2012; Wodon *et al.*, 2012).

The movement of a greater number of people to the region will also probably result in higher demand for land, and therefore might amplify the levels of encroachment into the sacred sites. In addition to issues of land availability and livelihood distribution, with an enlarged migrant population it is likely that there will be a lack of adherence to local laws and traditions. Those that move or pass through the region are unlikely to be aware of, or willing to adhere to, the local traditional laws which the conservation management of the SNS are based upon. Consequently, they may damage, encroach, or degrade the habitats within them. Both Coffin (2007) and Laurance *et al.*, (2009) state that the development of roads can result in the influx of land prospectors, miners, as well as increase illegal logging and poaching (Coffin, 2007; Laurance *et al.*, 2009), which would also be detrimental to the preservation of the SNS and the biodiversity they contain. There is a lack of information in the literature on the level of encroachment within the sacred sites (both by the local people and others) and their proximity to roads. As both of these factors are likely to have impacts on the ecology of the sites and their potential levels of biodiversity, it is important to investigate here.

3.2.5 Research Questions

Main Research Question: Is the conservation of the Mijikenda SNS on Kenya's north coast important for the conservation of biodiversity?

Null Hypothesis: The conservation of the Mijikenda SNS on Kenya's north coast are not important for biodiversity conservation

Sub Questions

1. What area of coastal forest conservation is found within the SNS?

Null Hypothesis: There is no coastal forest found within the SNS

2. Do the SNS of the north coast contain a range of habitats and habitat features?

Null Hypothesis: The SNS do not contain a variety of habitats and habitat features

3. Do the sites vary in their size, habitat composition and habitat features?

Null Hypothesis: The SNS do not vary in size, habitat composition or habitat features

4. Are the SNS likely to be important to biodiversity (based on the area of different habitats and habitat features within the SNS)?

Null hypothesis: The SNS are not likely to be important to biodiversity

5. Are the SNS under threat from encroachment?

Null Hypothesis: The SNS are not suffering from encroachment

6. Are the SNS undergoing forest loss?

Null Hypothesis: The SNS are not undergoing forest loss

7. Is the rate of habitat loss within the SNS different from the rate of forest loss within the surrounding landscape?

Null Hpothesis: There is no significant difference in the rate of forest loss between the area within the SNS and the surrounding landscape

3.3 Methods

The data for this chapter were collected using both in field habitat mappiong and satellite imagery in accordance to the methodology outlined in Chapter Two part 2.6. Nineteen study sites were analysed (there are 20 culturally, but two are connecte, so therefore function as

one site ecologically). As outlined in Chapter 2.6.6, the vegetation maps were produced using hand-held Garmin eTrex GPS units and remote mapping using satellite imagery from Google Earth and ArcGIS. In addition, data on forest loss was obtained from the study by Hansen *et al.* (2013) (http://earthenginepartners.appspot.com/science-2013-global-forest). The vegetation maps were constructed using ArcCatalogue (version 10.1, Esri) and ArcMap (version 10.1, Esri) as described in Chapter 2.7.6 and areas were calculated in ArcGIS using the calculate feature. The habitats were categorised as described in Chapter 2.6.6. The habitat heterogeneity and diversity were calculated using using Simpson's diversity index and Shannon-Weiner index (Chapter 2.7.2.2). Encroachment and development were calculated in ArcGIS using the calculate feature. Forest loss was calculated using pixel number. Pixels are 900m^2 (Hansen et al., 2013), therefore allowing for the calculation of the area of forest loss. To investigate the relationship between variables correlation analysis and regression plots were used as described in Chapter 2.7.2.2. The data were analysed in ArcMap (version 10.1, Esri), Excel (2010, Microsoft) and SPSS (version 21, IBM) as described in Chapter 2.7.2.

Vaiables

Sacred Site Size – measured using field marked boundires and calculated in ArcGIS

Sacred Site location – Distances between sites measured using ruler tool in ArcGIS

Habitat type – Classified in accordance to the categorisations described in Chapter 2.6.6 (and below), and areas calculated in ArcGIS using the calculate area tool

Encroachment – measured as the area within the cultural boundary of the SNS of farmland, disused farmland, schools, homesteads, churches, other buildings, school grounds, and mined areas (as described in Chapter 2.6.4). It was calculated in ArcGIS using the calculate area tool

Development – measured as the area of schools, homesteads, churches, other buildings, school grounds, mined areas, as well as trading centres and towns surrounding the SNS (described in Chapter 2.6.4), and area calculated in ArcGIS using the calculate area tool

Distance from Roads – Distances measured using the ruler tool in ArcGIS

Forest Loss – Forest loss defined as "stand-replacement, disturbance or the complete removal of tree canopy cover at the Landsat pixel scale" (pixel size is 30 x 30 m) (Hansen *et al.*, 2013).

Habitat classifications

Table 3.1 Habitat and Map Feature Classifications

Habitat/map feature	Description/classification of habitat
Cloud/Shade	Area unable to be mapped due to cloud/shade on satellite image
Mine	Mining area (type of mining not specified)
Church and Christian Cultural Site	Church and Christian Cultural Site
Building	Building
Trading Centre/Small Town	Trading Centre/Small Town
School	School
School Grounds	Area of land a school is on
Homestead	Homestead
River	River
River bed	Area of dry riverbed
Riverbank	Riverbank
Flood Plain	Flood Plain
Grass	Medium density, low height vegetation
Farm	Farm
Disused Farm	Farmland that is no longer used
Cleared (not farm)	Area of cleared vegetation that has not been converted to farm
Bare	Bare ground
Rocky Outcrop with dense shrub and trees	High density, medium height vegetation
Dry bush	Medium density, medium height vegetation
Dry shrubby forest	Medium density, high height vegetation
Sparse Shrub with few trees	Low density, medium height vegetation
Shrub - Medium density (with few threes)	Medium density, medium height vegetation
Shrub – High density (with few trees)	High density, medium height vegetation
Mangrove	High density, High height vegetation
Brachystigia Woodland	High density, Medium height vegetation
Forest – Medium density	High density, Medium height vegetation
Forest – High density	High density, High height vegetation

3.4 Results

3.4.1 Distribution of sites and their habitats

The Mijikenda Kayas and sacred sites surveyed in this project are found to be distributed across Kilifi District (Figure 3.1). Some sites are clustered together, such as Kaya Bomu, Kaya Fimboni, Kaya Mudzimuvia, Kaya Mudzimwiru and Mzizima SG. However, others are more

Figure 3.1: Distribution of Surveyed Sacred Sites
(Base map from Google Earth, 2014)

isolated, such as Kaya Fungo. The closest two SNS are Kaya Bomu and Kaya Fimboni which are joined and, therefore, are one site ecologically (Table 3.2). These sites will be referred to in this section as Kaya Bomu/Fimboni. The most isolated sites are Kaya Fungo and Kaya

Jorore, which are over 11 km away from each other, and 14,471 km and 19,879 km respectively away from any other sacred sites. When based on a distance of 10 m or less Kayas Bomu/Fimboni and Mudzimuvia; Kayas Ribe and Bedida; and Kaya Kauma and Kambe-Kauma SG, can be grouped together (Table 3.3). Kaya Bomu/Fimboni is separated from Mudzimuvia by a river, as are Ribe and Bedida whereas Kaya Kauma and Kambe-Kauma SG are separated by a small dirt road. There are a number of sites which are less than two kilometres away from each other. These include Kayas Ribe/Bedida with Chizani SG, Kaya Chonyi from both Kizingo Hill and Kaya Jibana, and Kaya Jibana from Kambe. Kayas Bomu/Fimboni, Mudzimuvia, Mudzimwiru and Mzizima SG are next closest to Kayas Ribe/Bedida. Ribe/Bedida are closest to Kaya Kambe, which in turn is closest to Kaya Jibana. Kaya Jibana is closest to Kaya Chonyi. Kaya Jibana is also the closest site to Kaya Tsolokero and Kaya Chonyi is the closest site to Kizingo Hill SG. Kaya Kauma and Kambe-Kauma SG are closest to Kaya Chivara (7.7 1km) which is 9.87 km away from Kizingo Hill.

Table 3.2: Sacred Site (SS) distributions and separating features

SS	SS Size (ha)	Nearest SS	Distance between (m)	Separating feature/ habitats
Bedida	35.8	Ribe	8	River
Bomu	290.8	Fimboni	0	Small footpath
Chasimba Rocks	3.6	Chivara	4850	Farmland and Roads
Chivara	87.8	Chasimba Rocks	4850	Farmland, Roads, Shrub, disused farm
Chizani	0.9	Ribe	1428	Farmland, Roads, Shrub
Chonyi	197.3	Jibana	1384	Farmland, Roads, Shrub, Forest
Fimboni	77.9	Bomu	0	Small Footpath
Fungo	260.2	Jorore	11603	Farmland and Roads
Jibana	119.3	Chonyi	1384	Farmland, Roads, Shrub, Forest
Jorore	93.5	Fungo	11603	Farmland and Roads
Kambe	67.5	Jibana	1937	Farmland, Mine, Road, Shrub
Kambe-Kauma	12.4	Kauma	5	Dirt Road
Kauma	77.2	Kambe-Kauma	5	Dirt Road
Kizingo	14.1	Chonyi	1765	Farmland and Roads
Mudzimuvia	186.7	Bomu/Fimboni	10	River
Mudzimwiru	150.0	Mudzimuvia	475	Farmland, Roads, Shrub, Forest
Mwarakaya	1.1	Chonyi	1513	Farmland and Roads
Mzizima	25.5	Bomu	841	Farmland, Shrub, River
Ribe	45.5	Bedida	8	River
Tsolokero	24.5	Jibana	7177	Farmland and Roads

Table 3.3: Grouped Site Distributions
Grouped sites based on sacred sites less than 10m apart.

Sacred Forest group	Nearest Sacred Forest Group	Distance (m)
Bomu/Fimboni/Mudzimuvia	Mudzimwiru	475
Chivara	Kauma/Kambe Kauma	7712
Chizani	Ribe/Bedida	1428
Chonyi	Kizingo	1770
Fungo	Jorore	11603
Jibana	Chonyi	1935
Jorore	Fungo	11603
Kambe	Jibana	1937
Kauma/Kambe Kauma	Chivara	7712
Kizingo	Chonyi	1770
Mudzimwiru	Bomu/Fimboni/Mudzimuvia	475
Mzizima	Bomu/Fimboni/Mudzimuvia	841
Ribe/Bedida	Kambe	3200
Tsolokero	Jibana	7177

Together the total area of non-encroached habitat for Kaya Bomu and Kaya Fimboni sites is 365.7 ha. Together Bomu/Fimboni and Mudzimuvia have a non-encroached habitat area of 551.3 ha, Kaya Ribe and Kaya Bedida have a combined non-encroached habitat area of 81.0 ha, and Kaya Kauma and Kambe-Kauma SG together have a non-encroached habitat area of 80.7 ha.

3.4.3 Sacred Site Area and Habitat Analysis

All surveyed sacred sites varied in size, contained a number of different habitat types, exhibited different levels of forest loss and encroachment, and varied in their distance from roads (Table 3.4; Figures 3.2 to 3.18). The sites with the highest levels of habitat heterogeneity were Kaya Chivara and Mzizima SG. The average number of habitat types within the sacred sites is 5.65 (the range of the number of habitats within the sites was found to be normally distributed under Shapiro-Wilk test W = 0.936, df = 19, p = 0.220). The sites range in size from 0.86 ha (Chizani SG) to 368.7 ha (Kaya Bomu/Fimboni). Kaya Bomu/Fimboni also has the largest area of dense forest. However, Kaya Tsolokero has the greatest proportion of dense forest in relation to its overall area. Although not all sites contain extensive areas of dense coastal forests, most contain at least some (16 out of 20; Table 3.4). The SNS analysed in this project contained 11.1 km^2 of medium to high density coastal forest.

Table 3.4: Habitats and features associated with north coast sacred sites

Sacred Site (SS)	Area (ha)	Number of habitat types	(%) Building	Bare	Vegetation cover (%) Density Low	Medium	High	Height Low	Medium	High	Mixed	Dense forest (ha)	Dense forest (%)	Dominant habitat type
Bedida	35.8	5	0.00	0.00	16.12	8.31	75.6	0.00	7.03	76.9	16.10	27.03	75.6	Dense forest
Bomu/Fimboni	368.7	8	0.00	0.11	3.38	19.85	96.4	0.00	9.76	85.3	0.69	248.39	67.4	Dense forest
Chasimba	3.6	3	0.00	0.00	0.00	12.41	87.6	0.00	10.20	0.0	89.80	0.00	0.0	Rocky dense shrub & trees
Chivara	87.8	10	0.00	1.27	2.97	26.90	68.8	0.00	31.99	63.7	3.03	55.14	63.0	Dense Forest
Chizani	0.9	1	0.00	0.00	0.00	12.37	87.6	0.00	0.00	87.6	12.40	0.76	87.6	Dense Forest
Chonyi	197.3	9	0.24	0.00	6.09	43.67	49.6	2.12	41.97	18.3	37.61	29.55	15.0	Farm
Fungo	260.2	7	0.00	0.39	42.44	54.63	0.77	1.93	0.78	56.4	42.30	0.00	0.0	Dense Forest
Jibana	119.3	5	0.00	0.08	0.33	2.39	97.2	0.01	0.49	96.8	2.54	98.28	82.7	Dense Forest
Jorore	93.5	5	0.00	0.00	17.70	29.75	52.5	0.00	82.19	0.0	17.81	0.00	0.0	Dense shrub with trees
Kambe	67.5	7	0.00	0.24	6.32	13.13	80.2	0.00	0.90	80.2	17.69	53.18	78.8	Dense Forest
Kambe-Kauma	12.4	3	0.00	1.21	0.00	62.36	36.4	0.00	62.36	36.4	0.00	4.51	36.4	Disused Farm
Kauma	77.2	5	0.00	0.15	6.13	1.55	92.2	0.00	0.91	92.1	6.84	71.01	92.1	Dense Forest
Kizingo	14.1	4	0.00	0.00	1.62	1.73	96.6	0.84	1.12	0.0	1.39	0.00	0.0	Dense shrub with trees
Mudzimuvia	186.7	6	0.00	0.04	1.46	35.64	61.7	0.00	11.50	86.3	1.82	111.31	59.6	Dense Forest
Mudzimwiru	150.0	6	0.00	0.37	5.46	67.92	26.3	4.30	0.04	80.9	14.40	39.41	26.3	Medium density forest
Mwarakaya	1.12	3	0.00	0.00	0.00	1.61	98.4	0.00	1.01	0.0	99.00	0.00	0.0	Rocky dense shrub & trees
Mzizima	25.5	10	0.00	0.01	5.57	7.42	87.0	1.46	7.02	82.5	8.92	21.00	82.4	Brachystigia Woodland
Ribe	45.5	8	0.00	0.00	0.45	4.85	94.7	0.00	5.78	94.3	0.00	40.95	94.3	Dense Forest
Tsolokero	24.5	3	0.00	1.47	0.00	0.91	97.6	0.00	0.00	97.6	0.91	23.89	97.6	Dense Forest

Table 3.4 (continued): Habitats and features associated with north coast sacred sites.
Legend: NA = Sites close to a main dirt road or tarmac road but not near a small dirt road

Sacred Site	Road Within	Encroachment (m²)	Development in Buffer Zone (m²)	Not Encroached (ha)	Forest loss (ha)	Forest loss (%)	Dist. From road (m)		
							Tarmac	Main Dirt	Small Dirt
Bedida	No	2160	2977	35.54	0.45	1.33	1575.3	163.2	69.5
Bomu/Fimboni	No	29632	277478	365.70	2.25	0.65	155.0	1024.8	0.0
Chasimba	No	800	18673	3.54	0.00	0.00	11547.1	36.5	NA
Chivara	Dirt	525	14125	87.76	0.18	0.22	13284.7	647.9	Within site
Chizani	No	1068	1266	0.76	0.00	0.00	3269.2	36.1	NA
Chonyi	Main Dirt	763992	341767	120.87	0.54	0.29	5000.9	Within site	NA
Fungo	Dirt	35395	Unknown	256.65	0.12	0.48	7170.3	0.0	Within site
Jibana	No	22645	155602	116.98	1.08	0.96	3496.4	136.8	NA
Jorore	No	1357	Unknown	93.34	0.81	0.92	16344.9	133.3	2.9
Kambe	No	87302	375686	58.78	1.08	1.71	1740.5	0.0	0.0
Kambe-Kauma	Dirt	77194	7841	4.63	0.27	2.38	10875.5	630.8	Within site
Kauma	No	12182	181916	76.02	0.18	0.25	10260.4	21.5	0.0
Kizingo	No	866	58671	14.00	0.00	0.00	5395.0	396.6	0.0
Mudzimuvia	No	11027	145658	185.59	1.35	0.77	1057.7	50.6	NA
Mudzimwiru	No	198060	263707	130.25	1.35	0.96	816.4	0.0	NA
Mwarakaya	No	67	63797	1.11	0.00	0.00	8168.7	89.6	49.6
Mzizima	No	7518	51312	24.76	1.08	4.53	4465.4	2140.8	195.2
Ribe	No	0	1364	45.45	0.00	0.00	4547.3	94.9	0.0
Tsolokero	Dirt	2257	82386	24.25	0.00	0.00	5031.0	441.9	Within site
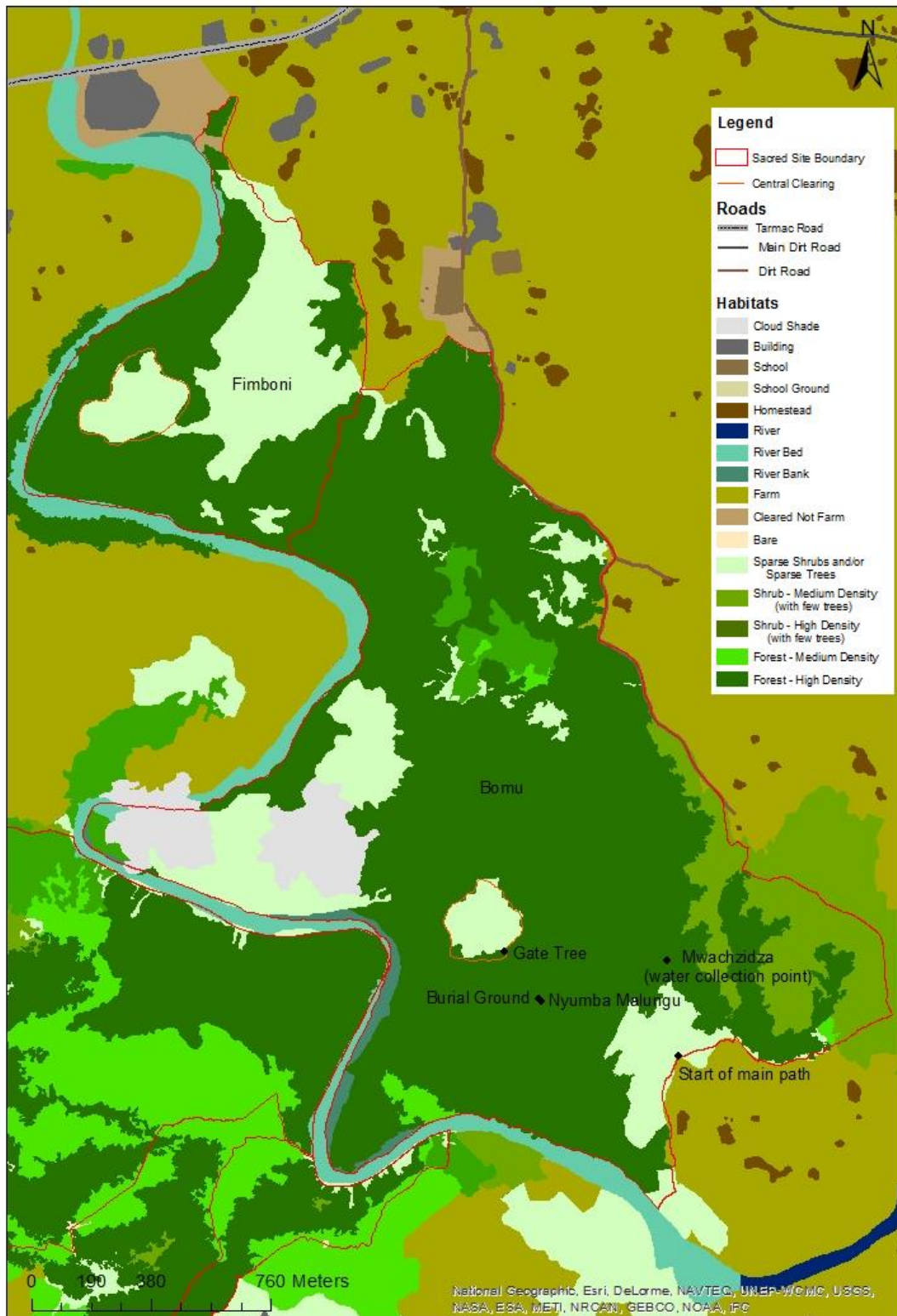
Figure 3.2: Habitat map of Kaya Bomu and Kaya Fimboni

Figure 3.3: Habitat map of Chasimba Rocks

Figure 3.4: Habitat map of Kaya Chivara
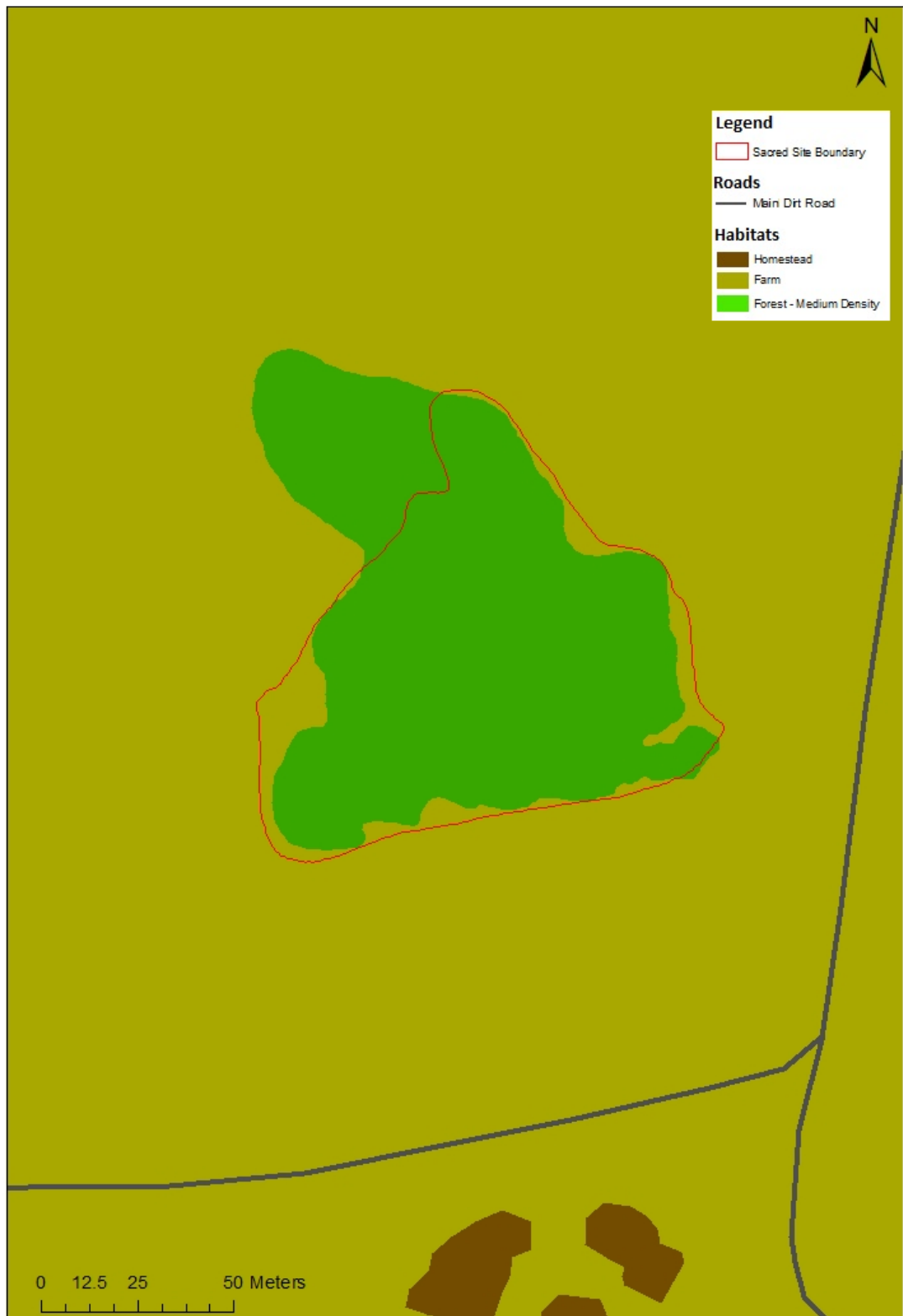
Figure 3.5: Habitat map of Chizani Sacred Grove
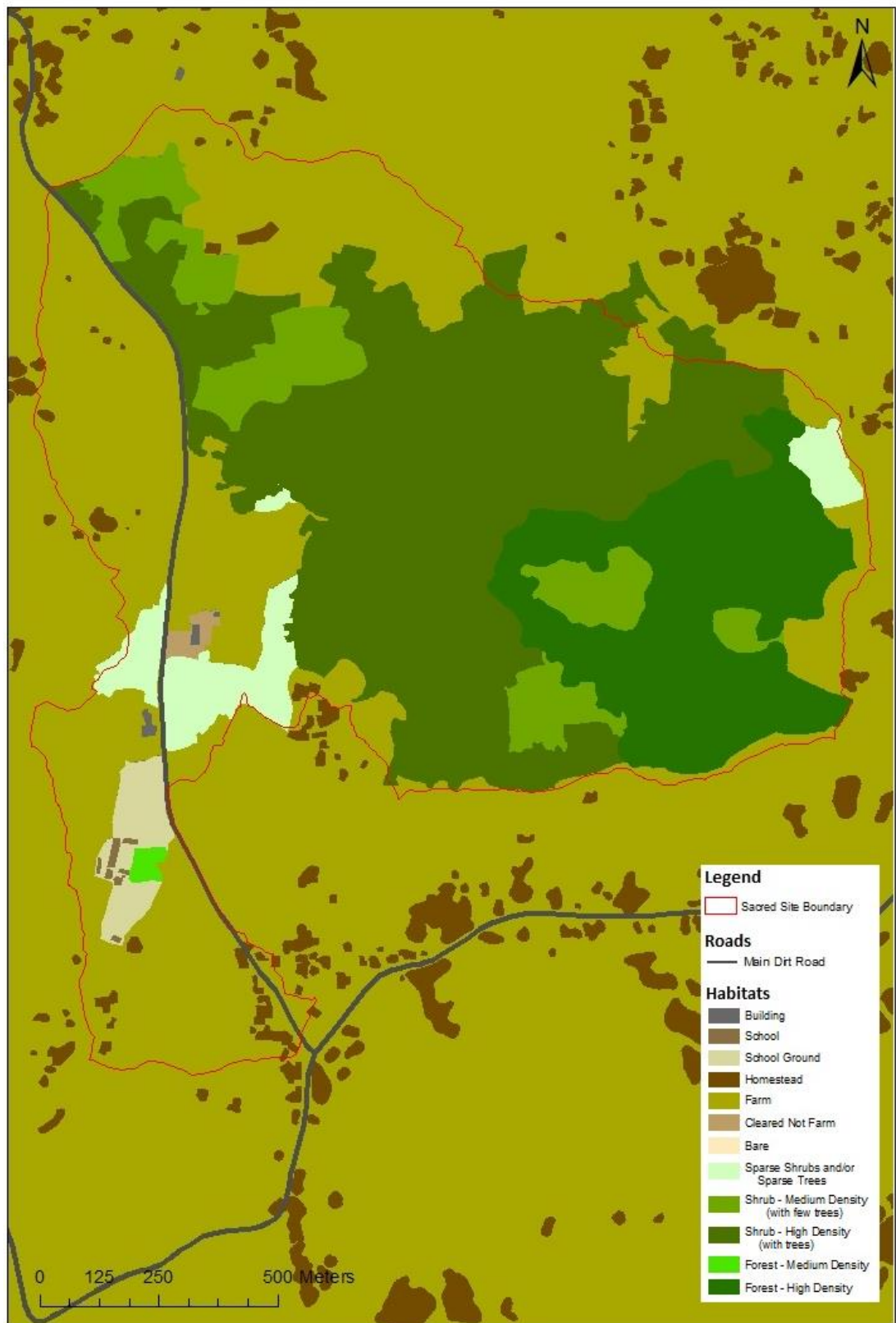
Figure 3.6: Habitat map of Kaya Chonyi
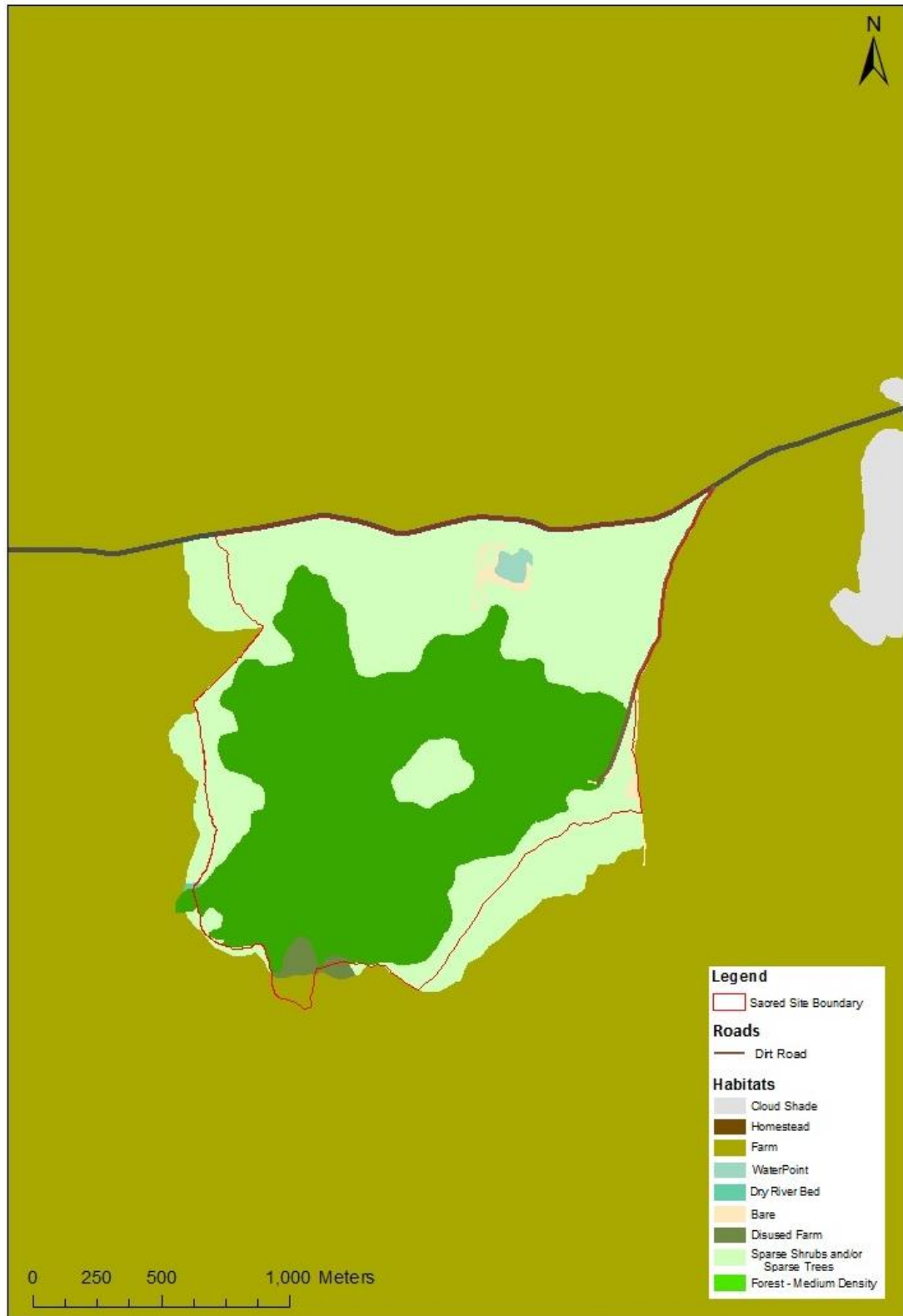
Figure 3.7: Habitat map of Kaya Fungo
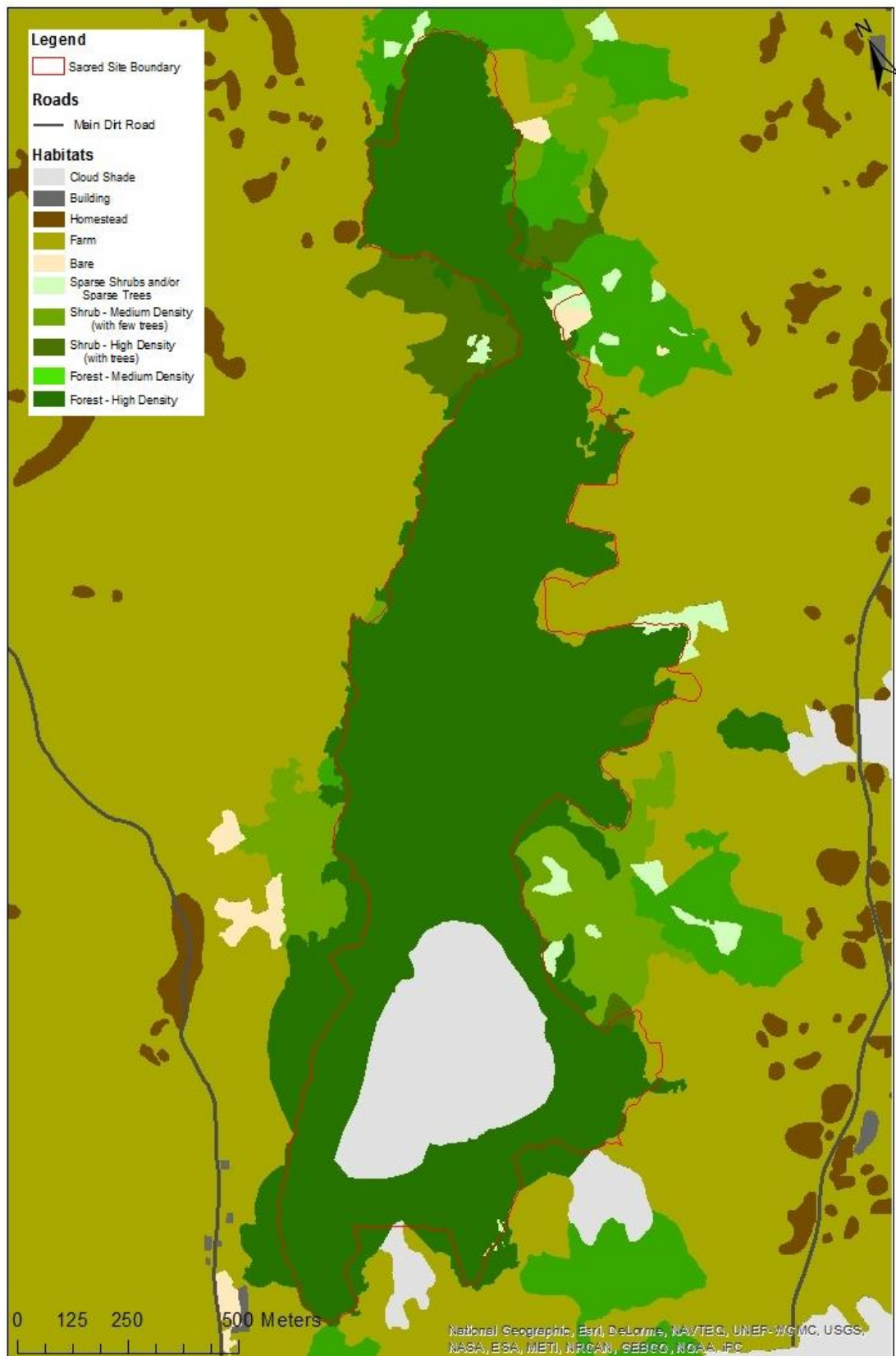
Figure 3.8: Habitat map of Kaya Jibana
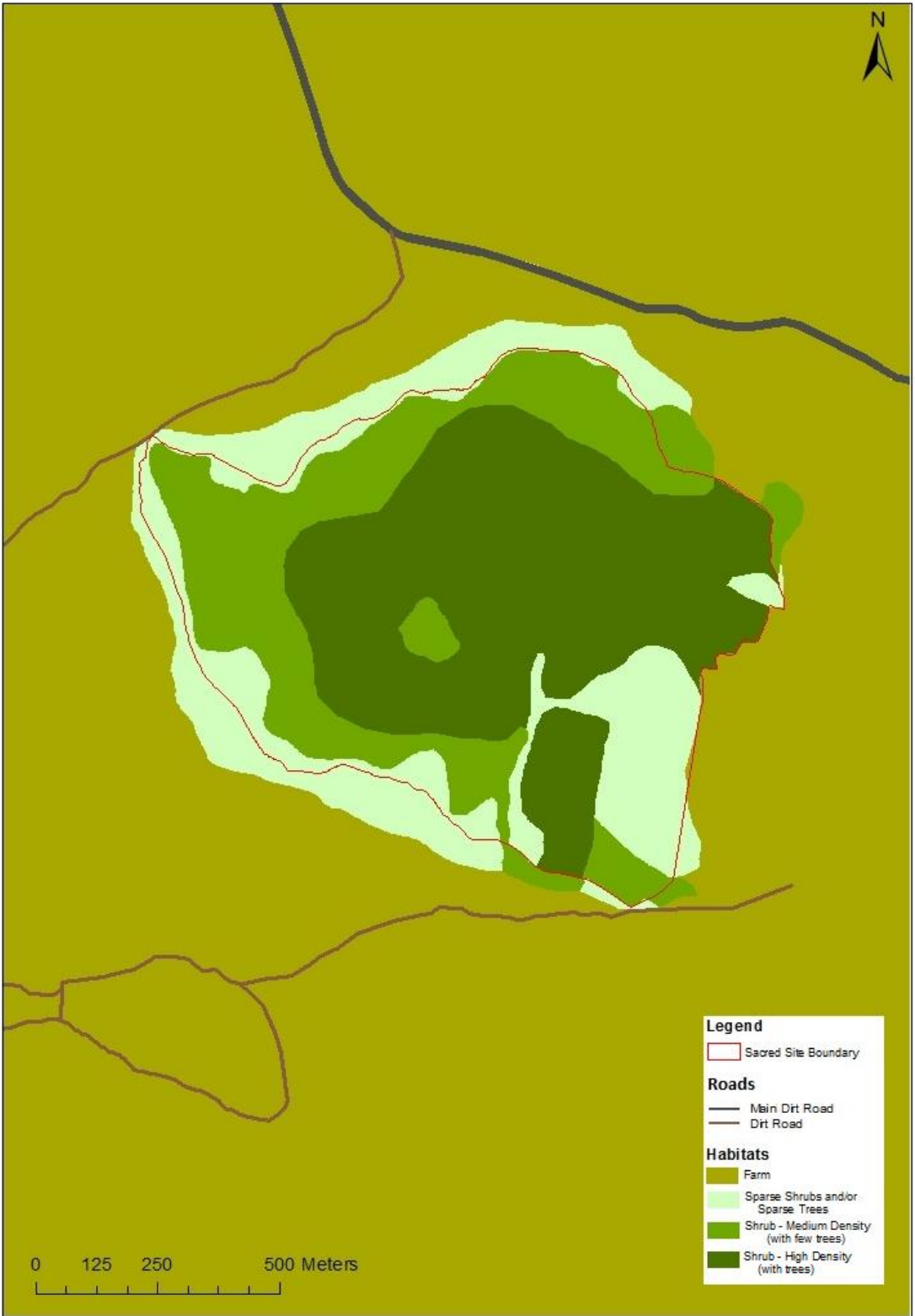
Figure 3.9: Habitat map of Kaya Jorore
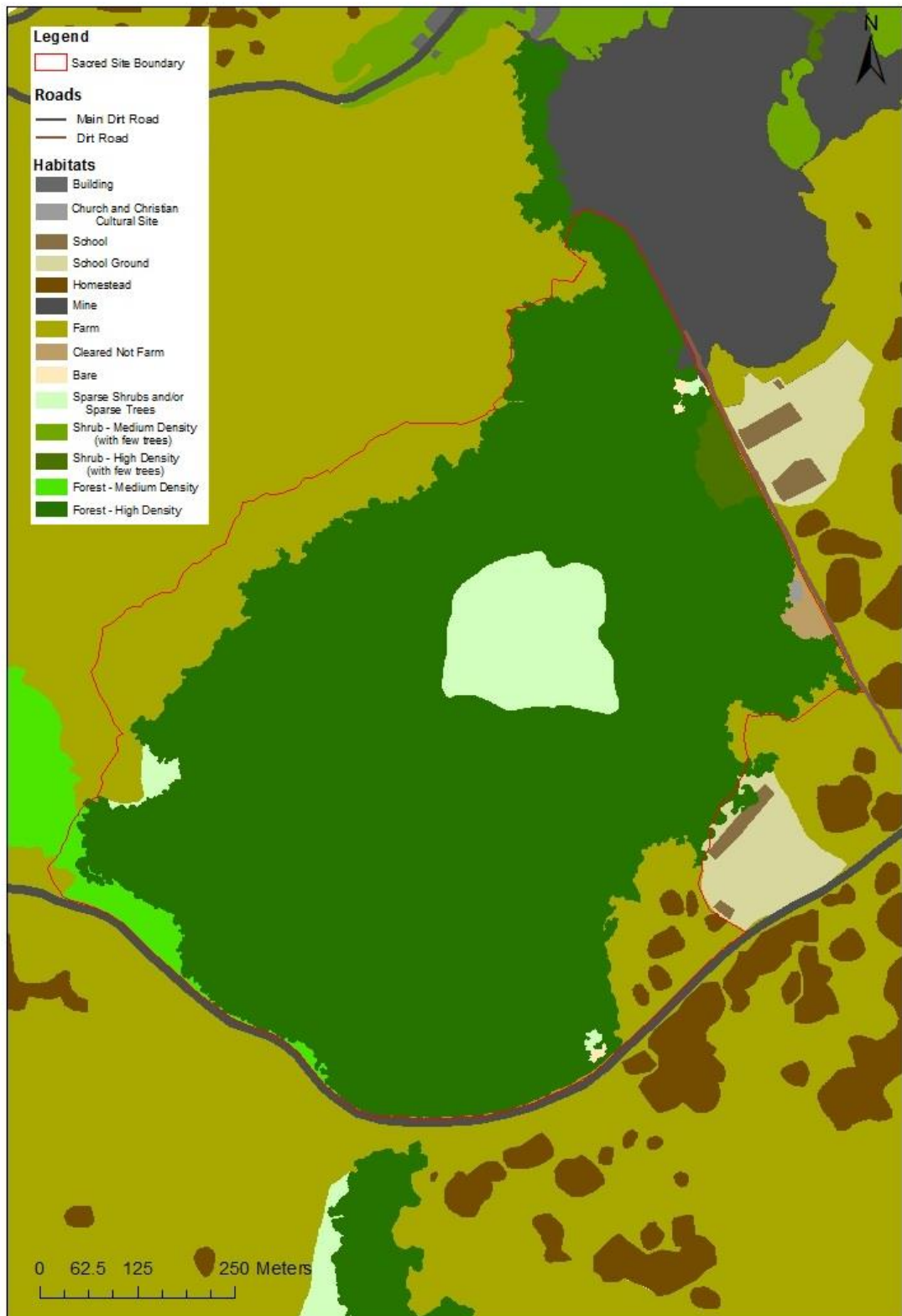
Figure 3.10: Habitat map of Kaya Kambe
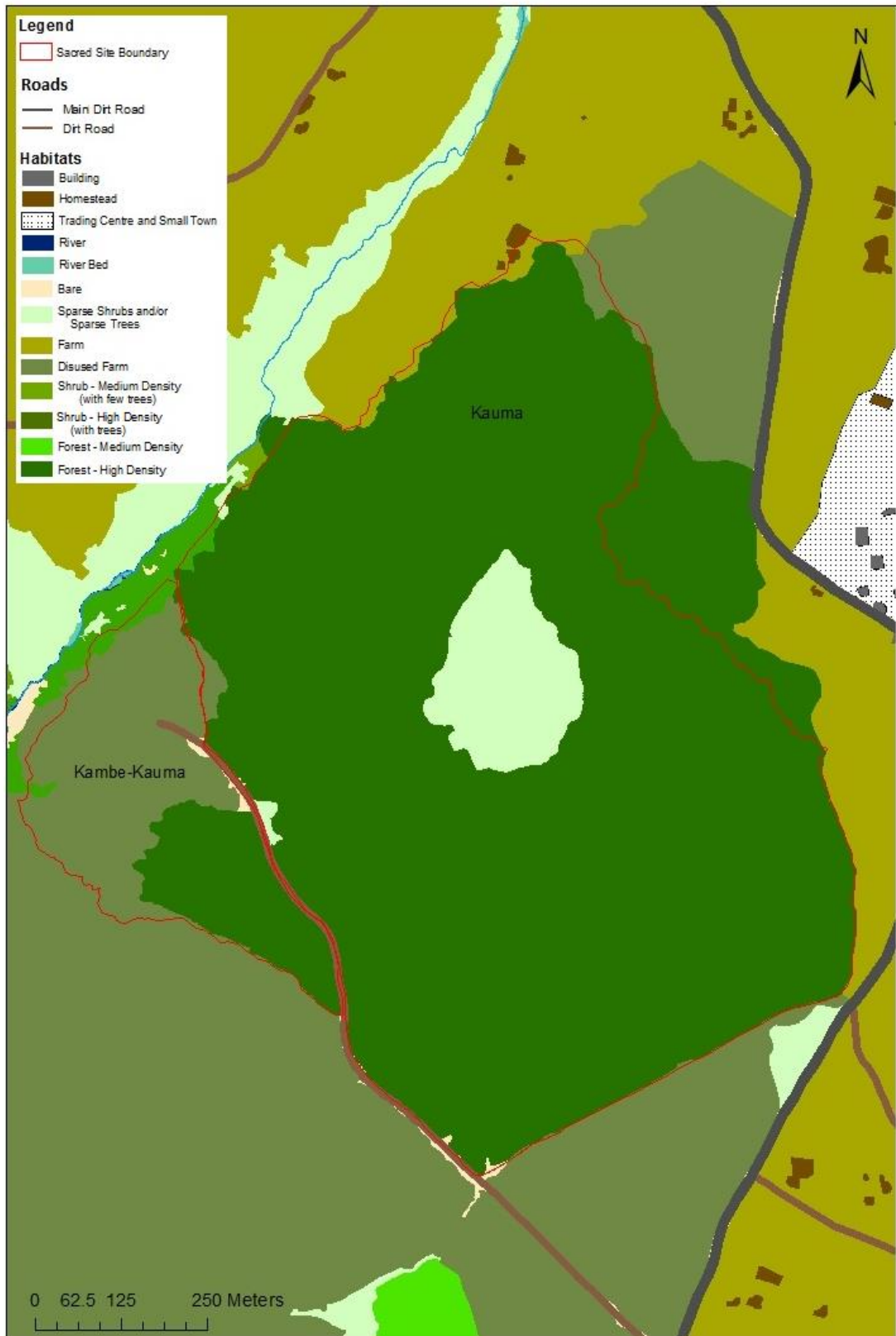
Figure 3.11: Habitat map of Kaya Kauma and Kambe-Kauma Sacred Grove

Figure 3.12: Habitat map of Kizingo Hill Sacred Grove
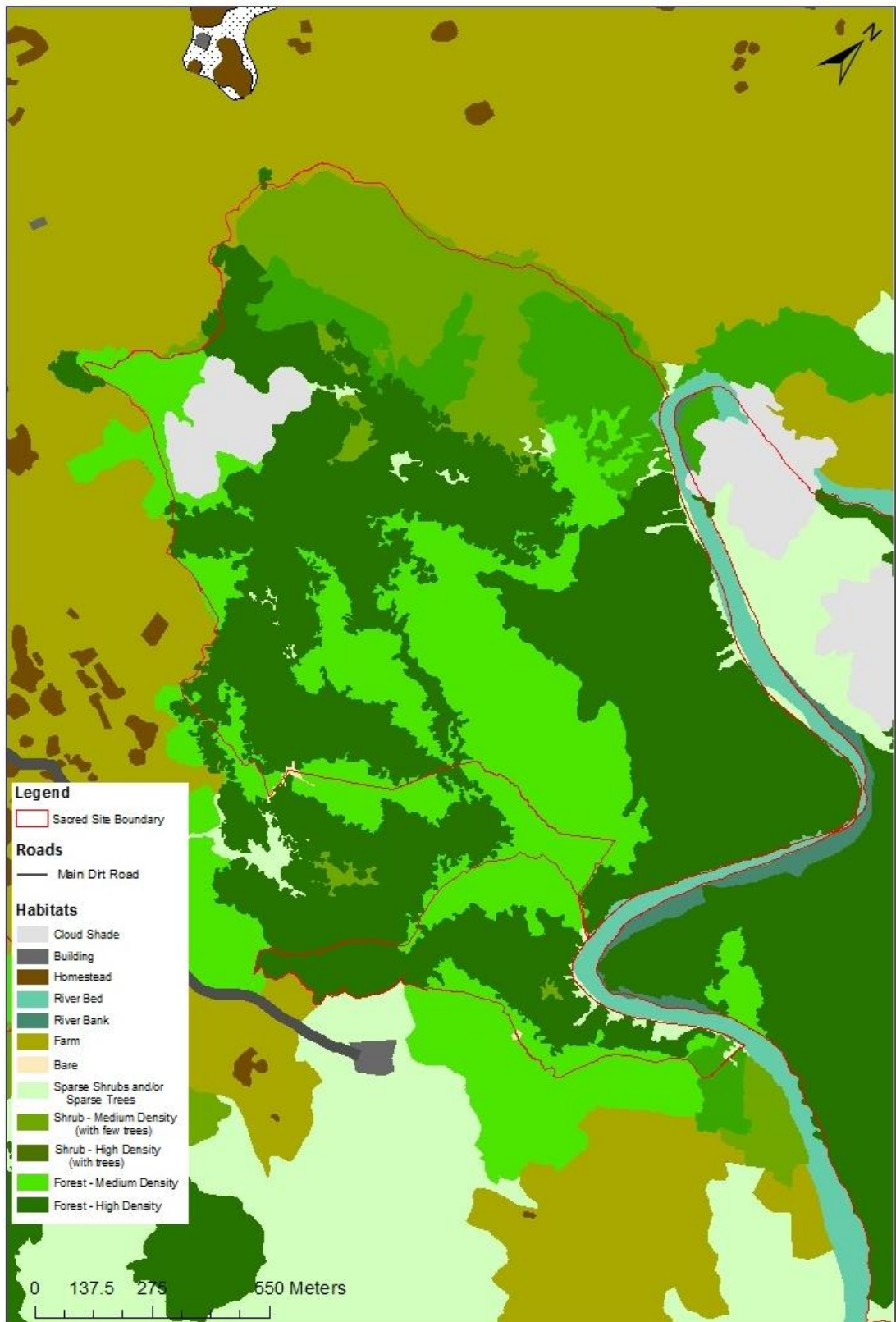
Figure 3.13: Habitat map of Kaya Mudzimuvia

Legend

Sacred Site Boundary

Roads
— Main Dirt Road

Habitats
Cloud Shade
Building
Homestead
River Bed
River Bank
Farm
Bare
Sparse Shrubs and/or Sparse Trees
Shrub - Medium Density (with few trees)
Shrub - High Density (with trees)
Forest - Medium Density
Forest - High Density

0   137.5   275   550 Meters
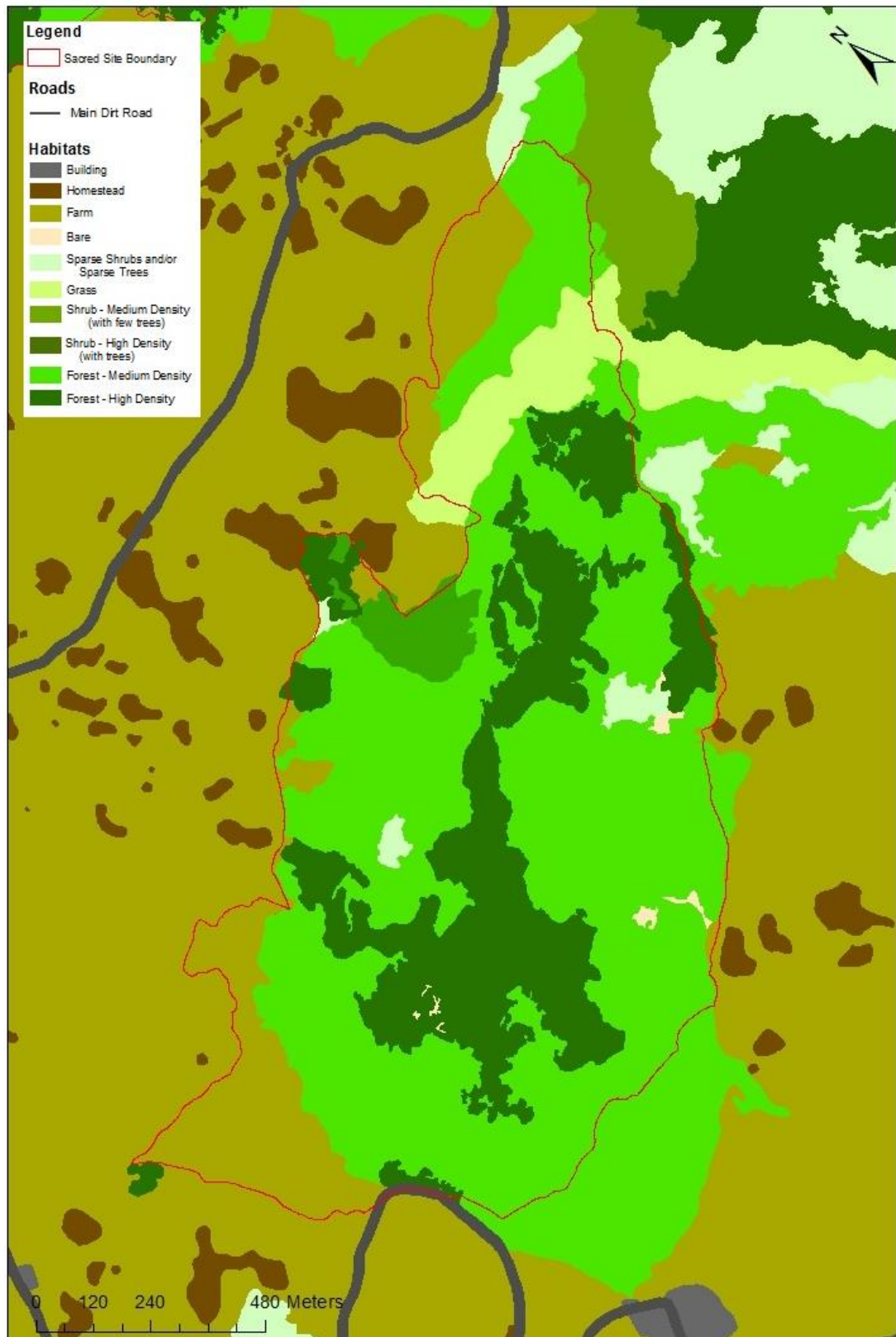
Figure 3.14: Habitat map of Kaya Mudzimwiru

Figure 3.15: Habitat map of Mwarakaya Rocks
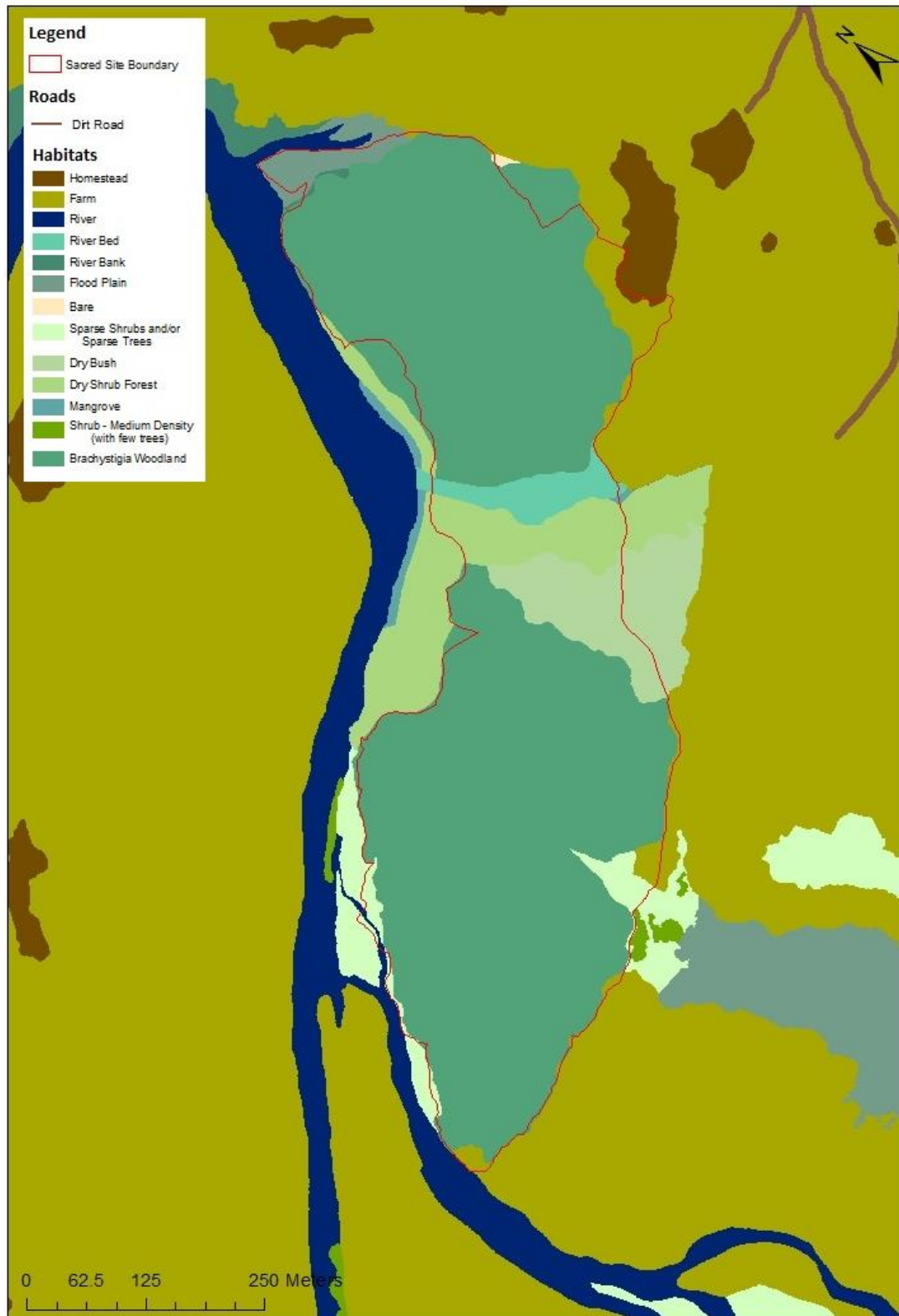
Figure 3.16: Habitat map of Mzizima Sacred Grove
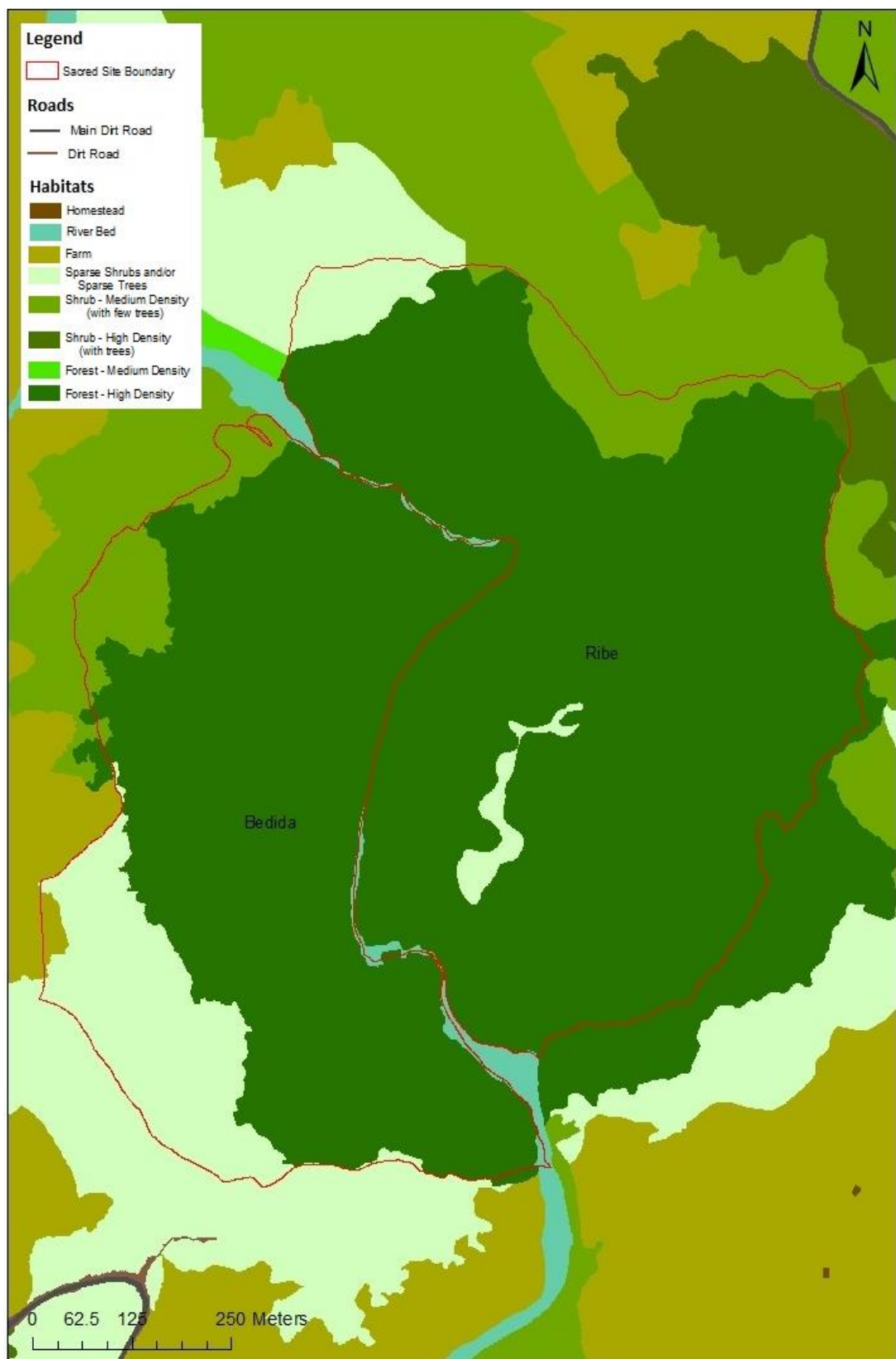
Figure 3.17: Habitat map of Kaya Ribe and Kaya Bedida
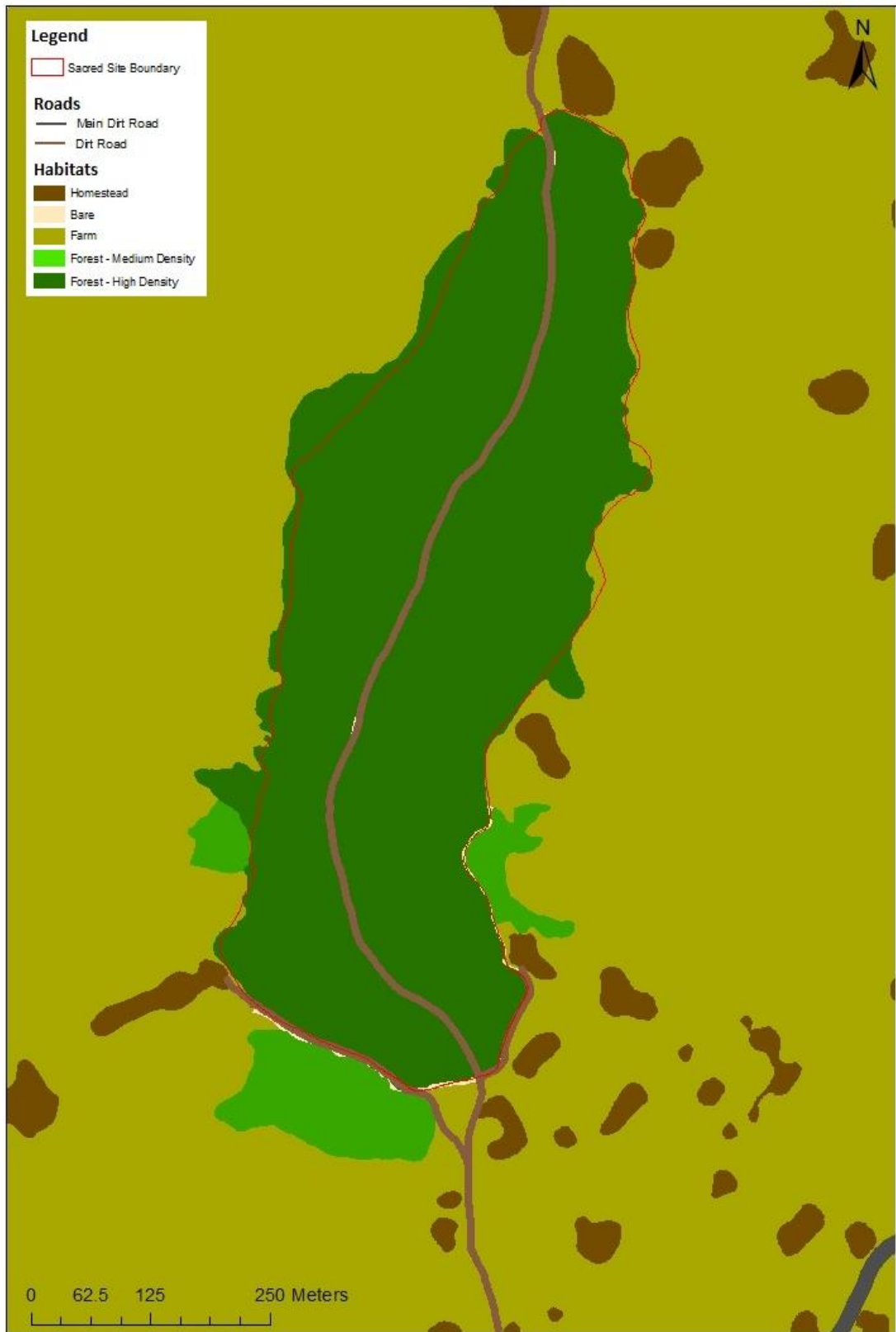
Figure 3.18: Habitat map of Kaya Tsolokero

Dense habitat comprises the largest proportion of habitat in 17 of the sites. The remaining three (Kaya Fungo, Kambe-Kauma SG and Kaya Mudzimwiru) have greater proportions of medium density vegetation habitat. All sites have a number of different levels of density of habitat within their boundaries and contain both medium and high density vegetation. The site which has the greatest proportion of dense vegetation is Mwarakaya rocks. Of the larger 'forest' sites, that with the largest proportion of dense vegetation is Kaya Tsolokero (which also has the largest proportion of dense forest). Eight sites (Kaya Chivara, Kaya Fungo, Kaya Jibana, Kaya Kambe, Kaya Kauma, Kaya Mudzimuvia, Kaya Mudzimwiru, and Mzizima SG) had all four densities of habitat (bare, low, medium and high).

There are also a range of vegetation heights in the different SNS. All of them had vegetation that was predominantly either medium or high height, and 14 sites had both. Six of the sites (Kaya Fungo, Kaya Jibana, Kaya Kambe, Kaya Mudzimuvia, Kaya Mudzimwiru and Mzizima SG) had all five height categories (bare, low, medium, high and mixed) of vegetation represented, meaning they were the most structurally complex. The classification for vegetation height in this study was coarser than the density of vegetation. Analysis of proportional areal extents (based on arcsine transformations) showed that the area of a SNS was significantly positively correlated with the proportion of low density vegetation within the site, but negatively correlated with the proportion of high density habitat (Table 3.5, Figures 3.19 and 3.20). When assessing the proportions of high density vegetation the results show that Kambe-Kauma SG had a lower proportion of high density habitat than its size would predict compared to all other sites, whereas Kaya Tsolokero had a much greater proportion.

Table 3.5: Correlation (r) between area of all sacred sites and habitats
Legend: Thick Forest = High density, High height vegetation; Analysis conducted using Pearson's Product Moment Correlation. [1] = Transformed using Log_{10}; [2] = Transformed using arcsine

		Vegetation cover (proportions)							Proportion Thick Forest[2]	Proportion Non-encroached[2]
		Density			Height					
		Low[2]	Medium[2]	High[2]	Low[2]	Medium[2]	High[2]	Mixed[2]		
Area SS[1]	r	0.503	0.170	-0.577	0.319	0.135	-0.294	0.020	0.390	0.073
	N	19	19	19	19	19	19	19	19	19
	p	**0.028**	0.487	**0.010**	0.183	0.581	0.222	0.934	0.098	0.766
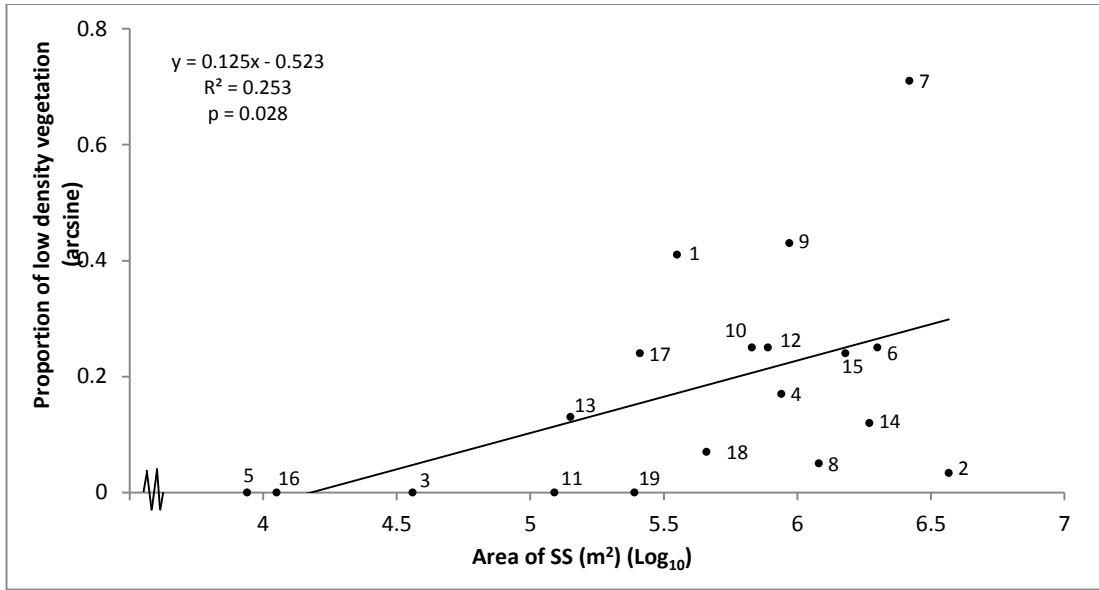
Figure 3.19: Association between area of SS and area of low density vegetation with least-squares regression line

Legend: 1) Bedida; 2) Bomu/Fimboni; 3) Chasimba rocks; 4) Chivara; 5) Chizani; 6) Chonyi; 7) Fungo; 8) Jibana; 9) Jorore; 10) Kambe; 11) Kambe-Kauma; 12) Kauma; 13) Kizingo Hill; 14) Mudzimuvia; 15) Mudzimwiru; 16) Mwarakaya rocks; 17) Mzizima; 18) Ribe; 19) Tsolokero
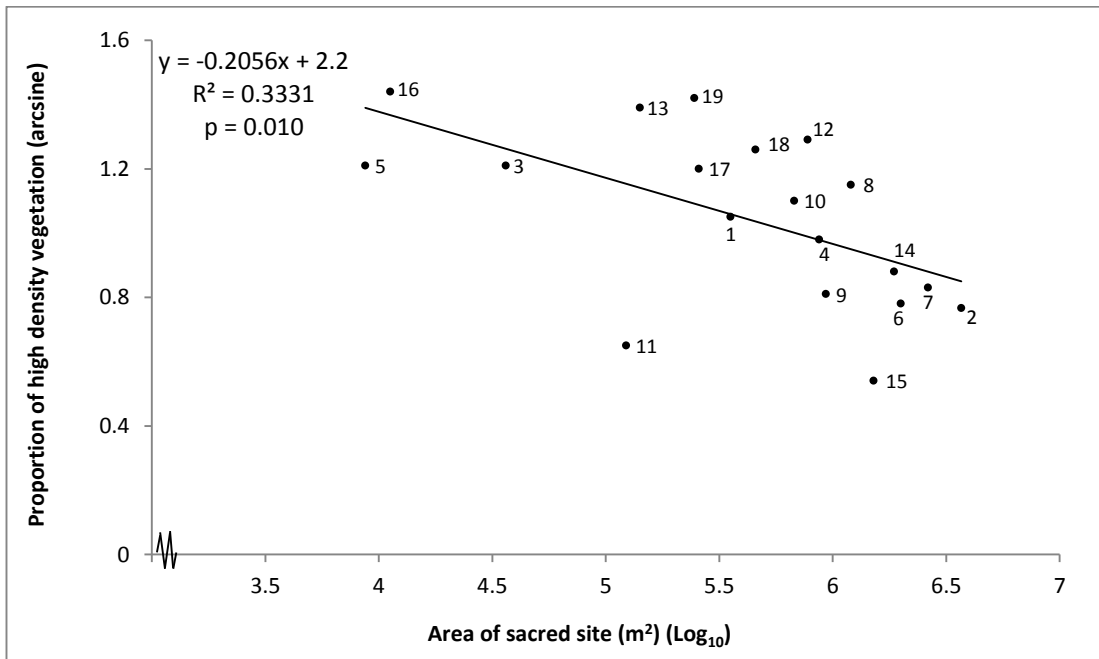
Figure 3.20: Association between area of SS and area of high density vegetation with least-squares regression line. For legend see Figure 3.19

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The results show that there was large variation in the area and number of habitats that the sacred sites contain (Figures 3.2 – 3.18). The greatest total area of non-encroached habitat was within Kaya Bomu/Fimboni at an area of 368.7 ha. The site with the greatest habitat heterogeneity (using Simpson's diversity Index) and habitat evenness (under Shannon-Wiener index) was Kaya Chonyi (Table 3.6). Chizani SG was the smallest SNS containing one type of habitat (under the classifications in this study), and therefore the lowest level of habitat heterogeneity of all the sites surveyed.

Table 3.6: Analysis of habitats, habitat heterogeneity and evenness of sites

Site	Number of habitats	Area non-encroached (m²)	Simpson's Index (1-D)	Shannon-Wiener (H')
Bedida	5	35.54	0.401	0.767
Bomu/ Fimboni	6	365.70	0.370	0.754
Chasimba	2	3.54	0.187	0.334
Chivara	7	87.76	0.546	1.108
Chizani	1	0.76	0.000	0.000
Chonyi	5	120.87	0.609	1.135
Fungo	4	256.65	0.497	0.715
Jibana	5	116.98	0.020	0.069
Jorore	3	93.34	0.310	0.527
Kambe	5	58.78	0.177	0.395
Kambe -Kauma	2	4.63	0.063	0.143
Kauma	4	76.02	0.120	0.246
Kizingo Hill	3	14.00	0.054	0.145
Mudzimuvia	6	185.59	0.540	0.965
Mudzimwiru	6	130.25	0.509	0.886
Mwarakaya	2	1.11	0.020	0.057
Mzizima	10	24.76	0.275	0.665
Ribe	6	45.45	0.184	0.420
Tsolokero	2	24.25	0.029	0.077

3.4.4 Roads

The results show (Table 3.7) that there was a significant negative association between the distance from a tarmac road and the area of high density vegetation within the SNS (Figure 3.21). There were also significant negative correlations between the distance of a site from the tarmac road and the area of high height vegetation (Figure 3.22) and the area of thick

Table 3.7: Correlation (r / r_s) between the distance from a tarmac road and SS features
Legend: Thick Forest = High density, High height vegetation; Analysis conducted using Pearson's Product Moment Correlation unless otherwise noted. Corr. = Correlation; [1] = Log_{10} transformed; [2] = Arcsine transformed, [3] = Analysed using Spearman's Rho correlation (to account for lack of normality in distribution of results)

			Tarmac Road [1]		
			r / r_s	N	p
Area of SS (m^2) [1]			-0.374	19	0.115
Vegetation Cover	Density	Low			
		Area (m^2) [1, 3]	-0.163	19	0.505
		Proportion [2]	0.134	19	0.585
		Medium			
		Area (m^2) [1]	-0.397	19	0.093
		Proportion [2]	-0.016	19	0.948
		High			
		Area (m^2) [1]	-0.376	19	**0.0113**
		Proportion [2]	0.269	19	0.265
	Height	Low			
		Area (m^2) [1, 3]	-0.309	19	0.198
		Proportion [2]	-0.093	19	0.705
		Medium			
		Area (m^2) [1, 3]	0.066	19	0.787
		Proportion [2]	0.448	19	0.054
		High			
		Area (m^2) [1]	-0.485	19	**0.035**
		Proportion [2]	-0.162	19	0.508
		Mixed			
		Area (m^2) [1]	-0.319	19	0.183
		Proportion [2]	-0.091	19	0.711
Thick Forest		Area (m^2) [1, 3]	-0.475	19	**0.040**
		Proportion [2]	-0.297	19	0.216
Habitat		Area (m^2) [1]	-0.391	19	0.098
		Proportion [2]	-0.071	19	0.774

forest (Figure 3.23). There was no significant correlation between the distance of the SNS and any other areas of vegetation coverage, proportion of vegetation coverage within the sites, or the area of encroachment within the sites.
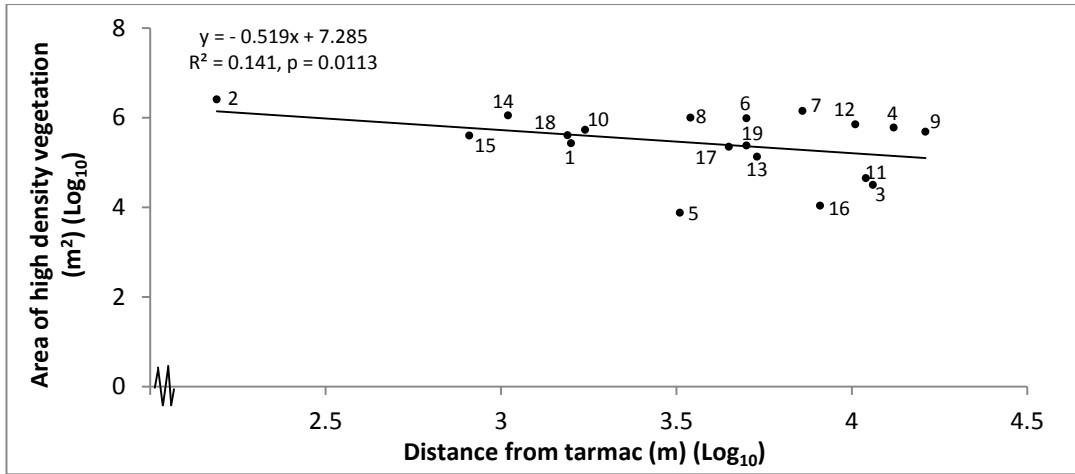
Figure 3.21: Association between Distance from tarmac roads and area of high density vegetation with least-squares regression line. For legend see Figure 3.19
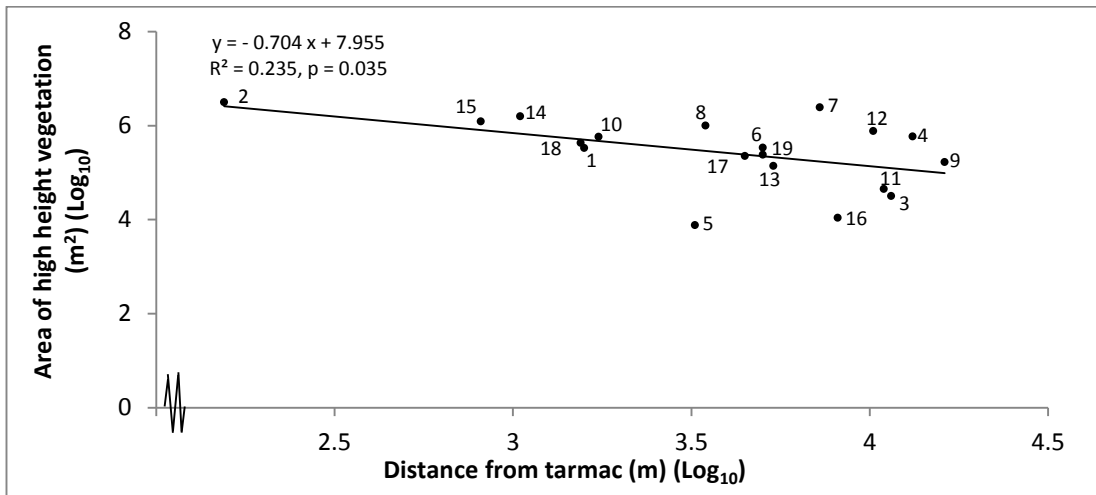
Figure 3.22: Association between Distance from tarmac roads and area of high height vegetation with least-squares regression line. For legend see Figure 3.19
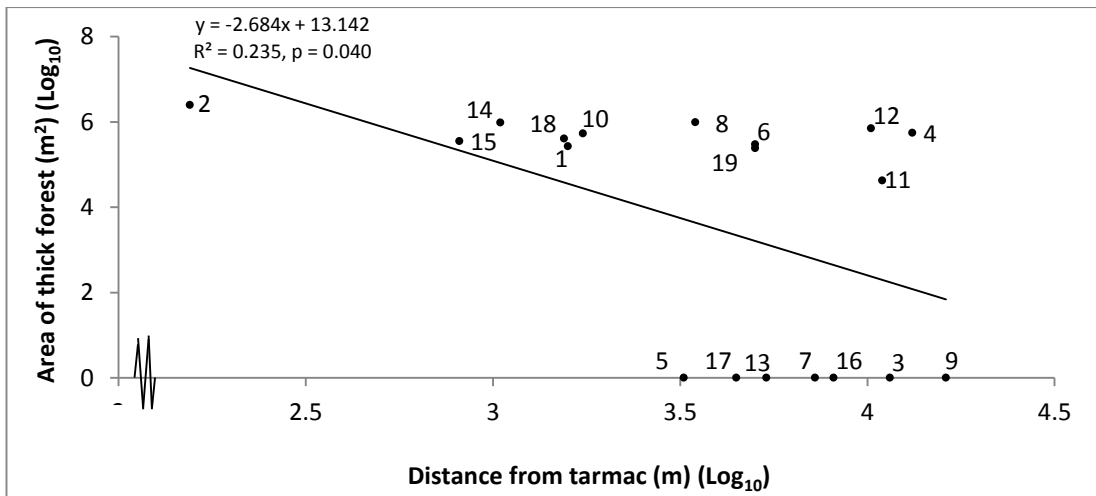
Figure 3.23: Association between Distance from tarmac roads and area of thick forest with least-squares regression line. For legend see Figure 3.19

3.4.5 Encroachment and Development

All sites except for Kaya Ribe had some level of encroachment (defined in section 3.3) within their boundary (Figure 3.24). The largest area of encroachment was in Kaya Chonyi, where over 76 ha (38.4%) of the area within the sacred site is encroached. However, the site with the highest proportion of encroachment was Kambe-Kauma SG with 62.5% (7.72 ha) of the site being encroached habitat. The correlation of the proportion of encroachment within the sites with Kaya features was calculated (Table 3.8) and results show that there was a positive association with the proportion of medium density vegetation (Figures 3.25). However, there was a negative correlation with the proportion of high height vegetation (Figure 3.26).

All sites which were analysed had a degree of development within the surrounding 500 m buffer zone. Results also highlight that there was a positive correlation between the area of development surrounding the SNS and their size, and the area of encroachment within the sites (Table 3.9, Figures 3.27 and 3.28). However, there was no significant association between the area of development surrounding the sites and the proportion of vegetation cover or other SS features.
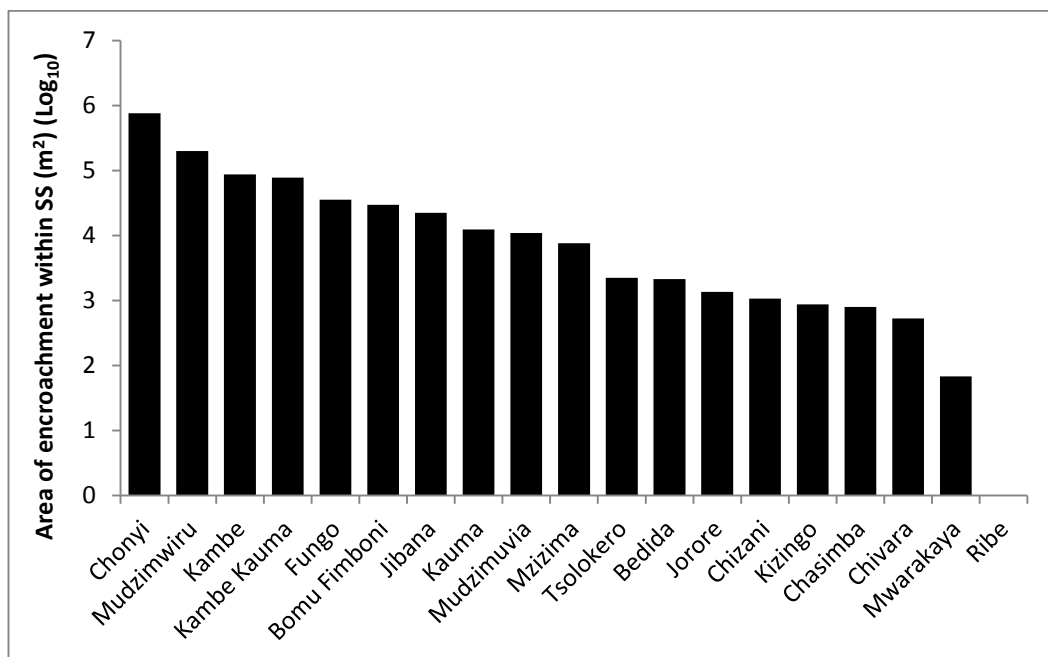
Figure 3.24: Area of encroachment (Log_{10} transformed) within surveyed SS

Table 3.8: Correlation (r) between the proportion of encroachment within the SS and SS features
Legend: 1 = Log_{10} transformation; 3 = arcsine transformation

		Proportion of encroachment[3]		
		r	N	p
Area of Sacred Site (m²) [1]		- 0.107	19	0.662
Distance from Tarmac (m) [1]		0.144	19	0.557
Vegetation cover (proportion)	Density Low[3]	- 0.119	19	0.627
	Density Medium[3]	0.643	19	**0.003**
	Density High[3]	- 0.450	19	0.053
	Height Low[3]	0.264	19	0.274
	Height Medium[3]	0.338	19	0.157
	Height Mixed[3]	0.528	19	**0.020**
Proportion Dense Forest [1]		- 0.098	19	0.688
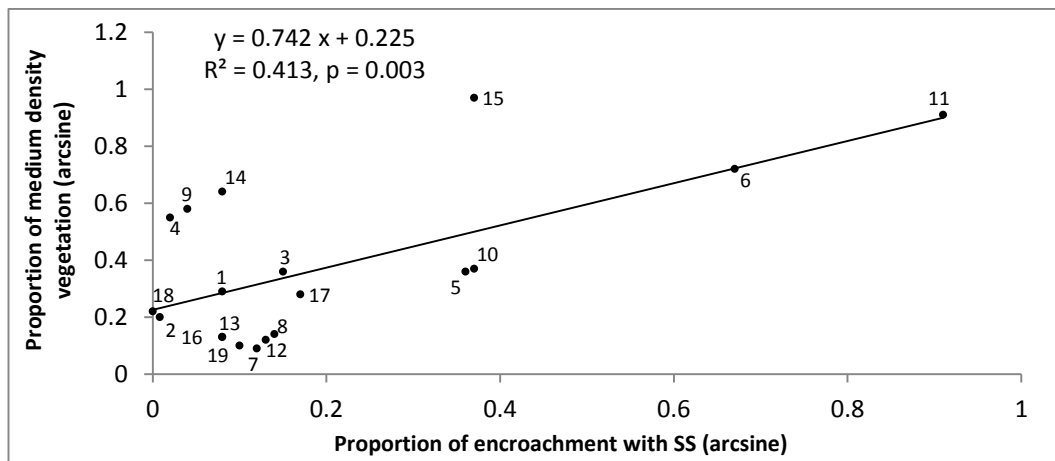
Figure 3.25: Association between proportion of encroachment and proportion of medium density vegetation within SS, with least-squares regression line. For legend see Figure 3.19
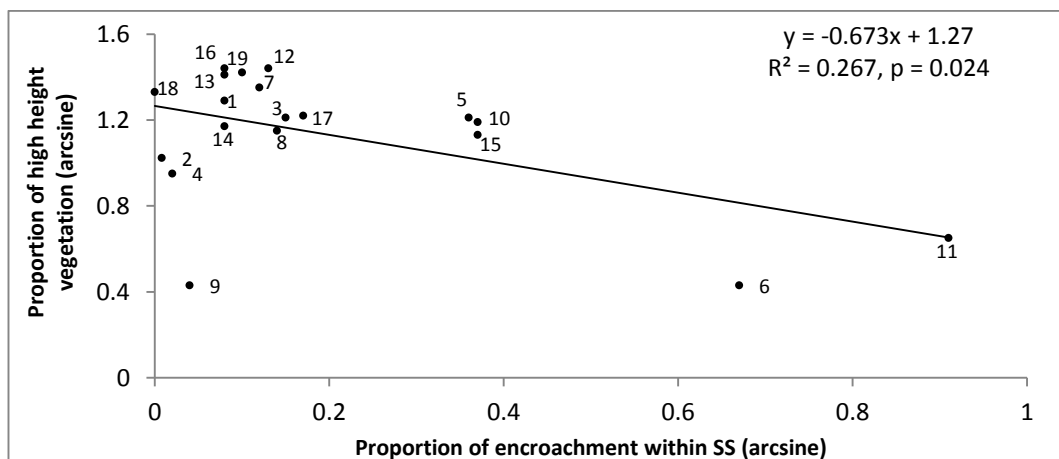
Figure 3.26: Association between proportion of encroachment and proportion of high height vegetation within SS, with least-squares regression line. Legend see Figure 3.19

Table 3.9: Correlation (r) between the area of development around SS and SS features
Legend: Conducted using Pearson's Product Moment Correlation unless otherwise noted. [1] = Log$_{10}$ transformed; [2] = Arcsine transformed

			Area of Development[1]		
			r	N	p
Area of SS (m²) [1]			0.549	17	**0.022**
Distance from tarmac [1]			-0.131	17	0.617
Vegetation Cover	Density	Low Proportion [2]	0.268	17	0.298
		Medium Proportion [2]	0.126	17	0.629
		High Proportion [2]	-0.264	17	0.306
	Height	Low Proportion [2]	0.395	17	0.117
		Medium Proportion [2]	0.011	17	0.965
		High Proportion [2]	-0.214	17	0.409
		Mixed Proportion [2]	0.295	17	0.251
Thick Forest	Proportion [2]		- 0.017	17	0.949
Encroachment in SS	Area (m²) [1]		0.621	17	**0.008**
	Proportion [2]		0.026	17	0.922
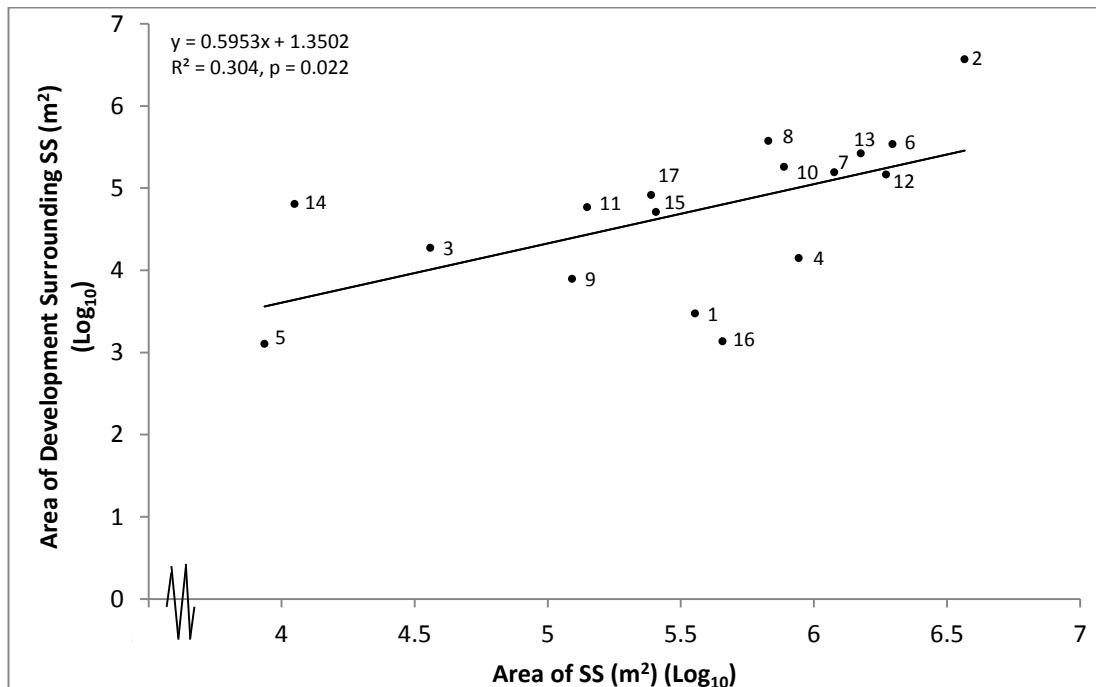
Figure 3.27: Association between area of development around the SS and area of the SS
Legend: 1) Bedida; 2) Bomu/Fimboni; 3) Chasimba rocks; 4) Chivara; 5) Chizani; 6) Chonyi; 7) Jibana; 8) Kambe; 9) Kambe-Kauma; 10) Kauma; 11) Kizingo Hill; 12) Mudzimuvia; 13) Mudzimwiru; 14) Mwarakaya rocks; 15) Mzizima; 16) Ribe; 17) Tsolokero
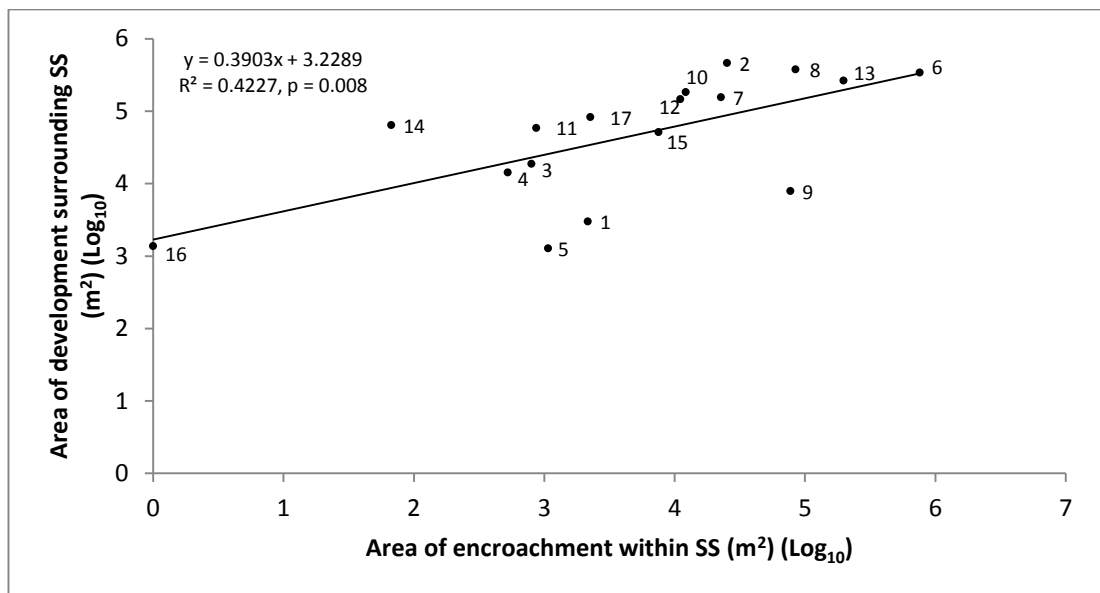
Figure 3.28: Association between area of development around the SS and area of encroachment within SS. For legend see Figure 3.27

3.4.6 Forest Loss

Using the data from Hansen *et al*. (2013) results show that most sites experienced forest loss over the period from 2002 to 2012 (Table 3.10, Figure 3.29). The area of sites calculated from pixel numbers (based on calculation of 900m^2 per pixel from the data obtained from Hansen *et al.*, 2013) was on average 6.30% (S.E. = 0.684; IQR = 1.12) smaller than the areas measured in the field. The smallest difference was for Chasimba Rocks where the area calculated by pixels was only 0.6% smaller than the field calculated area. The largest difference was Chizani SG where the pixel-derived area was 16% smaller than the field measured area. Both of these sites however exhibited no forest loss. The site with the largest difference amongst those with forest loss was Kambe-Kauma SG where the pixel-derived area was 8% lower than the field measured area. The largest total difference in area was for Kaya Fungo where the difference between the pixel-calculated areas was 14.9 ha less than the field-calculated area. Six SNS did not exhibit any forest loss. In the sites exhibiting loss the amount ranged from 0.22% (in Kaya Chivara) to 4.53% (in Mzizima SG). The site that experienced the greatest area of forest loss was Kaya Bomu/Fimboni (2.25ha) although this was only 0.65% of the total sacred site area. Based on pixel-generated areas, the total area inside all Kayas was 1676.5 ha, and the total forest loss across all Kayas combined amounts to 11.79 ha (0.71%). The area
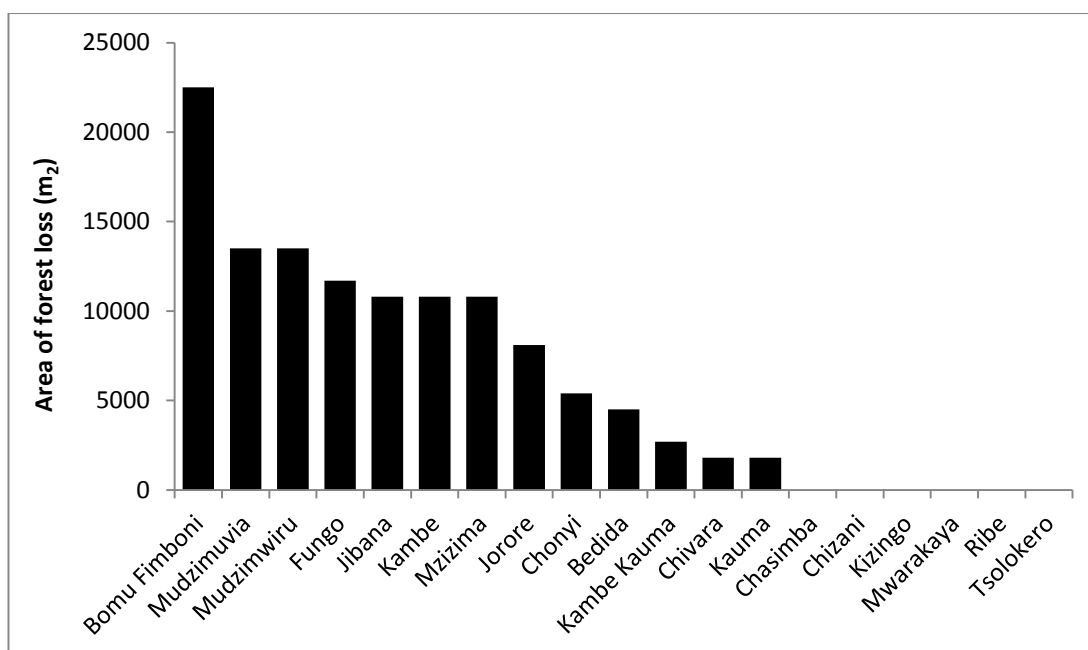
Figure 3.29: Area of forest loss within SS between 2002 and 2012
Data from (Hansen *et al*., 2013, http://earthenginepartners.appspot.com/science-2013-global-forest)

Table 3.10: Forest loss within SS

Sacred Site (SS)	Pixel calculated SS Area (ha)	Forest loss (ha)	Forest loss (%)
Bedida	33.75	0.45	1.33
Bomu/Fimboni	345.78	2.25	0.65
Chasimba	3.60	0.00	0.00
Chivara	83.07	0.18	0.22
Chizani	0.72	0.00	0.00
Chonyi	185.13	0.54	0.29
Fungo	245.25	0.12	0.48
Jibana	112.95	1.08	0.96
Jorore	87.93	0.81	0.92
Kambe	63.27	1.08	1.71
Kambe-Kauma	11.34	0.27	2.38
Kauma	72.36	0.18	0.25
Kizingo	13.41	0.00	0.00
Mudzimuvia	175.95	1.35	0.77
Mudzimwiru	140.31	1.35	0.96
Mwarakaya	1.08	0.00	0.00
Mzizima	23.85	1.08	4.53
Ribe	42.39	0.00	0.00
Tsolokero	22.59	0.00	0.00

within the 7.5 km buffer zone surrounding the sites was 19538.1 ha. The area of forest loss within this area was 4540.0 ha which equates to 23.2%. Chi-square analysis shows that the proportion of forest loss outside of the sacred sites was significantly higher than the loss within the SNS (χ^2 = 5131.1, p < 0.001, 1 df). When analysing the correlation between the forest loss and features of the sacred sites, the results show (Table 3.11) that there was a significant positive association between the proportion of forest loss in a site and the area of encroachment within the site (Figure 3.30).

Table 3.11: Correlation (r / r_s) between the forest loss and SS features
Legend: Transformations: [1] = Log_{10}; [2] = Arcsine, [3] = Analysed using Spearman's Rho correlation

		Proportion of forest loss [2]		
		r / r_s	N	p
SS Area [1]		0.297	19	0.217
Distance from Tarmac [1]		0.027	19	0.912
Density of Vegetation	Proportion Low [2]	0.390	19	0.099
	Proportion Medium [2]	0.389	19	0.100
	Proportion High [2]	-0.416	19	0.077
Height of Vegetation	Proportion Low [2]	0.238	19	0.327
	Proportion Medium [2]	0.316	19	0.187
	Proportion High [2]	-0.294	19	0.221
	Proportion Mixed [2]	0.068	19	0.783
Area of Dense Forest [1, 3]		0.158	19	0.519
Proportion Dense Forest [2]		0.014	19	0.954
Area of Encroachment [1]		0.478	19	**0.038**
Proportion encroached [2]		0.342	19	0.152
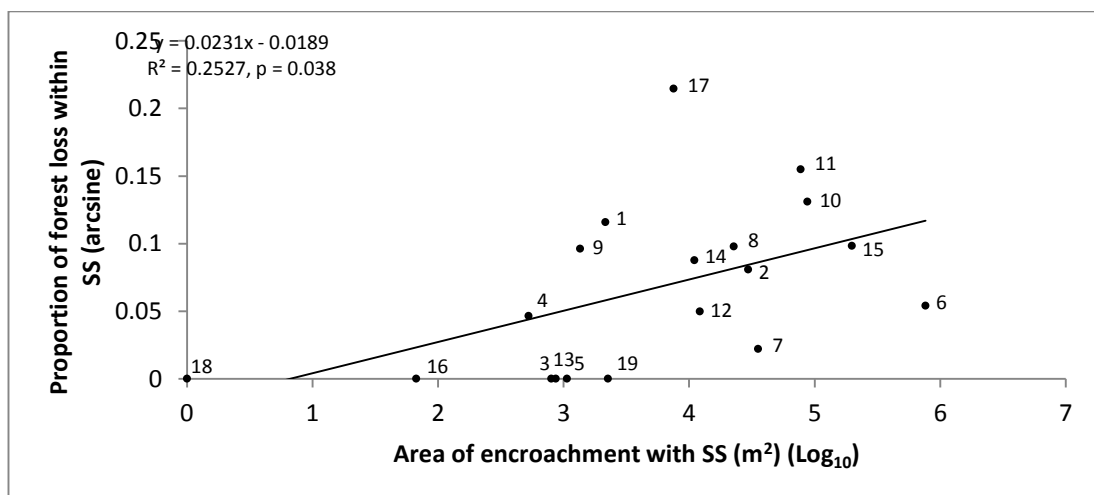
Figure 3.30: Association between proportion of forest loss and area of encroachment within SS with least-squares regression line. For legend see Figure 3.19

3.5 Discussion

3.5.1 Methodologies of surveying sacred sites

As highlighted in Chapter 1.1.4 and 2.7.6 due to cultural sensitivities and other access issues, comprehensive surveys of sacred sites using standard field techniques (e.g. transects and quadrats) are often not possible in SNS, so a combination of ground truthing and remote imagery was used to assess size, habitat cover, encroachment and degradation. The methodology employed in this research not only allows assessments of restricted access sites, but provides an approach which would produce directly comparable results that can be used to assess the biodiversity value of the Mijikenda SNS across the whole coastal region as well as SNS worldwide. As was observed for these sites, the local community and Elders may support such work to gain access to better information on their sites. The preservation of these sites is important to the Elders, and any information that allows them to better understand the sites and that may help to achieve more effective conservation is valuable to them (Shepheard-Walwyn, pers. obs., 2012). Each group of Elders (associated with their tribal group) is responsible for a number of the SNS (those that are used by their tibal group). However, they also try to support each other and work coorperatively in the conservation of all ther SNS. The types of information that may be of use to the Elders includes information about which sites are most important to biodiversity, which are affected by encroachment, which have seen the highest rates of forest loss, and which may be at the greatest risk from the development of roads so that they can focus efforts on sites at higher risk. However, it is noted (Chapter 2.7.6) that imagery of sites is sometimes prohibited at certain sites, and this may also extend to the use of satellite images. Therefore it is important to gain consent from the local communities, as well as those who are in charge of sites (such as priests or elders) to be able to use images in this way to assess SNS.

3.5.2 Distribution of sites

The sites in this study were distributed across Kilifi District (Figure 3.1) at a range of distances between the sites (Table 3.2 and 3.3). When examining the sacred sites (SS) in relation to their surrounding areas there are few other forested patches outside the sites. The Kayas and other SS are islands of remnant habitats in an ocean of converted land. There are still a number of large forest patches on the coast of Kenya, including some which are protected areas and contain a number of rare and endemic species (FitzGibbon, 1995; Burgess *et al.*, 1998; Metcalfe *et al.*, 2010). To the north of the Kayas, and the closest main forest patch to them is the Arabuko Sokoke forest. The Arabuko Sokoke forest is approximately 15km north

of Kaya Kauma. To the east of the Kayas surveyed there are no other large forest patches, and the coast is 7.5km from Kaya Tsolokero. Tsavo East National Park is approximately 47 km to the west of Kaya Jorore and there do not appear to be any other large forest patches between the surveyed SNS and Tsavo East. There are a number of forest patches to the south of the SNS examined in this project. These include a number of SNS on the south coast as well as both private owned sites (such as the Mwaluganje Elephant Sanctuary) and nationally protected areas. One of the largest forest sites on the south coast is the Shimba Hills National Park which is approximately 27 km south of Kaya Mudzimwiru.

The distribution of the sites and their location between larger forest patches makes it feasible that different species will be able to pass between different sites depending on their dispersal ability. For example, birds which are not affected by a degraded matrix surrounding the sites are likely to be able to pass between a number of the sites; however, due to the features which separate some sites there may be limitations to dispersal between them for some species (Lindenmayer and Fischer, 2006). For example, species which cannot move across flowing water will not be able to pass between Kaya Ribe and Kaya Bedida, or Kaya Bomu/Fimboni and Kaya Mudzimuvia as they are separated by rivers. It has been noted that butterflies, bats, birds and monkeys use small isolated patches of habitat within modified landscapes (such as farmland) for access to resources and as stepping stones (Lindenmayer and Fischer, 2006; Anderson *et al*., 2007c; Callens *et al.*, 2011). Anderson *et al.,* 2007 note that the Kayas of the south coast function as stepping stones within the matrix for monkeys (their focus was on the Angola black-and-white colobus, *Colobus angolensis palliates*) and it is possible that the SNS on the north coast function in the same way for monkeys and other species found within the region.

On the south coast a small patch of sacred forest with caves in a degraded landscape was found to contain many threatened species of flora and fauna, including insects, birds, reptiles and mammals (Metcalfe *et al*., 2009). Therefore, whilst some of the sites in this survey are very small, such as rocky outcrops, they provide patches of habitat within a degraded landscape so are likely to be important refuges for plants, insects (including pollinators important for crops), small mammals, reptiles and birds. In addition, they provide features which are not found elsewhere in the landscape (such as caves) and they are not as modified or disturbed as is found in the surrounding habitat which is predominantly farmland.

Due to their potential to contain a range of invertebrates and small reptiles/mammals, the smaller sites may also be potential feeding sites for larger animals including mammals and birds which are adapted to using transformed landscapes. These smaller patches, if not able to hold populations of larger vertebrates, may provide feeding or nesting sites for birds, as well as acting as stepping stones within the landscape matrix between larger forest patches (Law and Dickman, 1998; Price *et al*., 1999; Lindenmayer and Fischer, 2006; Boscolo *et al*., 2008). Whilst the smaller sites will not hold viable populations of larger-bodied animals, for example large bovids, or those with large range sizes, such as leopards, they have the potential to hold viable populations of plants and invertebrates, as well as being valuable sites for mammals, reptiles and birds (Price *et al*., 1999; Lindenmayer and Fischer, 2006; Boscolo *et al.*, 2008). It has been noted previously that a number of the smaller sites contain a variety of plant species (including rare species) (Robertson and Luke, 1993; Luke, obs. in IUCN.org, 2014) and due to their low level of disturbance, they are likely to still do so. Plants and invertebrates have smaller home-range sizes than vertebrates (Gaston, 1996), so are therefore likely to be able to survive in smaller areas like a number of the SG recorded in this study.

Research into the modelling of dispersal patterns of different species found in the region needs to be conducted. This will help to further explore the role that the SNS play in the preservation of biodiversity, and will help to further the understanding of the movement of species across the region.

3.5.3 Contribution to Kenya's East African Coastal Forest

The East African Coastal forest is a known priority ecosystem for global conservation (Githitho, 1998; Burgess *et al*., 2000; Matiku, 2003; Azeria *et al*., 2007; UNESCO, 2008). The Mijikenda Kayas and other sacred sites (SS) contribute to this ecosystem (Githitho, 1998; Burgess *et al*., 2000; Matiku, 2003; Azeria *et al*., 2007; UNESCO, 2008). The current estimate of Kenya's total coastal forest coverage is 787 km^2, based on a report produced in 2002 (Younge *et al.*, 2002). Although deforestation has occurred during the 10 year period between when the report was produced and when the surveys for this study were undertaken (Githitho, 2003; Matiku, 2003; Anderson *et al*., 2007a), we can use the measurement of 787 km^2 as an estimate of the maximum likely level of coastal forest in Kenya. Based on this figure the coastal forest contained within the sacred sites surveyed in this project account for 1.4% of Kenya's coastal forest.

These results show that the contribution of the Kayas to Kenya's East African Coastal forest is greater than some previous estimations but lower than others. Burgess *et al.* (1998) stated that the Kaya forests accounted for 0.2% of all East African coastal forest which based on their estimates was approximately 6.47 km^2. They calculated Kenya's Coastal forest area to be 660 km^2 resulting in the SNS accounting for 0.98% of Kenya's coastal forest. However, these calculations are based on only a limited number of Mijikenda SNS, so are likely to be an underestimation of the true amount. However, Githitho (1998, 2003) estimates the amount of coastal forest within the SNS at 10%. As discussed in section 3.2 this is based on a greater number of sacred sites than recorded by Burgess *et al.,* (1998). In addition, both sets of calculations are based on total areas of SNS using anecdotal information on the cultural boundaries of the sites. This area therefore does not account for alternative habitats or encroachment within the SNS, therefore Githitho's (1998; 2003) estimations are likely to be overestimation.

The findings in this study provide the first accurate measurements of coastal forest within a range of the Mijikenda SNS. The measurement of 1.4% is based on just 20 of the known 60 sites (Githitho, 2003; Nyamweru et al., 2008). It is known that a number of the sites on the south coast are substantially larger, and the area of the surveyed sites on the north cost are estimated to make up just over one quarter of the area of known sacred sites (Githitho, 1998). In addition, there are a number of sites that were not known about by non-community members (Chapter 2.2). Therefore, from this research it can be estimated that the Mijikenda SNS contain between 4.2% and 5.6% of Kenya's coastal forest. However, the true percentage may be much higher. This supposition is based on two main factors: 1) there is a greater number of Mijikenda SNS than are currently on record; and 2) The extent of Kenya's total area of coastal forest is likely to be lower than the current estimate due to deforestation since the report was released. However, the rate of deforestation is lower within the SNS compared to surrounding areas, so therefore they may account for a greater proportion than estimated in this chapter. The findings in this research bring to light the need for comprehensive mapping of all the Mijikenda SNS and a full survey of the coastal forest that they contain.

3.5.4 Size and habitat diversity

The sites were found to range in size (Table 3.4) with the smallest sites being SG and rocky outcrops, and the largest sites Kaya forests. They contain a variety of different habitats and features (Figures 3.2 – 3.18, Table 3.4). While the largest sites contain more habitat heterogeneity, some of the smaller sites contain habitats and features which are not found within larger sites. For example, the rocky outcrops contain shrubs and trees on a rocky bed, as well as caves and large crevices which are not found in many of the larger sites (Figure 3.3, Figure 3.15, and Table 3.4). These results show that while small sites do not contain as much habitat variation as larger sites, they contain a greater proportion of dense habitat and therefore may be of use to species which favour dense habitats, as long as they are able to live in sites within a smaller area (especially plant species) with small home and/or territory sizes, and can survive in close proximity to a largely transformed landscape. For example, *Abutilon mauritianum* and *Cadaba farnosia* which are shrubs that grow in thickets and areas of bushland (Dharani, 2002), as well as the Kenya leaf chameleon (*Rhampholeon kersteni*) and the Pemba Island writhing-skink (*Lygosoma pembanum*), both of which have been found in dense vegetation within Kilifi District (Spawls and Rotich, 1997).

The results show that the sites vary in the number of habitats that they contain and this information can be used as a proxy to determine levels of biodiversity at the sites (Woodroffe & Ginsberg, 1998; Ferrier, 2002; Glenn & Ripple, 2004; Benchimol & Peres, 2013; Berhane *et al*. 2013). The results show that Kaya Bomu/Fimboni is the largest site. Analysis of habitats using diversity indices indicates that Kaya Chonyi is the most diverse and has the greatest level of habitat evenness, suggesting that it may be more biodiverse than Kaya Bomu/Fimboni. However, this site also has the second highest amount of encroachment at 39% (76.4 ha). The level of encroachment and probable disturbance from it is likely to have had an impact on the species within the remaining habitats (Woodroffe & Ginsberg, 1998; Iftekhar and Hoque, 2005; Lindenmayer and Fischer, 2006). Therefore, whilst Chonyi has high levels of habitat structure heterogeneity, which may indicate high levels of biodiversity, it may be less biodiverse than the indices imply. According to its size and the habitats it contains, Chizani SG is likely to be the least biodiverse site.

Although the larger sites, with more habitats, are likely to be more biodiverse than the small rocky outcrops, some of the smaller sites contain unique features and habitats which are not found in the bigger sites. For example, both *Rhipsalis baccifera* and *Amorphophallus*

stuhlmannii grow on limestone outcrops and shady rocks and have been recorded within the sacred rocky outcrops in this survey (Robertson and Luke, 1993; IUCN, 2014). As has been found in the past, it is possible that these smaller sites still contain species which are not found within the larger forest sites. Mzizima SG is also likely to contain species not found in any of the other SNS as it contains habitats which are not found at other sites including mangroves and floodplains. In addition, the forest within Mzizima SG has a more open understory, and therefore species which favour more open-structured habitats or bare ground are more likely to be found within Mzizima than within some of the larger Kayas which have more dense undergrowth. For example the Eurasian (or European) nightjar (*Caprimulgus europaeus*) or *Asteranthe asterias* both of which are found in more open habitats in the region (Lewis and Pomeroy, 1989; Robertson and Luke, 1993; IUCN, 2014).

3.5.5 Potential for biodiversity within the sites

As well as contributing to an important ecosystem, due to the range of habitats the SNS contain (Figures 3.2 – 3.18), the variety of size of sites, the mix of features within the sites, and the reduced rate of forest loss the sites have experienced, it is likely that the Mijikenda SNS are important for both local and global biodiversity. Previous studies argued that due to the range of habitats, terrains and geological features that the SNS contain, which was also observed in this research, the plant communities differ greatly across the sites (Robertson and Luke, 1993; Githitho, 2003; Nyamweru *et al.*, 2008). In the past the rocky outcrops have been found to contain rare plants. For example *Amorphophallus stuhlmannii*, which is listed as endangered, was found at Pangani and Chasimba rocks (IUCN, 2014). As encroachment is low at these sites (Map 3.3) (Pangani rocks was not able to be mapped due to visibility issues noted in Chapter 2.9) and there was no forest loss recorded (Table 3.12), it is likely they continue to contain this plant. In addition, due to the geographic formation of the sites, the possibility of encroachment is limited without major excavation of rocks. Therefore, it is feasible that these sites may continue to contain such species if the removal of plants can be prevented. Due to the conditions that these plants favour, there is also the possibility that they may exist within other SNS in the region in inaccessible areas such as on sheer rocky edges (which are features in some of the Kayas).

As some of species previously found in the sites, such as *Afrocanthium kilifiense, Julbernardia madnistipulata, Mildbraedia carpinifoli, and Memecylon fragrans* (all listed as Vulnerable on the IUCN Red List) are only found within forest habitats (Kibet and Nyamweru, 2008; Kibet,

2011; IUCN, 2014), it is likely that due to the low rate of forest loss within the SNS these species will have persisted in the sites. However, some of them may be under threat if they are vulnerable to disturbance, as they may be affected by the use and alteration of the landscape surrounding the sites. In addition to those species already identified as being within the sites, there are a number of species that the SNS within Kilifi District may contain based on their habitat composition. In the south coast Kayas, *Aloe kilifiensis* (Endangered) has been recorded (IUCN, 2014). As the habitats identified in the north coast SNS are similar, it is possible that this species may be found in one or more of the northern sites. In addition, a number of the SNS are by rivers, such as Kaya Bomu/Fimboni, Kaya Mudzimuvia, Mzizima SG, Kaya Ribe/Bedida, Kaya Kauma, and Kambe Kauma SG. These sites may hold species such as amphibians which require habitats with water sources. For example, *Afrixalus sylvaticus* is found in the Shimba Hills, and there have been unconfirmed sightings further north. The species lives in lowland forest and can survive in secondary growth and plantations (although not in completely degraded habitats). It requires temporary pools and/or water filled depressions to breed in (IUCN 2014), therefore the SNS which are near rivers may provide suitable habitats for this species.

There are a number of rare and endemic birds in the region, which may also be found within the SNS, in particular the larger Kayas. The Sokoke Scopse-owl (*Otus ireneae*) is an endangered species known to be found within the region surrounding the Arabuko-Sokoke forest, and whilst none were found in surveys of Kayas on the south coast of Kenya (Monadjem *et al.,* 2012), to date no comprehensive surveys of the north coast SNS have been conducted. The species uses habitats similar to those found within the SNS, roosting in hollows in *Brachystigia* trees. Based on the numbers located within the Arabuko-Sokoke forest, and their home range size of 12-14 ha (Birdlife International, 2014), it is possible that sites such as Kaya Bomu/Fimboni, Kaya Mudzimuvia and Kaya Mudzimwiru may be large enough to hold this species. As these sites are close together, it is also possible that individuals may move between the sites. Other endangered birds which are known to use habitats similar to those found in the Kayas, and are present in the region include the Amani Sunbird (*Anthreptes pallidigaster*), Sokoke Pitpit (*Anthus sokokensis*) and Clarke's Weaver (*Ploceus golandi*). It is possible that all of these species may be found in any of the larger, less disturbed forests (BirdLife International, 2014).

While most sites are not big enough (Table 3.4) to hold viable populations of large mammals, due to their more substantial home range sizes (Woodroffe & Ginsberg, 1998), some have the potential to hold small and medium sized species. Due to their small home ranges (100 m^2), and their ability to survive near degraded habitat, most SNS have the potential to hold a viable population of dik-diks (*Madoqua kirkii kirkii*) (Sellmann, 2010). In addition, a number might support bush-bucks (*Tragelaphus Scriptus*). They are not territorial animals and often their home ranges overlap. Minimum home ranges for males are around three hectares and for females they are two hectares. However males can have home ranges which reach up to 175 ha and females 120 ha where space permits (Wildliferanching.org, 2009). The sites most likely to hold viable populations include Bomu/Fimboni Chivara, Chonyi, Jibana, Kambe, Kauma, Mudzimuvia and Mudzimwiru. It is also possible that both Ribe and Bedida might, especially as they are next to a river, although the sites are only 35.6 ha and 45.5 ha respectively, so any populations in these locations are likely to be small (Wildliferanching.org, 2009).

Another mammal which may be found in viable populations at some of the sites is the endangered golden-rumped elephant shrew (*Rhynchocyon chrysopygus*). They have already been found within Kayas in the region in the past, and as pairs have a home range of 1.7 ha it is likely that a number of sites including Bedida, Ribe, Bomu/Fimboni, Chivara, Chonyi, Jibana, Kambe, Kauma, Mudzimuvia and Mudzimwiru all may hold viable populations (ZSL, 2014). While the size is adequate, it is unlikely that golden-rumped elephant shrews would be found in either Kaya Jorore or Fungo as these sites are located in more arid terrain and further inland than the current predicted distribution of the species. In addition, there is little dense habitat at Kaya Jorore, which indicates high levels of disturbance, so this further indicates that the shrews are unlikely to be found within this Kaya. Along with antelopes and rodents, another taxonomic group of mammal which may be found within the SNS is primates. Baboons (*Papio cynocephalus*), vervet monkeys (*Chlorobebus pygerythrus*) Sykes' monkeys (*Cercopithecus albogularis*) and bushbabies (such as: *Galagoides cocos, Galagoides orinus, Otolemur garnettii*) are all likely to use all the forest patches. All the primates noted are able to live in transformed and degraded habitats and can survive with a degree of human disturbance. The monkeys will feed on crops (especially mango and cashew trees) within the farmland (which are found throughout the area) and all will use the forest patches as refuges, areas of shade and foraging grounds (IUCN, 2014; de Jong & Butynski, 2011).

3.5.6 Forest Loss

The results show that the proportion of forest loss during the period 2002 – 2012 was significantly lower in SNS compared to the surrounding area (see section 3.4.6). The proportional amount of forest loss outside the SS (23.2%) was over 32 times greater than the total proportional loss across all SS (0.71%). When looking at just the SS that have experienced forest loss, the proportion of forest loss is over 26 times greater outside the SS (23.2%) than inside the SS (0.875%). These results suggest that the SNS have been better protected than any forest habitat elsewhere in the area. Since the protection to date is centred on traditional customary laws, it is possible to conclude that the local beliefs and culture associated with the sites has contributed to their protection to date. However, the results highlight that there has been forest loss in 14 of the sites (Table 3.12, Figure 3.29) which shows that they are undergoing degradation (which supports suggestions made in previous studies such as, Githitho, 2003). The evidence of forest loss within a number of the SNS indicates that the management approach is no longer as effective as it may once have been. At the time that this work was conducted no new management approaches had been put in place to address the forest loss within the sites. Therefore it is probable that those sites experiencing loss have continued to do so, and it is possible that other sites may have begun to experience forest loss as well.

As the definition for forest loss given by Hansen *et al.* (2013) includes all trees (not just native species or natural forest patches), the loss outside the sites could be associated with plantations, and would therefore be expected to be slightly greater. Further research into the area surrounding the SS needs to be done to investigate what type of forest is being lost to determine the potential impacts on biodiversity.

3.5.7 Encroachment and Development

Encroachment is considered to be a major threat to the sacred sites in the region (Younge *et al.*, 2002; Githitho, 2003; Matiku, 2003; Anderson *et al.*, 2007a; Metcalfe *et al.*, 2010). However, to date, there are no estimates on the extent within the sites. The results presented here demonstrate that all but one site (Kaya Ribe) showed evidence of encroachment, with some sites having high levels (Chonyi, Kambe-Kauma) (Map 3.2 – 3.18 and Table 3.4). The extent of encroachment calculated in this survey is a conservative estimate as only areas of farmland, disused farmland, buildings, homesteads, school

grounds, and mined areas were recorded as 'encroachment' but degraded patches and/or bare ground could not assessed.

The results show that the level of encroachment varies across the sites (Figure 3.24) and is positively correlated with the area of development surrounding the sacred site (Table 3.10 and Figure 3.28). In addition there is a positive association with the proportion of encroachment and the proportion of medium density habitat (Table 3.9 and Figure 3.25). These findings indicate that development may be a driver of encroachment, and as development in the region is increasing this may result in further encroachment into sites if it is not managed and addressed. Medium density habitat may be an indicator of disturbance. This is because medium density vegetation may result from the removal of plants from previously dense areas. If this is the case, and the proportion of encroachment is associated with the proportion of medium density vegetation, then this would suggest that encroachment is correlated with resource extraction and if encroachment increases so will the degradation of the remaining vegetation within the sites. The proportion of encroachment is negatively correlated with the proportion of high height vegetation (Figure 3.26). Lower proportions of high height vegetation may be due to the removal of trees (for resources such as firewood and timber). Therefore this would also support the suggestion that sites with high proportions of encroachment have more degraded remaining habitats. The mapping confirms that there is encroachment, and that it is a major threat to these sites which needs to be addressed. The encroachment observed in this study indicates that there is demand for land, which is likely to increase with increasing development in the area. In addition it highlights a lack of adherence to the traditional laws associated with the management of the sites. This shows that the management strategy, which depends solely on traditional management, is ineffective and is not well enforced.

Since there is a correlation between the amount of encroachment and the level of development surrounding the sites, as the region undergoes further development this threat is likely to increase. In addition, due to the positive correlation between forest loss and encroachment (Figure 3.30) as encroachment increases so may forest loss. While development is important to the local area, the threats that it brings to the natural environment can be severe. The issues associated with development and globalisation, to both people and the natural environment, have been seen around the world (Maffi, 2001; Maiero and Shen, 2004; Xu *et al.,* 2005; Turvey *et al.,* 2010). Due to the threats that such

changes pose to the sites they need to be incorporated into the conservation management plans. At present the management plans based solely on traditional customs do not account for the encroachment that is seen within the sites, nor does it acknowledge or address issues which are linked to development. Therefore it is important that the conservation plans associated with the sites are updated to account for the existing, and future threats which the sites face, in particular encroachment and development.

3.5.8 Roads

The results show that most sites are near a road (Figures 3.2 – 3.18). There is a negative association between the distance from roads and the area of high height and high density vegetation and the area of thick forest (high density, high height vegetation) (Table 3.8, Figure 3.21 – 3.23). High height vegetation is dominated by trees. These results indicate that sites further from roads have smaller areas of trees and dense vegetation/forest. These findings are contrary to what may be expected due to deforestation rates often being higher in sites closer to roads (Forman and Alexander, 1998; Trombulak and Frissell, 2000; Coffin, 2007; Laurence, 2009). The findings may be due to a number of reasons. High density vegetation at sites close to tarmac roads may be due to invasive species which are often associated with the development of roads near forest sites (Forman and Alexander, 1998; Trombulak and Frissell, 2000; Coffin, 2007; Laurence, 2009). The correlations may be spurious correlations. The sites that are at the lower end most often include Mwarakaya Rocks, Chasimba Rocks Kaya Jorore. The lower areas of dense and high vegetation may be due to the features of the sites, rather than their distance from roads. For example, Mwarakaya Rocks and Chasimba Rocks are both small rocky outcrops so are likely to have less dense forest than the Kaya forests. In addition, Kaya Jorore is in a more arid region and therefore may have different habitat compositions such as lower density vegetation (Burgess *et al*., 1998; Githitho, 2003).

However, smaller areas of trees and dense forest may also be seen if the communities surrounding the SNS are using them to access resources and are therefore removing trees and other vegetation from within the sites. Both Kaya Jorore and Kambe-Kauma SG are far away from Tarmac roads and have smaller areas of high height and high density vegetation than expected. High levels of deforestation and encroachment have been found (and were observed) at these sites (Figures 3.9 and 3.11). If the correlation between smaller areas of high height and high density vegetation with greater distances from roads is due to

extraction, this may indicate that more remote communities (those further from tarmac roads) use their SNS to access resources more than those who are near to tarmac roads. This may be possible as those who live in more remote and inaccessible areas have less access to alternative resources, and therefore may be more dependent on the forests. It has been observed that the communities living around a number of the SNS are poor, and rely on the forests for resources (Nyamweru, 1997; Matiku, 2003). This dependence on the forest for resources may be exaggerated for communities in more isolated locations. Resource extraction in remote areas, away from roads and other development predictors, has been found in other studies, such as Abram *et al.* (2015). This suggests that the correlation with remote locations may be a valid finding. The difficulties of living in more remote areas and the lack of access to resources has been noted by governmental officials in the region, and is a major reason given in favour of the development of roads (Kenya National Assembly, 1997; Kenya National Assembly, 2013).

As noted previously, there is an ongoing project to build a highway through the region where the SNS are located. The creation of the tarmac road may be both beneficial and detrimental to the region. While the development of the road may help more remote communities access resources, Pfeifer *et al*. (2012) note that human pressure and forest accessibility are significant drivers for forest loss in East Africa. Therefore a larger population in the region and increased ease of access to the sacred sites resulting from the development of the road may result in an increase in forest loss at the sites.

In addition people that are moving into the area are not likely to be Mijikenda. As has been observed in other regions, such as Madagascar, people who are not from the local community often do not follow traditional laws and customs associated with SNS (Andriamarovololona and Jones, 2012). Therefore, it is possible that with an increase of migration into the region the number of people who do not follow the customary laws and traditions associated with the SNS will increase (Githitho, 2003; Andriamarovololona and Jones, 2012). Consequently, management plans need to reflect the potential changes to the local population and extend interventions beyond the reliance on people adhering to customary practices.

It is possible that better roads will help with conservation efforts. Improved roads may result in better access to the sites which will enable easier assessment and monitoring of the sites.

However, if sites are easier to reach that will also enable more people to access them and therefore extraction of resources will increase the threat to the sites. As well as the threats from an increased population and greater access to the sites, the construction and use of roads also poses a direct threat to the sites. Roads are known to cause degradation of natural sites and damage ecosystems through road kill, destruction and degradation of habitat, noise pollution, chemical and nutrient pollution, increased numbers of people, introduction of exotic species and alteration of available resources (Forman and Alexander, 1998; Trombulak and Frissell, 2000; Coffin, 2007; Laurance *et al*. 2009). Therefore while the construction of a tarmac road in the area could have some benefits for both development and the monitoring and surveying of sites, it is also likely to increase the number of pressures and threats on these sites which could hinder their conservation. It is vital that the changes within the region and the potential direct and indirect threats that may come from the road construction and regional development are monitored and incorporated into the management plans of the sites.

3.6 Conclusion

The results show that due to their size and habitat composition, as well as their substantial contribution to the East African coastal forest the north coast sacred sites of the Mijikenda are important to both local and global biodiversity. They have experienced a much lower rate of forest loss than the surrounding area and are likely to hold both the range of plants and species that have been recorded in the past. However, there is evidence of encroachment at almost all sites, as well as habitats which suggest degradation of the sites, and these threats are likely to increase with further development and improved roads in the region. Whilst the management of the SNS needs to be respectful of their sanctity, it also needs to address the threats that they face. The encroachment and degradation shown in this research suggests that the existing management plan based solely on customary traditions is ineffective, and it is likely that it will be less so with the increase in pressures that are likely to come with local development. It is therefore important that the management plan is redesigned to account for the spiritual and cultural significance of the sites, yet also addresses the current and future threats that they face.

Chapter 4: Demography, Attitudes and Values of Current Populations Surrounding the North Coast Sacred Sites

4.1 Abstract

Sacred natural sites (SNS) can be important refuges for biodiversity, and are also important for social and cultural purposes. Their existence is due to the cultural and spiritual beliefs associated with them. The recommended strategy for the management of SNS is for plans to be based on traditional customs and for the local communities to have autonomy over such sites. The Mijikenda SNS have been found to be important for the biodiversity of Coastal Kenya; however, the sites continue to undergo encroachment, degradation and habitat loss. While it is recognised in the literature that cultures are dynamic, the existing guidelines for the management of SNS assume that the cultures of local indigenous populations are static and that all members of the community follow the laws and traditions associated with them. Very little literature on the demography, attitudes and values of the Mijikenda exists beyond the 1990's, and the idea that the populations surrounding the Mijikenda SNS are one homogenous group whose culture has not changed is questionable. This study analysed the demographics, attitudes and values of the populations surrounding twenty Mijikenda SNS in Kilifi District on the north coast of Kenya. The results show that the populations are predominantly Mijikenda, although a number of other ethnicities also live in these areas. The Majority of people are Christian, and most do not believe in the traditional faith system, emphasising a shift away from traditional customs. In addition the populations were found to be diverse in their attitudes and values towards the local culture and practices. The diversity of the populations and the shift away from traditional practices indicates that the existing management plan is outdated and unsustainable. A change in the management approach for the SNS is needed which allows for the preservation of the sanctity of the sites, whilst accounting for the alterations in the local communities and their culture.

4.2.1 Introduction

The conservation of sacred natural sites (SNS) is important for both local and global conservation (Jeanrenaud, 2001; Dudley *et al*., 2005, Bhagwat and Rutte, 2006, Dudley *et al*., 2009; Anthwal *et al*., 2010; Dudley *et al*., 2010; Metcalfe *et al*., 2010; Verschuuren *et al*., 2010; Berhane *et al*. 2013). One of the key factors for protecting SNS is their effective management (Jeanrenaud , 2001; Dudley *et al*., 2005, IUCN, 2008), which is complex due to

the combination of social, cultural and biological issues that need to be taken into account (Dudley *et al.*, 2005; IUCN, 2008; Verschuuren *et al.*, 2010). As outlined in Chapter 1.2.7, the existing management of the Mijikenda SNS is based on local traditional practices. The nomination dossier submitted to the World Heritage convention by the National Museums of Kenya (NMK, 2008: 79), states that the management of the sites is based predominantly upon "protective rules and actions of the Kaya Elders". In their report they state that "protective measures are undertaken by the Kaya Elders who lay down traditional rules and punish minor infringements such as damage or desecration with traditional fines of livestock etc." (NMK, 2008: 79 – 80). In the application, it is claimed that the local community follow and accept the traditional laws and the punishments given out by the kaya elders. Nyamweru and Kimaru (2008), support the concept that the adherence to the traditional institutions are still strong, although this appears to be based on studies conducted in the early to late 1990's.

The conservation management of the Mijikenda Kayas is in keeping with the existing understanding of SNS. Dudley *et al*. (2005) outlined concepts for how SNS should be managed in a report by entitled 'Beyond Belief – Linking Faiths and Protected Areas for Biodiversity Conservation'. At the end of the report, they highlighted the recommendations produced at the World Parks Congress in Durban, 2003. These recommendations include, "Acknowledge indigenous peoples' internationally guaranteed rights to… control their sacred places", as well as for governments to acknowledge the importance of such sites and to develop laws which support communities to protect their cultures and sacred places (Dudley *et al.*, 2005: 129). In addition, in 2008 the IUCN asked governments and non-governmental organisations at the World Conservation Congress in Barcelona to "recognise the rights, the skills and the knowledge that local and indigenous custodians and mainstream faith communities have in managing the resources and ecosystems associated with sacred natural sites" (IUCN, 2008: ix). They asked governments and other organisations to develop programmes to work with indigenous and traditional communities to find ways to protect SNS and their associated biological and cultural heritage, and to develop laws which supported these efforts. They also called on conservationists to take part in intercultural dialogue with local people and faith groups to address conflicts and find new ways to collaborate to improve the conservation of SNS. These statements highlight the promotion and support of traditional use and practice associated with SNS by international organisations, and they encourage the management of such sites in accordance with

customary practices. As highlighted in chapter 1.2.7 the governance of the Mijikenda SNS conforms to these concepts. The current management of the Mijikenda SNS is based upon traditional rules and punishments, and it is assumed that the local population follow and accept these rules and regulations (NMK, 2008).

However the continued degradation of the Mijikenda SNS brings the strength and efficacy of the current management strategy based solely on the traditional system into question. As highlighted by Bresnahan (2010), the existing management of the Mijikenda SNS is based on an idealistic and simplistic perception of the Mijikenda people. It assumes that the local population are all Mijikenda who conform to traditional laws, attitudes and behaviours, and share the same beliefs, traditions, values, cultures and behaviours towards the sites. In addition to the assumption of cultural homogeneity within the community, there are also assumptions made about the demography and behaviour of the Mijikenda as a whole. One of the most commonly referenced documents on the Mijikenda people and their attitudes, values and beliefs in both the social and conservation literature is a study by Spear published in 1978. This work is a historical account that is often still referenced to describe the Mijikenda people, including within the nomination dossier submitted to the World Heritage convention (NMK, 2008), despite the fact that it is a study of who the Mijikenda were over 100 years ago.

The literature and existing management plan therefore make the assumption that the Mijikenda culture is static and has not changed over this period. However, as discussed in Chapter 1.1.2 and 1.1.6, cultures are dynamic. Communities and their cultures adapt and change in reference to the world around them and the changes can be different for different parts of the populations as individuals change due to personal experiences (Agrawal & Gibson, 1999; Bresnahan, 2010). Therefore, if different groups within the population have different experiences (such as younger generations receiving formal education when older generations did not) then the changes to their attitudes, values and culture will not be the same.

The coastal region in Kenya has undergone significant changes in recent history as has the county as a whole. Some of the most significant changes include conversions to mainstream faiths (Githitho, 1998; Githitho, 2003; Bresnahan, 2010); development across much of the coastal region (Spear, 1978; Githitho, 2003; Anderson *et al*., 2007b; Nyamweru *et al*, 2008;

Bresnahan, 2010; Metcalfe *et al*., 2010; Wanza & Njuguna, 2012), mainstream schooling with national curriculums (Githitho, 2003; Bresnahan, 2010; Otanga and Nyandusi, 2010; Wanza & Njuguna, 2012), and changes in land tenure and land use (Spear, 1978; Khalil *et al*., 1992; Githitho, 2003; Matiku, 2003; Nyamweru *et al*, 2008; Bresnahan, 2010). Due to these changes, the homogeneity of local people's attitudes, values and belief systems as well as the implied rigidity of their culture is bought into question. The transformation that have been observed through colonialism, independence and recent development have all impacted upon both the environment and the communities. For example, as noted in chapter 1.2.3, some of the Mijikenda SNS were cut down by the colonial administration, who also removed land from some of the communities and imposed policies intended to suppress the local people in the region (Spear, 1978; Bresnahan, 2010). Along with changes to the environment, the colonialists also introduced Christian schools and discouraged traditional practices (Zeleza, 1995; Nyamweru *et al*, 2008; Bresnahan, 2010). In addition, there have been major alterations to both the culture and the environment from development, for example, there have been a number of mining projects undertaken on both the north and south coast (Younge *et al.*, 2002; Githitho, 2003; Anderson *et al*., 2007b; Metcalfe *et al*., 2010).

With improved transport in the region, there has also been an increase in people moving away from the area to find jobs elsewhere, and there has been a change in how people view positions in society, with wealth playing a more significant role than before (Spear, 1972; Zeleza, 1995; Githitho, 2003; Nyamweru *et al*, 2008; Bresnahan, 2010). This change in how people perceive status within the community has also altered how people interact with one another, with elders having less prominence and respect than they once did. Githitho (2003) states that one of the main threats facing the Mijikenda SNS is the loss of traditional knowledge and culture, as well as the lack of adherence to customary laws associated with the sites. This therefore indicates that the current population no longer follow the rules associated with the SNS (contrary to what is suggested by the NMK (2008) dossier, or Nyamweru and Kimaru (2008)), and also implies that there is a variety of attitudes and value systems amongst the communities in the area. The outdated nature of much of the literature on the Mijikenda, as well as the recognition of both the continued degradation of the sacred sites, and the potential complexity of the Mijikenda community raise two main questions: i) Who are the Mijikenda today? and ii) Do they all have the same beliefs, attitudes, and values?

To investigate these questions it is important to understand what influences attitudes and behaviours. As noted by Grob (1995) and St John *et al*. (2010), social relations, who people associate with and how they are perceived by their peers, can influence an individual's attitudes and values. Therefore as noted in chapter 1.1.1 and 1.1.2, understanding an individual's social relationships as well as how the community functions as a whole is important to understanding this. For example, there may be different social influences on a single person (who may be influenced predominantly by their peers) compared to someone who is married (who may be influenced more by their spouse and family circumstances). In addition religion has a very strong impact on people's values and attitudes (Grob, 1995; Bhagwat *et al*., 2011; Sponsel 2007). Therefore investigating these factors which may alter a respondent's attitudes and values is important to understanding who the Mijikenda are today, and in investigating their beliefs.

If differences exist within the community, it is important to understand how they may affect the way in which people within the community interact with each other, as well as the impact they may have on the preservation of local cultural history and the conservation of the SNS. Bhagwat *et al*., (2011) note that even though communities may have different religions, they may be congruent and the community may continue to function as a cohesive unit allowing for the protection of the SNS within adapted cultural practice (such as through the incorporation of traditional customs and use of sacred sites into the practice of introduced faiths, such as Christianity and Islam). However, conflict between traditional and modernised cultures, practices and attitudes, through development and globalisation may also occur (Kasongo, 2010). Kasongo (2010: 313) notes that development which results in some members of the community shifting away from traditional values can result in "identity conflict, cultural conflict or economic conflict" within the community, and Bhagwat *et al*. (2011) state that changes in belief systems may result in the degradation of SNS. Therefore, being aware of these potential issues is important for understanding the impact that differences in the community may have on the conservation of the cultural heritage and biodiversity associated with the SNS. These issues also raise one further question: If the community is not one homogenous group with the same beliefs, attitudes, and values, what impact might these differences have on the conservation of the SNS?

The questions about the Mijikenda communities and the conservation of the SNS that have arisen in the literature can be investigated in a number of ways. In-depth anthropological

studies, similar to that conducted by Spear (1978) provide invaluable insight and depth into the understanding of communities. However, they are often limited in their scope due to the inability to interview and observe large numbers of people, as well as resulting in data that is difficult to compare across different groups (Bernard, 2006; Newing *et al.*, 2011). Another way to gain information on communities is through demographic studies and questionnaires (Bernard, 2006; Newing *et al.*, 2011; UNEP 2012, UNFPA, 2014). Demographic questions provide information on the characteristics of the surveyed population. The UNEP 2012 Global Environment Outlook 5 report highlights in its 'Biodiversity' chapter that "[t]he interaction of multiple drivers, including demographic, economic, socio-political, scientific and technological" affect biodiversity and its ability to provide ecosystem services (UNEP 2012: 139). Newing *et al.*, (2011) argue that demographic information can give important information in its own right. It provides information that can be used in planning and implementation, as well as to enable monitoring and evaluations of communities (UNFPA, 2014). In addition demographic information can be used to test for differences in attitudes, values and behaviours within communities and across different types of respondents (Newing *et al.*, 2011).

4.2.2 Research Questions

Main Research Question: Are the Mijikenda one homogenous group with similar demographies, attitudes, values and perceptions (in reference to traditional customs) as is suggested in the management plan for the SNS?

Null Hypothesis: The Mijikenda do not vary in their demographies, attitudes, values and perceptions. They are one homogenous group as outlined in the management plans for the SNS

Sub Questions

1. What are the different ethnicities in the region and are these different from what would have been expected in the past?

Null Hypothesis: The distribution of ethnic groups is no different than it was in the past

2. Do people vary in their religion, and is it different than it would have been in the past (i.e. all people belong to the traditional animisit faith)?

Null Hypothesis: There is no difference in religious adherence – all people are members of the traditional animistic faith

3. Do people vary in their marital status?
Null Hypothesis: There is no variation in marital status across the groups

4. Does the ethnicity of peoples' parents vary and is it different from what would be traditionally expected (i.e. all the respondents' parents are Mijikenda)?
Null Hypothesis: There is no variation in peoples' parents' ethnicity – they are all Mijikenda

5. Do people still belong to the Kaya, and if so which one? – To investigate if there has there been divergence away from this custom?
Null Hypothesis: There has been no divergence away from the traditional customs – all individuals belong to a Kaya, and they belong to the one that is traditionally associated with their ethnic group

6. Does peoples' perceptions towards the importance of their cultural identity vary?
Null hypothesis: There is no difference in peoples' perceptions towards the importance of their cultural identity

7. Is there any diversity in whether or not people believe in the traditional belief system?
Null Hypothesis: There is no diversity in whether or not people believe in the traditional belief system – they all do so (in line with the traditional practices)

8. If differences exist across the Mijikenda communities, is this likely to impact the conservation of the SNS?
Null Hypothesis: Differences across the Mijikenda communities are not likely to impact the conservation of the SNS

4.3 Methods

The data in this chapter were collected using questionnaires (Appendix 1) from face-to-face interviews in accordance with the methodology outlined in chapter 2.5. The data were input into Access (2010, Microsoft) the database was then formatted in Excel (2010, Microsoft) before being analysed in SPSS (version 21, IBM) and Excel (2010, Microsoft). The data were

analysed individually and in relation to one-another using a range of descriptive statistics including histograms, percentages, chi-square and post hoc tests as outlined in chapter 2.7.1.1. In addition multinomial regression was used to investigate relationships further as described in Chapter 2.7.1.2.

Variables

Gender – Was used to look at differences in responses

Age – Ages were grouped into five categories 17 – 25; 26 – 35; 36 – 45; 46 – 55; and 55+ (as outlined in Chapter 2.7.1)

Ethnicity – Respondents self identified and answers were grouped accordingly

Religion – Respondents self identified and answers were grouped accordingly (the traditional animistic faith is noted as 'Pagan'in the analysis and discussion)

Marital Status – Respondents grouped themselves into categories 'Single', 'Married' 'Divorces/Separated', or 'Widowed'

Ethnicity of Parents – Respondents were asked if both parents were Mijikenda, and if not were asked to specify which ethnicity parents were

Spatial Variation – To investigate responses at different spatial scales Location (finest scale), Division (medium spatial scale), and Sub-District (also known as constituency: largest spatial scale) were used. To date most work has focused on single groups and/or at low spatial scales (see Chapter 1.2.4 and 2.5.1).

Belonging to a Kaya – Respondents identified as belonging to a Kaya or not, and if so which one they belonged to. Answers were grouped accordingly

Importance of cultural identity – Respondents indicated how important their cultural identity was on a five-part ranking scale

Belief in traditional belief system – Respondents indicated if they believed in the traditional belief system (as a separate question from religion to investigate duality of beliefs)

4.4 Results

4.4.1 Ethnic Group

The questionnaires were used to obtain the demographic data for the analysis. The results show that there were 19 different ethnic groups identified in the interview population. The majority of people were Mijikenda (98.9%). Of the Mijikenda just 4 individuals (0.24% of the Mijikenda population interviewed) were Digo and 14 (0.83%) were Duruma. When divided by sub-district, division and location, there was a mix of tribal groups in all areas

(Tables 4.1 – 4.3). The results show that while most of those interviewed were from one of the seven "northern" Mijikenda tribes, there is diversity in the ethnic groups that lived in each area. The location with the fewest ethnic groups was Tsangatsini (which also had the ewest number of respondents).

Table 4.1: Ethnicity by Sub-District

		Ethnic Group								
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other
Sub-District	Ganze	3	8	2	8	151	3	0	3	0
	Junju	4	2	3	2	0	0	0	0	0
	Kaloleni	4	142	62	68	0	6	77	2	1
	Kilifi	250	106	8	1	5	35	0	5	4
	Mariakani	0	2	0	0	0	0	0	0	0
	Rabai	4	10	4	83	1	261	54	8	5

Table 4.2: Ethnicity by Division

		Ethnic Group									
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	Total
Division	Kaloleni	10	236	71	152	1	301	131	12	6	920
	Chonyi	207	7	0	0	1	0	0	1	3	219
	Ganze	3	8	2	8	153	3	0	3	0	180
	Kikambala	45	19	6	2	2	1	0	2	1	78
	Total	265	270	79	162	157	305	131	18	10	1397

Table 4.3: Ethnicity by location

		Ethnic Group									
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	Total
Location	Bedida	0	0	1	0	0	74	7	0	2	84
	Chasimba	50	5	0	0	1	0	0	0	0	56
	Chivara	1	2	0	0	24	1	0	1	0	29
	Jaribuni	2	5	2	6	95	1	0	2	0	111
	Jibana	1	12	65	0	0	0	0	0	0	78
	Junju	45	19	6	2	2	1	0	2	1	78
	Kambe	5	4	3	148	1	5	5	5	2	178
	Kauma	0	1	0	2	34	1	0	0	0	38
	Kaya Fungo	0	114	1	0	0	0	0	1	0	116
	Mwanamwinga	1	84	1	0	0	0	0	1	0	87
	Mwarakaya (Chonyi)	157	2	0	0	0	0	0	1	3	163
	Rabai	3	7	0	1	0	219	1	4	1	236
	Ribe	0	1	0	3	0	1	118	1	1	125
	Tsangatsini	0	14	0	0	0	1	0	0	0	15
	Total	265	270	79	160	157	304	131	18	10	1394

4.4.2 Religion

The majority of individuals surveyed were Christian (67.1%). Over 26% of individuals were Muslim and just over 4% said they had no religion. Only 2.2% of the interviewed population identified as being pagan or of the traditional faith (the local, traditional, animist faith of the Mijikenda). Chi-square analysis shows that there was no significant difference in the proportions of people who adhere to the different religions based on age or gender, but there are significant differences across ethnicities and locations (Table 4.4). The results show (Table 4.5) that all ethnic groups, except for Digo/Duruma (identified in this analysis as "Other Mijikenda"), had a greater number of people identifying as Christian than any other religion (or as having no religion). In contrast the "Other Mijikenda" group had a higher number of Muslims.

Post-hoc z-test shows (Table 4.5) a significantly greater proportion than expected of those in the ethnic group Chonyi identified as being Pagan compared to any other religion. There were also a significantly greater proportion of Chonyi respondents who identified as Christian rather than Muslim than was expected. However, for the Giriama, a significantly greater proportion of respondents identified as being Muslim than was expected compared to those who identified as Christian. When separated by location the post-hoc z-test shows that there are more people who are Christian than any other religion in all locations, except for Tsangatsini (Table 4.6). In Tsangatsini there were a greater number of Muslims. Not all locations show a significant difference in the proportions of individuals identifying with different religions. In Chasimba location a significantly greater proportion were Christian than was expected compared to those who are Muslim, however in Rabai location a greater

Table 4.4: Chi-square results for analysis of individuals identified religion
Legend: [1] = χ^2 Monte Carlo Exact Test and Bootstrapped Cramer's V analysis conducted to account for violations in assumptions of the model
[A] Ethnicity: (44.4% cells have expected count less than 5, minimum expected count = 0.17)
[B] Location: (50% of expected counts are less than 5, minimum expected count is 0.24)

Variable	χ^2	Degrees of freedom (df)	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	4.25	3	0.235					
Age	13.9	12	0.310					
Ethnicity[1] [A]	156.9	24	**< 0.001**	< 0.001	< 0.001	0.244	0.212	0.305
Location[1] [B]	258.9	39	**< 0.001**	< 0.001	< 0.001	0.313	0.272	0.396

proportion of interviewees are Muslim than expected compared to those who are Christian or those who have no religion, and in Jibana a significantly greater number of people identified as being Pagan than was expected compared to Christian or Muslim.

Table 4.5: Cross-tabulation of ethnic group and religion with post-hoc z-test
Legend: Sig = Significance. [*] Denotes that there is a significant difference between proportions on that row to the value of $p \leq 0.05$. NS = not significant. Different letters denote proportions (based on observed count compared to expected count) that are significantly different from each other. With a having the greatest proportion; b = significantly less than 'a' and significantly greater than 'c' etc.

		Religion				Sig
		Christian	Muslim	Pagan	None	
Ethnic Group	Chonyi	122_b	9_c	13_a	6_b	*
	Giriama	87_b	53_a	$0_{a, b}$	$10_{a, b}$	*
	Jibana	20_b	8_b	4_a	0_b	*
	Kambe	90_a	15_b	$0_{a, b}$	8_a	*
	Kauma	39_b	$16_{a, b}$	$0_{a, b}$	7_a	*
	Rabai	132_b	91_a	$2_{a, b}$	2_b	*
	Ribe	93_a	31_a	0_a	2_a	NS
	Other Mijikenda	3_b	9_a	$0_{a, b}$	$1_{a, b}$	*
	Other	6_a	2_a	0_a	0_a	NS

Table 4.6: Cross-tabulation of location and religion with post-hoc z-test
For legend see Table 4.5

		Religion				Sig
		Christian	Muslim	Pagan	None	
Location	Bedida	53_a	26_a	0_a	0_a	NS
	Chasimba	40_a	0_b	$0_{a, b}$	$0_{a, b}$	*
	Chivara	8_b	0_b	$0_{a, b}$	4_a	*
	Jaribuni	21_a	10_a	0_a	3_a	NS
	Jibana	17_b	7_b	4_a	0_a	*
	Junju	38_a	28_b	$0_{a, b}$	$3_{a, b}$	*
	Kambe	102_a	18_b	$0_{a, b}$	10_a	*
	Kauma	15_a	4_a	0_a	0_a	NS
	Kaya Fungo	30_a	15_a	0_a	3_a	NS
	Mwanamwinga	41_a	15_a	0_a	5_a	*
	Mwarakaya (Chonyi)	53_b	3_c	13_a	3_b	*
	Rabai	82_b	70_a	$2_{a, b}$	2_b	*
	Ribe	89_a	29_a	0_a	3_a	NS
	Tsangatsini	2_b	9_a	$0_{a, b}$	$0_{a, b}$	*

4.4.3 Marital Status

The majority of the interviewed population (62.2%) were married. There was a significant difference in marital status between genders and ages (Table 4.7). Post-hoc z-tests show that a significantly greater proportion of men compared to women were single, and a significantly greater proportion of women were both separated and widowed compared to men (Table 4.8). For women a significantly greater proportion than expected were widowed than those who were single or married, whereas for men the opposite was true (Table 4.9). The post-hoc z-test shows that in the age group 17 – 25 a significantly greater proportion of respondents were single people than any other marital status (Table 4.10). There were significantly fewer widowed individuals than expected compared to those who are separated/divorced in this age group. In the age group 26 – 35, there were significantly fewer widowed people than any other marital status; however, there was no significant difference in the proportions (compared to the expected values) between those who were single, married, or separated/divorced. For both age groups 36 – 45 and 46 - 55 there were significantly fewer single people than would be expected by chance compared to those who are married, separated/divorced or widowed. For those in the age category 56+, there was a significantly greater proportion of single people than those who were married or widowed, there was also a significantly greater proportion of widowed people than any other marital status.

Table 4.7: Chi-square results for analysis of marital status
For legend see Table 4.4

Variable	χ^2	df	p	Cramer's V
Gender	37.9	3	**< 0.001**	0.174
Age	589.4	12	**< 0.001**	0.401

Table 4.8: Cross-tabulation of Marital Status and Gender with post-hoc z-test
For legend see Table 4.5

		Male	Female	Sig
Marital Status	Single	185_a	147_b	*
	Married	417_a	391_a	NS
	Separated/ Divorced	14_b	27_a	*
	Widowed	14_b	60_a	*

Table 4.9: Cross-tabulation of Marital Status divided by gender with post-hoc z-test
For legend see Table 4.5

		Single	Married	Separated/ Divorced	Widowed	Sig
Gender	Male	185$_a$	417$_a$	14$_{a, b}$	14$_b$	*
	Female	147$_b$	391$_b$	27$_{a, b}$	60$_a$	*

Table 4.10: Cross-tabulation of marital status and age with post-hoc z-test
For legend see Table 4.5

		Single	Married	Separated/ Divorced	Widowed	Sig
Age in Groups	17 – 25	216$_a$	65$_{b, c}$	4$_b$	0$_c$	*
	26 - 35	78$_a$	157$_a$	8$_a$	2$_b$	NS
	36 – 45	21$_b$	213$_a$	15$_a$	13$_a$	*
	46 – 55	10$_b$	158$_a$	9$_a$	11$_a$	*
	56 +	5$_c$	191$_b$	3$_{b, c}$	44$_a$	*

4.4.4 Ethnicity of Parents

The majority of those interviewed (96.2%) stated that both their parents were Mijikenda. There was no significant difference between the genders, different age groups, or religions with regards to both parents being Mijikenda. However, there were significant differences according to ethnicity (Table 4.11). A post-hoc z-test shows that those who do not identify as Mijikenda (ethnic group "Other") were significantly less likely to have two parents who were Mijikenda than any other ethnic group (Table 4.12).

Table 4.11: Chi-square results for analysis of the ethnicity of parents
For legend see Table 4.4. [(A)]: 44.4% cells have expected count less than 5

Variable	χ²	df	p	Monte Carlo Exact 99% CI Upper bound	Monte Carlo Exact 99% CI Lower bound	Cramer's V	Bootstrapped 99% CI Upper bound	Bootstrapped 99% CI Lower bound
Gender	0.00	1	0.992					
Age	3.25	4	0.517					
Religion	2.80	3	0.424					
Ethnicity[1] [(A)]	214.80	8	**< 0.001**	< 0.001	< 0.001	0.393	0.189	0.565

Table 4.12: Cross-tabulation of Both Parents Mijikenda with ethnic group post-hoc z-test
For legend see Table 4.5

		Ethnic Group									Sig.
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
Both Parents Mijikenda	Yes	254_a	263_a	75_a	154_a	157_a	292_a	126_a	17_a	1_b	*
	No	9_b	7_b	4_b	7_b	0_b	10_b	5_b	1_b	9_a	*

4.4.5 Belonging to a Kaya

Of the 1406 respondents who did the questionnaire, 1340 (95%) answered the question 'Do you belong to a Kaya?'. Sixty-six individuals (5%) chose not to answer this question. Of those that did answer the question 87.4% of people identified as belonging to a Kaya and 12.6% did not (noted in figures and tables as 'no Kaya'). There was a difference in the number of ethnic groups that belong to each Kaya (Figure 4.1, Table 4.13). Kaya Jorore had the lowest number with just ethnicity identifying as belonging to it (one = Giriama), whereas Kaya Kambe had the highest (seven ethnicities). There was a greater diversity in the number of ethnic groups that belong to most sacred sites for women than men (Table 4.13). Chi-square analysis shows there was no significant difference between genders. However, there was a significant difference between age groups, ethnicities, location (Table 4.14). A post-hoc z-test indicates that a significantly greater proportion of those in the age category 56+ belong to a Kaya than those in any other age group. When gender and age were investigated together using a layered chi-square, results show that women in the age group 26 – 35 yrs. were significantly more likely to belong to a Kaya than men. However, there was no significant difference between men and women in any other age group.

A post-hoc z-test also shows that a significantly greater proportion of people in the Kambe ethnic group said they belonged to a Kaya than expected compared to all other ethnic groups apart from Jibana (Table 4.15). There was no significant difference in the proportions of the number of people who belong to Kayas across any of the other ethnic groups. Results show that proportionately more respondents in Chasimba, Kambe and Kaya Fungo locations were more likely to belong to a Kaya than expected, whereas those in Bedida, Mwanamwinga and Rabai location were less likely than expected to belong to a Kaya.
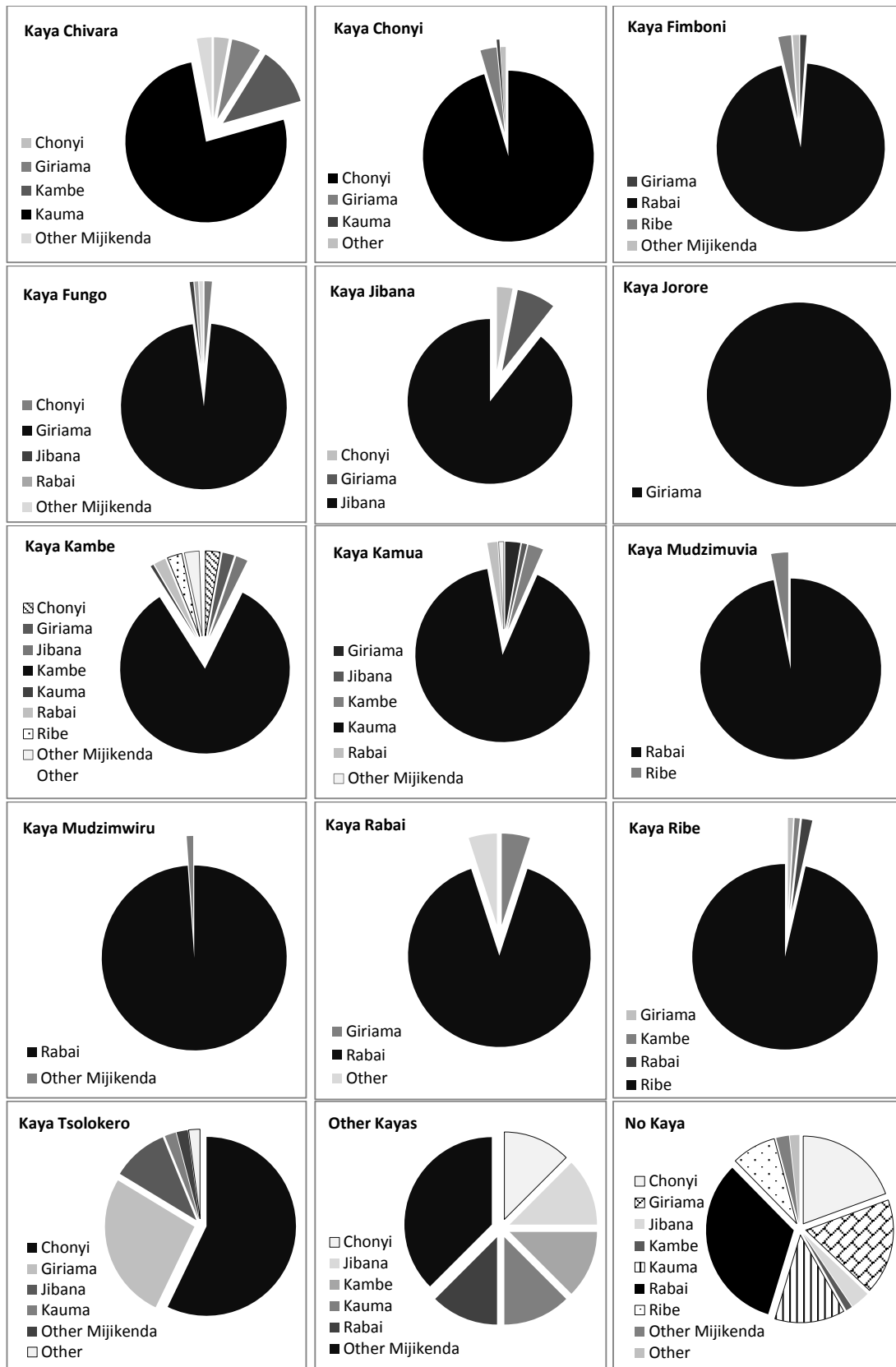
Figure 4.1: Pie charts showing the ethnicities belonging to each of the main northern Kayas

Table 4.13: Number of ethnic groups belonging to each Kaya, total and separated by gender

	Rabai	Chivara	Chonyi	Fimboni	Fungo	Jibana	Tsolokero	Jorore	Kambe	Kauma	Mudzimwiru	Ribe	Mudzimuvia	Other	None
														Kaya	
Total	3	5	4	4	5	3	6	1	9	6	2	4	2	6	9
Male	2	2	2	3	2	3	3	1	4	2	1	1	1	3	8
Female	2	5	4	2	4	3	6	1	8	6	2	4	2	4	9

Table 4.14: Chi-square results for analysis of if people belong to a Kaya
For legend see Table 4.4
[A]: 25.0% cells have expected count less than 5, minimum expected count 0.82
[B]: 40.0% cells have expected count less than 5

Variable	χ^2	df	p	Monte Carlo Exact 99% CI Upper bound	Monte Carlo Exact 99% CI Lower bound	Cramer's V	Bootstrapped 99% CI Upper bound	Bootstrapped 99% CI Lower bound
Gender	1.22	1	0.269					
Age	34.6	4	**< 0.001**			0.163		
Ethnicity	41.0	8	**< 0.001**			0.175		
Location	87.2	13	**< 0.001**			0.255		
Age and Men[1] [A]	4.56	13	**< 0.001**	< 0.001	< 0.001	0.264	0.233	0.355
Age and Women	50.6	13	**< 0.001**			0.276		
Age and Chonyi	5.33	4	0.255					
Age and Giriama	11.6	4	**0.021**			0.214		
Age and Jibana	8.33	4	0.080					
Age and Kambe	3.22	4	0.521					
Age and Kauma[1] [B]	12.1	4	**0.013**	0.010	0.016	0.289	0.238	0.438
Age and Rabai	10.7	4	**0.030**			0.199		
Age and Ribe	0.880	4	0.927					
Age and Other Mij.	2.87	4	0.580					

Table 4.15: Cross-tabulation of Belonging to Kaya and ethnic group
For legend see Table 4.5

		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	Sig
						Ethnic Group					
Belong to	Yes	227$_b$	230$_b$	71$_{a, b}$	158$_a$	127$_b$	226$_b$	116$_b$	14$_b$	5$_b$	*
Kaya	No	33$_a$	30$_a$	6$_{a, b}$	2$_b$	22$_a$	56$_a$	14$_a$	4$_a$	3$_a$	*

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The layered chi-square test results show that the difference in belonging to Kayas across the age-groups was dependent on the ethnic group of the individuals. Only 3 ethnic groups showed a significant difference between the age groups - the Giriama, Kauma and Rabai. The post hoc z-test (Table A3.1, Appendix 3) shows for the Giriama those in the age group 56+ were proportionately more likely to belong to a Kaya than those in the age group 17 – 25. For the Kauma ethnic group those aged 56+ are proportionately more likely to belong to a Kaya than those in the 17 – 25, 26 – 35 and 36 – 45 age groups. While in the Rabai group those aged 56+ were proportionately more likely to belong to a Kaya than those in the 26 – 35 and 46 – 55yr age groups.

For all Kayas, the majority ethnic group was the same as those traditionally associated with the Kaya. The Kaya with the largest number of different ethnic groups belonging to it was at Kaya Kambe (9 ethnic groups). There was a significant difference in which Kayas people belong to when divided by ethnic group and Division (Table 4.16). Post-hoc z-tests show that there was a significant difference in which ethnicities belong to each Kaya across all sites (Table 4.17) and which Kayas people belong to according to Division for all sites except Kaya Rabai (Table 4.18).

The Kayas that people identify as belonging to were unevenly distributed geographically in the different locational divisions. The Kaloleni division had the largest number of Kayas (nine) located within it which people identify as belonging to, Ganze division had two, whereas both Chonyi and Kikambala divisions only had one Kaya within their Divisions that people identify as belonging to. The large number of Kayas that people belong to in Kaloleni division coincides with a larger number of sacred sites being located in the division (Table 4.19), and the larger number of people who were interviewed in the area (which was related to the number of sacred sites in the area).

Table 4.16: Chi-square results for analysis of which Kayas people belong to
For legend see Table 4.4 [A]: 42.2% cells have expected count less than 5, minimum expected count is 0.05; [B]: 23.3% cells have expected count less than 5, minimum expected count is 0.46

| Variable | χ^2 | Degrees of freedom | p | Monte Carlo Exact 99% CI | | Cramer's V | Bootstrapped 99% CI | |
				Upper bound	Lower bound		Upper bound	Lower bound
Ethnicity[1] [A]	6026.5	112	**< 0.001**	< 0.001	< 0.001	0.749	0.729	0.778
Division[1] [B]	3073.9	42	**< 0.001**	< 0.001	< 0.001	0.873	0.841	0.906

Table 4.17: Cross-tabulation of Kaya respondents belong to and ethnic group

For legend see Table 4.5

		Ethnic Group									
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mij	Other	Sig
Kaya belong to	Rabai	0_c	1_c	$0_{a,b,c}$	0_c	$0_{b,c}$	$18_{a,b}$	$0_{b,c}$	$0_{a,b,c}$	1_a	*
	Chivara	$1_{b,c}$	$2_{b,c}$	$0_{b,c}$	$4_{b,c}$	26_a	0_c	$0_{b,c}$	$1_{a,b}$	$0_{a,b,c}$	*
	Chonyi	188_a	6_c	0_c	0_c	1_c	0_c	0_c	$0_{b,c}$	$2_{a,b}$	*
	Fimboni	0_c	$1_{b,c}$	$0_{b,c}$	$0_{b,c}$	$0_{b,c}$	78_a	$2_{b,c}$	$1_{a,b}$	$0_{a,b,c}$	*
	Fungo	2_b	135_a	1_b	0_b	0_b	1_b	0_b	1_b	$0_{a,b}$	*
	Jibana	2_b	5_b	59_a	0_b	0_b	0_b	0_b	0_b	0_b	*
	Tsolokero	28_a	$13_{a,b,c,d,e}$	$5_{a,d,e}$	$0_{c,f}$	$1_{b,c,d,e,f}$	0_f	$0_{c,e,f}$	$1_{a,b,c,d,e}$	$1_{a,b,d}$	*
	Jorore	0_b	59_a	0_b	0_b	0_b	0_b	0_b	$0_{a,b}$	$0_{a,b}$	*
	Kambe	5_c	4_c	$4_{b,c}$	149_a	1_c	4_c	5_c	5_b	$1_{b,c}$	*
	Kauma	0_c	$3_{b,c}$	$1_{b,c}$	$3_{b,c}$	97_a	$2_{b,c}$	$0_{b,c}$	1_b	$0_{b,c}$	*
	Mudzimwiru	0_c	0_c	$0_{b,c}$	$0_{b,c}$	$0_{b,c}$	88_a	$0_{b,c}$	$1_{a,b}$	$0_{a,b,c}$	*
	Ribe	0_b	1_b	0_b	1_b	0_b	2_b	108_a	0_b	0_b	*
	Mudzimuvia	0_b	0_b	$0_{a,b}$	0_b	0_b	32_a	1_b	$0_{a,b}$	$0_{a,b}$	*
	Other*	1_b	0_b	$1_{a,b}$	1_b	1_b	1_b	0_b	3_a	$0_{a,b}$	*
	None	33_a	30_a	$6_{a,b}$	2_b	22_a	56_a	14_a	4_a	3_a	*

Table 4.18: Cross-tabulation of Kaya respondents belong to and Division

For legend see Table 4.5

		Division				
		Kaloleni	Chonyi	Ganze	Kikambala	Sig
Kaya belong to	Rabai	19_a	0_a	0_a	1_a	NS
	Chivara	0_b	0_b	34_a	0_b	*
	Chonyi	2_c	189_a	0_c	6_b	*
	Fimboni	82_a	0_b	0_b	0_b	*
	Fungo	135_a	1_b	0_b	4_a	*
	Jibana	65_a	1_b	0_b	$0_{a,b}$	*
	Tsolokero	1_b	0_b	0_b	48_a	*
	Jorore	59_a	0_b	0_b	$0_{a,b}$	*
	Kambe	175_a	0_b	1_b	2_b	*
	Kauma	0_c	$0_{b,c}$	106_a	1_b	*
	Mudzimwiru	89_a	0_b	0_b	0_b	*
	Ribe	112_a	0_b	0_b	0_b	*
	Mudzimuvia	32_a	0_b	$0_{a,b}$	$0_{a,b}$	*
	Other*	4_b	0_b	$1_{a,b}$	3_a	*
	None	108_a	24_a	27_a	12_a	NS

Table 4.19: Number of SS surveyed in each division

	Kaloleni	Chonyi	Ganze	Kikambala
Number Surveyed SS	14	3	3	1

4.4.6 Importance of Cultural Identity

A Multinomial Regression analysis was performed with 'importance of cultural identity' as the dependent value, and gender, ethnic group and age as the independent variables. The results of the multinomial regression are represented in Figure 4.2 and the full output is in Appendix 3 (Table A3.2). The results show that with every unit increase in age an individual was 5% more likely to feel that their cultural identity was very important to them compared to those who think it was not important at all (Exp (B) = 1.05). An interviewee being male increased the likelihood that an individual would feel their cultural identity was very important to them compared to not important at all by 57%. Along with age and gender, results show a difference in how important a person's cultural identity is based on their ethnicity. Being Chonyi rather than Ribe means that a respondent was over three times more likely to think that their cultural identity was very important compared to thinking it was not important at all (Exp (B) = 3.47). They were also over three times more likely to think that it was quite important compared to not important at all. They were three times more likely to give a neutral response, and nearly five times more likely to feel that their cultural identity was of little importance compared to thinking it was not important at all. Individuals who identify as Giriama rather than Ribe were four times more likely to think that their cultural identity was very important than not at all, three times more likely to think that it was quite important, and they were nearly three times (Exp (B) = 2.96) more likely to give a neutral response (neither important nor not important), than to think it was not important at all.

Respondents with the ethnicity Jibana instead of Ribe were nearly six times more likely to think that their cultural identity was very important compared to thinking it was not important (Exp (B) = 5.88). Those who were Kambe instead of Ribe were over seven times more likely to think that their cultural identity was very important compared to not important at all (Exp (B) = 7.33). They were also over three times more likely to believe that it was quite important compared to not important at all. Respondents who were Kauma rather than Ribe were over six times more likely to think their cultural identity was very important rather than thinking it was not important at all. They were nearly four times more
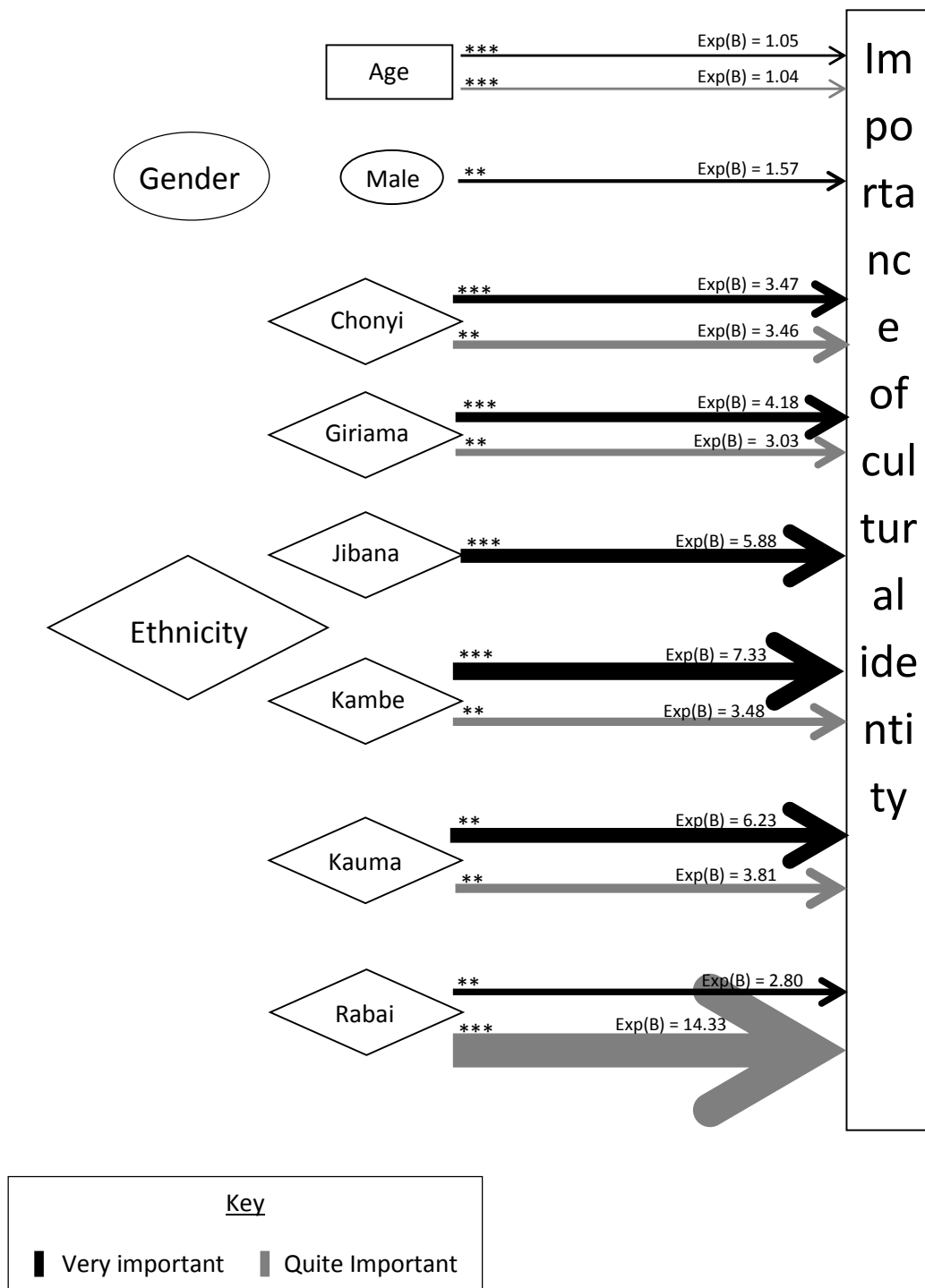
Figure 4.2: Visualisation of multinomial logistic regression output for the importance of cultural identity to respondents

Legend: Likelihood of response, very important or quite important, as to how important an individual feels their cultural identity is compared to thinking it is not important at all. Weights of lines are equal to odds ratio (Exp (B)) values. Significant factors under Wald test to the level of * p ≤ 0.05 ** p ≤ 0.01 or *** p ≤ 0.001. Reference categories are: Gender = Female. Ethnic Group = Ribe

likely to think it was quite important, and over twice as likely to think it was of little importance as to think it was not important at all. Individuals who were Rabai instead of Ribe were nearly three times more likely to think that their cultural identity was very important compared to not important at all (Exp (B) = 2.80). They were also over 14 times more likely to think that it was quite important rather than thinking that it was not important at all.

The model fitting analysis shows that the model was a good fit, and Nagelkerke R Square analysis shows that there was a moderate relationship between the dependent and independent variables (Model Fitting Criteria = 2410.3, χ^2 = 398.1, p < .001, df = 32; Nagelkerke R^2 = 0.283). The results from the classification (Table 4.20) show that the classification accuracy (47.3%) was greater than the proportional by chance accuracy criteria (27.04% - calculated using number per classification calculation). The maximum chance criterion was 0.5219 (or 52.19% - calculated due to high number of cases in 'Very Important' category) which was higher than the overall accuracy of the model. This shows that the accuracy of the model was less accurate than the maximum by chance criterion; however, the model was greater than the proportional by chance accuracy and was still deemed to be a good fit. Likelihood ratio tests show that all the predictor variables were significant contributors in explaining the difference in how important an individual's cultural identity is (age: χ^2 = 102.5, p < .001, df = 4; gender: χ^2 = 17.6, p = .001, df = 4; and ethnic group: χ^2 = 260.1, p < .001, df = 24).

Table 4.20: Classification Accuracy of Multinomial Logistic Regression

	Predicted					
	Very Important	Quite Important	Neutral	Of Little Importance	Of No Importance	Percent Correct
Very Important	415	59	0	8	52	77.7%
Quite Important	87	97	0	2	18	47.5%
Neutral	37	23	0	2	31	0.0%
Of Little Importance	90	48	0	5	25	3.0%
Of No Importance	139	48	0	5	88	31.4%
Overall Percentage	60.0%	21.5%	0.0%	1.7%	16.7%	47.3%

4.4.7 Traditional Belief System

48.9% of the population stated that they believed in the traditional belief system. All those who identified as Pagan believe in the traditional belief system. Of those who identified as having no religion 58.3% believe in the traditional faith system. As the majority of the population identifies as being either Christian or Muslim (93.5% of the population) this demonstrates a substantial level of dualistic belief systems. Over 43% of Muslims and 37% of Christians believe in the traditional belief system as well.

In order to further investigate people's perceptions of the local traditional belief system the statement "the local traditional belief system is no longer important" was posed (Q98, Appendix 1) and individuals were asked to state how strongly they agreed with the statement. A multinomial logistic regression was performed on the responses with 'importance of cultural identity', 'ethnic group' and 'belief in traditional faith system' as the independent variables. The output of the multinomial logistic regression is represented in Figure 4.4, and the full output Table is located in Appendix 3 (Table A3.3). The results show that if a respondent thinks their cultural identity is very important compared to not important they were over three times more likely to strongly disagree with the statement "the local traditional belief system is no longer important" than strongly agree (Exp (B) = 3.63). An individual who thinks either that their cultural identity is very important, or quite important, compared to those who believe it is not important were about three times more likely to disagree with the statement "the local traditional belief system is no longer important" than strongly agree (Exp (B) = 2.80 and Exp (B) = 3.16 respectively). These results indicate if a person feels their cultural identity is important, they were less likely to think that the local belief system is no longer important.

There are also differences among the various ethnic groups. If an individual was Chonyi rather than Ribe they were nearly five times more likely to strongly disagree with the statement "the local traditional belief system is no longer important" than strongly agree (Exp (B) = 4.94), and those who were Kambe rather than Ribe were 30 times more likely to disagree than strongly agree. The results also show that those who were Chonyi and Kambe were most likely to disagree with the statement. These results indicate that an individual's ethnic group was associated with how much they agree with the statement "the local traditional belief system is no longer important".
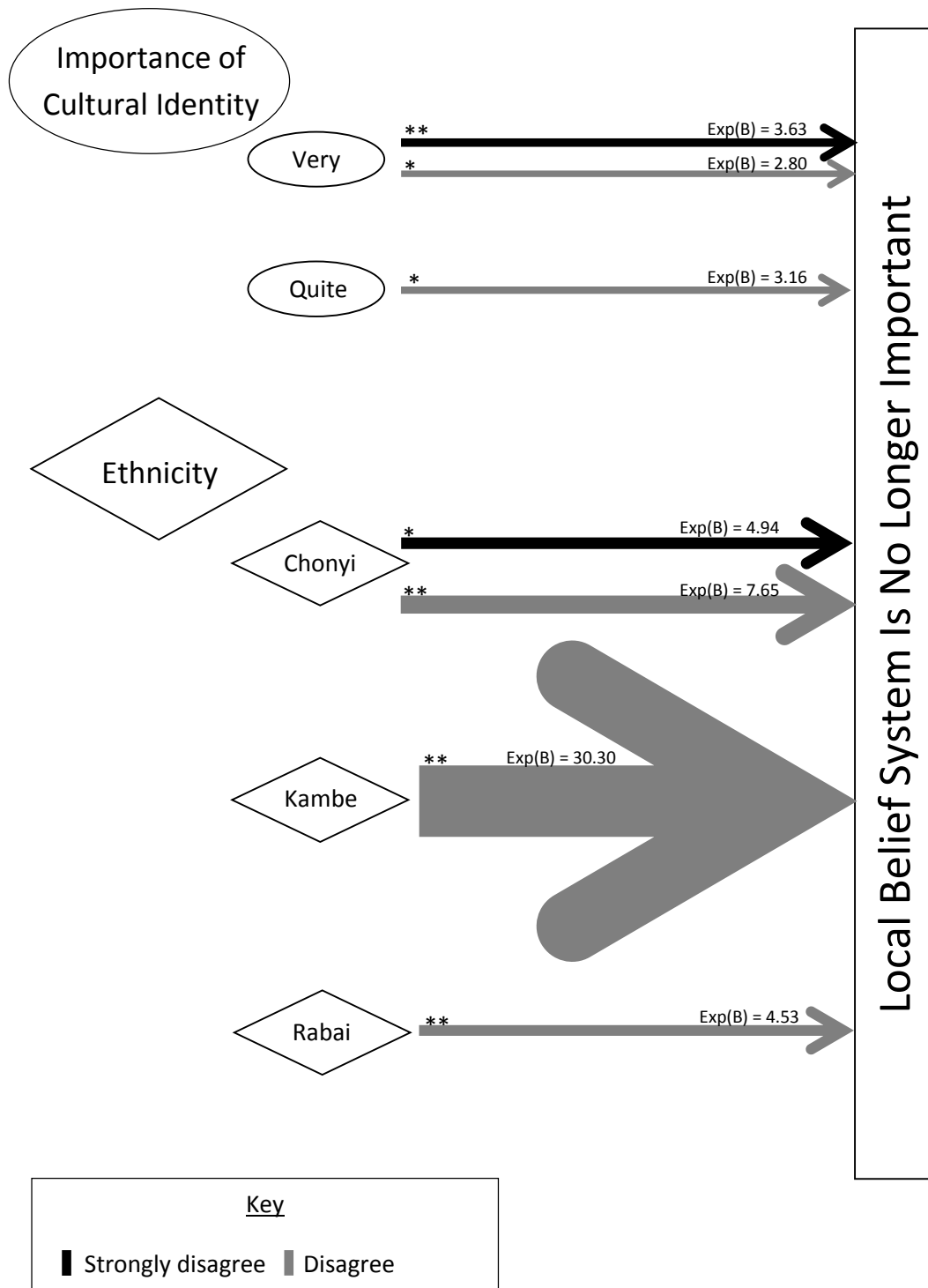
Figure 4.3: Visualisation of multinomial logistic regression output for if respondents think local belief system is no longer important

Legend: Likelihood of response, strongly disagree or disagree, with the statement "The local belief system is no longer important" compared to strongly agreeing.
Weights of lines are equal to odds ratio (Exp (B)) values.
Significant factors under Wald test to the level of * p ≤ 0.05 or ** p ≤ 0.01.
Reference categories are: Cultural Identity = Not important. Ethnic Group = Ribe. Spiritual Belief system = Not important.

The model fitting information along with Nagelkerke R square test show that the model was a good fit (χ^2 = 424.1, p < 0.001, df = 56, R^2 = 0.343). The results show that the classification accuracy of 46.1% was greater than the proportional by chance accuracy criteria (0.287 - calculated using the square of proportions of each category). The maximum chance criterion was 0.339 (or 33.9% - calculated based on the answer with the highest frequency of responses 'neither agree nor disagree') which was lower than the overall accuracy of the model. This shows that the accuracy of the model was more accurate than would be expected by chance. Likelihood ratio tests show that, how important an individual feels their cultural identity is, their ethnic group (when focusing just on the northern Mijikenda tribes) and how important a person feels their spiritual belief system is, were all significant contributors to the model in explaining the difference in responses as to whether a person believes that the traditional belief system is no longer important (Importance of cultural identity: χ^2 = 75.0, p < .001, df = 16; Ethnic Group: χ^2 = 180.3, p < .001, df = 24; Importance of belief system χ^2 = 68.5, p < .001, df = 16).

Chi-square analysis shows that there was a significant difference between the genders, and age groups (Table 4.21) with men being more likely to believe in the traditional belief system than women. A post-hoc z-test (Table 4.22) shows that those in the age group 17 – 25 were less likely to believe in the traditional belief system compared to all other age groups, whilst those in the 56+ group are more likely to believe in the traditional belief system than all other age groups. Those in the 46 – 55 age group were more likely to believe in the traditional belief system than those in the 26 – 35 age category. A layered chi-square with gender and age indicates a significant difference for both male and female respondents across the age groups. A significantly greater proportion of older individuals stated they believed in the traditional faith system compared to younger groups, for both men and women. However, there was no significant difference between the middle age groups (26 – 35, 36 – 45, and 46 – 45) for women (Table 4.23), and there was no significant difference between the 56+ and the 46 – 55 age group for men.

Table 4.21: Chi-square results for analysis of if people believe in traditional belief system
For legend see Table 4.4

Variable	χ^2	df	p	Cramer's V
Gender	5.87	1	0.015	0.066
Age	1051.3	4	< 0.001	0.338
Age (Men)	98.4	4	< 0.001	0.385
Age (Women)	55.5	4	< 0.001	0.292

Table 4.22: Cross-tabulation of whether individuals believe in the traditional faith system and their age. For legend see Table 4.5

		Age in Groups					
		17 - 25	26 – 35	36 - 45	46 - 55	56 +	Sig
Believe in traditional	Yes	79_d	103_c	$139_{b, c}$	123_b	198_a	*
belief system	No	220_a	163_b	$145_{b, c}$	84_c	67_d	*

Table 4.23: Cross-tabulation of whether individuals believe in the traditional faith system and their age layered by gender. For legend see Table 4.5

			Age in Groups					
			17 - 25	26 - 35	36 - 45	46 - 55	56 +	Sig
Male	Believe in traditional	Yes	35_d	$44_{c, d}$	$81_{b, c}$	$69_{a, b}$	118_a	*
	belief system	No	106_a	$73_{a, b}$	$69_{b, c}$	$34_{c, d}$	36_d	*
Female	Believe in traditional	Yes	43_c	$59_{b, c}$	58_b	54_b	79_a	*
	belief system	No	114_a	$88_{a, b}$	76_b	49_b	31_c	*

4.5 Discussion

4.5.1 Demography

The results showed that there was a range of ethnic groups in the region and that while the majority of individuals were Mijikenda some were not. While most locations have a dominant ethnic group in the region all have at least two ethnic groups (Tables 4.1 – 4.3). For the majority of those interviewed both parents were Mijikenda. There is no significant difference amongst the age groups, sexes or religions as to whether both a respondents parents were Mijikenda; however, there was between the ethnic groups (Table 4.4, 4.11 and 4.12). These results show that there is diversity among the groups that live in the different areas. This is likely to lead to different perceptions, attitudes and values across the populations. In addition the results show that not all people in the area are Mijikenda which is in contrast to the assumptions made by the management plan for the SNS.

In addition to a mix of different ethnicities of respondents and their families, the study also highlights that respondents identify with a number of religions. Investigation of differences in religions is important to this study as religion influences people's values, attitudes and

behaviours (Grob, 1995; Bhagwat *et al.*, 2011; Sponsel 2007). The majority of people are Christian, and the next most common religion is Islam. The differences in religious affiliations are observed between the locations and ethnic groups (Table 4.4 – 4.6). The switch to mainstream religions indicates a departure away from the traditional animistic belief system associated with the Kayas. While new religions may be compatible with some traditions, there may also be conflict (Sheridan and Nyamweru, 2008; Bhagwat *et al.*, 2011; Tengö and von Heland, 2011).

Bhagwat *et al.*, 2011 note that in 85% of the 125 countries in 'Biodiversity Hotspot' locations that they surveyed, over 70% of their populations adhere to mainstream faiths. However, the majority of SNS in Africa (including Kenya) are associated with traditional animistic faiths (Sheridan and Nyamweru, 2008). Bhagwat *et al.* (2011) highlight that although in some instances traditions, practices, and protection of SNS may be incorporated into the practices of the introduced faith when communities convert, there may also be conflict between traditional belief systems and new religions. It has been stated that the conversion to mainstream faiths as well as other social changes have eroded the "institutional legitimacy and cultural relevance" of SNS and the regulations that have protected them to date (Sheridan, 2008: 12).

Since the majority of people have changed to Christianity and Islam in the study area, it is important to understand the implications that this may have on local traditions and the SNS. In the process of this research a number of different attitudes have been encountered which highlight both the similarities and conflicts between local belief systems and the mainstream faiths. Examples of the compatibility include a number of the Kaya Elders being Christian and/or Muslim, and the adaptation of some traditional practices to include mainstream faith practices, such as allowing Taqiyahs [Islamic skull caps] to be worn in all parts of the Kayas and during ceremonies (in some parts of the Kayas and during some ceremonies hats are traditionally not allowed to be worn). However for some people the local traditions clash with their belief system. For example, one Christian respondent (Questionnaire number: 3/24/B) noted that "I don't think if the original faith is good… because I am seeing devilish things" and highlights that there is conflict between those who adhere to local customs and those who do not saying "there are some who thinks tradition is good and there are those who do not have time with it, so brings in contradiction".

Such conflicts could result in the loss of traditional customs and practices, and the degradation of traditional sacred natural sites. For example, Tengö and von Heland (2011) note that while there is a blend of the indigenous faith system with the Christianity that is followed by the Tandory communities in Madagascar, there has been a reduction in a cultural practices, especially the *sorona* ceremony (requiring the sacrifice of an animal which is against Christian teachings) amongst those that have converted. The prevention of *sorona* poses a problem for those that have converted as they then cannot be buried in the ancestral tomb, therefore causing a conflict between personal identity as a Tandory, as well as family traditions and connections, with being a Christian. Similar issues have also been observed in Kasigau in Kenya. A number of the local people have converted to Christianity and have stopped taking part in some traditions (Milton, 1996). In addition, some community members believe that any harm that befalls those who adhere to the traditional faith is because they do not follow God, whereas Christians are looked upon favourably and therefore good things will happen to them (Milton, 1996). It is possible that these attitudes, like those noted in this research amongst the Mijikenda could lead to disagreements and disputes amongst the communities and in turn could lead to further problems with enforcing traditional laws and protecting the associated SNS.

Along with ethnicity and religion, the populations surrounding the sacred sites also vary in marital status, particularly between genders and age groups (Table 4.7 – 4.10). The results show that younger people are more likely to be single compared to older age groups, which follows expected trends. Marital status is important because beliefs, attitudes and behaviours are affected by familial and social ties (Grob, 1995 and St John *et al.*, 2010). Those who are single while being affected by their parents, siblings and other family members may also be greatly influenced by their peers. However, beliefs, attitudes and behaviours of those who are married are likely to be greatly influenced by their spouse. As noted by Spear (1978), children take on the ethnic group of their fathers; however, some women may change ethnic groups when they marry, in addition, individuals (most often women) may also convert religions when they marry (Shepheard-Walwyn pers. obs.). Therefore, along with social interactions altering attitudes and behaviours, people may alter their own belief systems, and therefore their attitudes, values and behaviours associated with their religion, due to changes in their social situation (such as getting married). The variation in marital status, and the potential changes in attitudes and behaviours which come from marriage and having a family influences people's attitudes and behaviours towards local customs.

4.5.2 Belonging to a Kaya

Belonging to a Kaya is an integral part of Mijikenda culture, especially with regards to the SNS. Therefore understanding if local people still identify with this practice and way of conceptualising themselves and their cultural identity informs us about potential changes in tradition, as well as people's attitudes and behaviours towards the SNS. The results show that most people still identify as belonging to a Kaya. However, even though it seems as though this part of Mijikenda culture is still embedded within the local populations a departure from the traditional practice was seen (Figure 4.2, Table 4.15). While most people belong to a Kaya; the ethnic groups that associate with each Kaya are varied. This highlights a shift from the customary associations, as normally people from one ethnic group would belong to a specific Kaya (Spear, 1978).

In addition there were significant differences between the age groups and the ethnicities in adherence to this cultural practice (Table 4.13 – 4.19). Older respondents (in the age group 56+) were more likely to belong to a Kayas, showing degradation in the tradition amongst younger members of society. While all ethnic groups had a majority of people who belonged to Kayas, the Rabai had a larger proportion of individuals who said they did not belong to a Kaya than was expected. This shows that some ethnic groups may be experiencing a greater shift away from traditions compared to others. The greater shift away from traditional practices may be due to a range of different factors. One of the possible main factors as to why the Rabai group may have undergone greater cultural shift is due to their location and the level of development in the region. As shown in Figures 1.3 and 2.1 (Chapters One and Two), the Rabai traditionally live closer to Mombasa, and close to the Mombasa-Nairobi highway. In addition, there are major trading centres such as Mariakani located within the Rabai region. The region in which the Rabai live is therefore much more developed than many of the areas where other Mijikenda ethnic groups live. In addition, due to the proximity to the main road, and the trading centre, there are a large number of migrants that pass through the region.

As discussed in Chapters One and Three, migrants can influence the perceptions of individuals from traditional communities, and through experience of different values systems, attitudes, and values, this can lead to cultural shift within the local communities (Coffin, 2007; Laurance *et al.*, 2009; Tengö and von Heland, 2011; Andriamarovololona and

Jones, 2012). Along with development, and interactions with migrants, which may result in people shifting away from traditional customs, it is also easier for people from the Rabai region to travel to Mombasa, and other major towns along the highway. By travelling out of the region, working in towns and cities, and interacting with a range of people, the way in which these people view their culture is likely to change. This is because people's individual experiences alter how they view the world, and affect their attitdes and values (Agrawal & Gibson, 1999; Brown, 2003; Bresnahan, 2010). This change in perceptions of these individuals will therefore result in further cultural shift. Modernisation, development and the movement of people leads to cultural change (Mishler, 2001; Smith, 2001; Maiero and Shen, 2004; Dudley *et al.*, 2005; Hoekstra, 2010). It is likely that the shift away from traditional cultural practices observed for the Rabai is therefore, in large part, due to their location, the migration in and out of the region, and the increased development that has taken place. As other communities undergo development, and if the proposed extension of a tarmac road through the region (discussed in Chapter 3.2.4 and 3.5.8) goes ahead, it is likely that other Mijikenda ethnic groups are likely to be under threat of experiencing similar cultural shifts.

The loss of adherence of communities to local traditions is noted in a number of countries around the world: in Mexico where following practices associated with traditional medicine and speaking the traditional language has reduced (Maffi, 2001); in Japan where following and respecting laws and traditional practices associated with sites has decreased and sacred sites such as Mount Fuji have been desecrated and are used less (Bernbaum, 2010; Fukamachi and Rackham, 2012); in Uganda where sites are used in violation of traditional laws (Banana *et al.*, 2008; Berhane-Selassie, 2008); and in Madagascar where taboos are broken, and changes within society mean that some people are no longer following traditional laws and those who have converted to mainstream faiths no longer take part in traditional customs and ceremonies (Tengö and Heland, 2011; Andriamarovololona and Jones, 2012). These studies highlight the importance of changes in practices having a negative impact on the natural environments connected to these cultures, and it is possible that the loss of adherence to traditional practices amongst the Mijikenda will result in similar outcomes.

4.5.3 Importance of Cultural Identity

The Kayas and other SNS of the Mijikenda are rooted within local cultural identity, customs and traditions (Spear, 1978). Perceptions of cultural identity may influence an individual's

level of adherence to laws and practices, and their interactions with the sacred sites. The results show that the importance of cultural identity to a respondent was varied and depended on their age, gender and ethnicity (Tables 4.20 Figure 4.3). Older interviewees were more likely to feel that their cultural identity was important to them compared to younger people. Men were also more likely to feel that their cultural identity was important. The importance of cultural identity varied across the different ethnic groups with the Kambe and Rabai tribes being some of the most likely to think that their cultural identity was important (compared to thinking it was not important at all).

These results indicate degradation in the importance of and adherence to traditions and cultures among the younger generations and different communities. However, comparison of the results also shows attitudes and behaviours in relation to culture are different amongst the ethnic groups. Whilst Rabai respondents felt that their cultural identity was important, a high proportion did not belong to Kayas, whereas for Ribe interviewees the majority of individuals said that they belong to a Kaya (88.9%) but a higher proportion also said that their culture was not important (59.2%). Therefore this shows variation in people's attitudes and perceptions towards different aspects of culture and traditions across the ethnicities. This may reflect differences in how men and women view their own identity, or what is important to them, and may also influence their adherence to, and interaction with local cultural practices and laws. In Japan there has been a loss of respect for traditional customs and culture especially amongst younger community members within the *satoyama* landscape (Fukamachi and Rackham, 2012). This loss of respect for the culture has led to the degradation of SNS, and it is possible that if the Mijikenda community also lose respect for their culture and cultural identity that this may pose a threat to the conservation of the SNS. Therefore understanding how different members of the local community feel about the traditional culture will highlight groups where conservation based on the traditions will be favourable and groups where other approaches are necessary.

4.5.4 Traditional Belief System

As discussed above, the management of the Mijikenda Kayas and SNS is based upon traditional laws which are associated with the traditional animistic belief system (NMK, 2008). It is more likely that people who believe in and follow the traditional belief system will therefore know and follow the laws associated with it, including those related to SNS. Nyamweru and Kimaru (2008) and NMK (2008) state that local populations follow the local

traditions and laws, yet Githitho (2003) states that one of the threats to the Kayas is a loss of traditional knowledge and a lack of adherence to traditional customs and laws. Here, the results show that the majority of people interviewed did not believe in the traditional belief system, and of those that did a number also identified as being Christian or Muslim. The ability for indigenous people to identify as being Christian or Muslim whilst believing or following the local indigenous faith is not uncommon in Africa (Sherisan and Nyamweru, 2008; Tengö and von Heland, 2011). For example, Tengö and von Heland (2011) note that while 18% of people in Androy, Madagascar, identify as being Christian, 91% follow the traditional ancestral religion, demonstrating a minimum of 9% of people being both Christian and following the customary faith. The results from this study on the Mijikenda highlight a shift away from customary beliefs and practice. Religion is known to be a major influence with regards to people's attitudes, values and behaviours (Grob, 1995; Bhagwat *et al.*, 2011; Sponsel 2007). St John *et al.* (2010) note the complexities of what determines and affects decision making processes and behaviours, and it is likely to be even more complex for individuals who hold multiple attitudes and belief systems simultaneously. The duality of beliefs and the shift from traditional to mainstream faiths may affect people's value systems as well as behaviours and interactions towards the traditional SNS.

The results indicate that the belief in the traditional faith varies with age, gender, ethnic group, and the importance of their cultural identity (Figure 4.4, Tables 4.21 – 4.23). As with previous analysis associated with the traditional culture (4.5.2 and 4.5.3), it was found that older individuals and men are more likely to believe in the traditional faith. There is also a link between the importance of cultural identity and the belief in the traditional faith system. Those who feel that their cultural identity is important to them are more likely to believe in the traditional faith system. These attitudes and beliefs also vary based on an individual's ethnicity. Again, the results highlight the diversity in belief and adherence to traditional systems between different groups in the interviewed population.

One issue with the differences observed between those who believe in the traditional faith and those who do not is the perceived connection between the traditional faith and witchcraft. The association of the traditional culture and witchcraft has been noted in the questionnaires in this survey and has also been reported in local news. Often the association is met with much negativity and has even resulted in some youths murdering Elders as they believe them to be involved with witchcraft (Mwandoto, 2014). A local newspaper 'Habari

Kilifi' reports that authorities and police are of the opinion that the increase in Elders returning to practicing traditional cultures has given rise to local suspicion of individuals being associated in witchcraft. In their article, they note that Elders have been killed due to their association with practicing traditional customs and therefore giving rise to suspicions of witchcraft, and that some Elders have fled their homes due to the fear of being killed.

4.5.5 Cultural Transition

As noted by Agrawal & Gibson (1999), cultures are a product of people's experiences and surroundings, therefore as these drivers change over time so do the associated cultures, resulting in culture being part of an ever-evolving dynamic process that is shaping and being shaped by the communities they are part of. The results discussed above show that the current culture of the Mijikenda population has changed from the traditional form to a more diverse and complex culture within the modern day Mijikenda society. The transition of traditional cultures to more intricate and dynamic systems is observed worldwide, including in Mexico (Maffi, 2001), North America (Smith, 2001), Madagascar (Tengö and Heland, 2011; Andriamarovololona and Jones, 2012), Japan (Bernbaum, 2010; Fukamachi and Rackham, 2012), and Kenya (Milton, 1996; Githitho, 2003; Kibet and Nyamweru, 2008). For some the traditional customs are seen as a barrier to their development. In an article published in 'Habari Kilifi', the founder of 'Tulia Mwanahawa Foundation' (a women's education and empowerment group) stated that "As Mijikenda, we are rich in traditions but… we need to turn a blind eye to some if we are to prosper". In the same article, it also highlights findings from a local survey which noted that 17% of the interviewed population felt that their security and wellbeing is threatened by witchcraft (Mwachiro, 2014). As mentioned previously the connection between traditional customs and witchcraft can have very negative effects on the community.

These commentaries both from the questionnaire and local media show that there is much conflict between traditional customs and some of the current beliefs and values held by many of the younger members of the Mijikenda communities. It exemplifies the change in culture and attitudes within the community and issues that are beginning to arise due to misunderstandings and lack of knowledge of the traditional Mijikenda culture amongst the youth and perceived incompatibility of development and tradition from many members of the local community. Due to these differences, it is unlikely that those who see the traditional culture as a hindrance to progression or a threat to them personally are not likely to follow

traditional laws and customs. Therefore having a management strategy built solely on these grounds is liable to experience a low level of adherence, and may possibly encounter opposition.

4.6 Conclusions

The results in this chapter reveal important differences between the communities that associate with Kayas. They show that the Mijikenda on the north coast are a diverse group of people with varying attitudes, values, beliefs and who behave in different ways. Bresnahan (2010) argues that the existing management plans are too simplistic and treat the Mijikenda community as one homogenous group. The findings in this chapter support this view and demonstrate that the Mijikenda of the north coast are a varied and complex group. Whilst the management of the SNS must be sympathetic towards the traditional belief systems and not violate the sanctity of the sites, it must also account for and reflect the differences observed if it is to be effective. In addition, programs which help to bridge gaps between community members with opposing beliefs and/or opinions need to be in place in order to develop a management style that is more reflective of the communities as a whole.

Chapter 5: Perceptions of the Kayas

5.1. Abstract

Understanding what influences human behaviour is important for developing effective conservation management plans. While positive attitudes are vital to conservation, attitudes alone are not enough to predict behaviour. Other value systems, social norms and personal circumstances can influence an individual's attitudes and lead to behaviour which is contrary to what would otherwise be expected. Research on the Mijikenda to date has focused primarily on attitudes and values towards traditional culture and the sanctity of the sites without accounting for the weak association between attitudes and behaviours. The values, perceptions and behaviours towards the sites vary based on social and demographic factors. The results show that while people think of, and value, the sites as sacred and cultural spaces, they do not necessarily know or follow the laws. It was also found that the Kayas were thought to be important for the regulating and supporting services (such as for rain and soil retention), as well as for resource extraction (such as medicines, food and firewood). Many people in the local communities are very poor and the results suggest that they rely on the sacred sites for resources. Management plans need to reflect the changes in how the local people value and use the sites beyond their cultural/spiritual values and ensure that management actions are modified accordingly. In addition, efforts must be made to ensure local people are aware of the laws associated with the sites and follow them.

5.2.1 Introduction

Many factors influence behaviour including an individual's attitudes, values, demographics, social affiliations, social norms and personal situations (Grob, 1995; Kühl *et al.*, 2009; St John *et al.*, 2010; Herberlein, 2010). As outlined in chapter 1.2.2 and Chapter Four, the study area is subject to droughts, there are high levels of poverty, low levels of literacy, and the demography, perceptions and attitudes of the local populations are varied and complex. The attitudes of local people can influence conservation in a region, and positive attitudes towards the natural environment can be beneficial to conservation (Kühl *et al.*, 2009; St John *et al.*, 2010). However, in order to understand people's attitudes and values towards specific sites of interest for conservation, social research is required that poses direct questions about these issues (St John *et al.*, 2010). Therefore investigating people's attitudes specifically towards the Kayas and their behaviours associated with the sites are important

to enable improvements in the design of intervention and management plans. However, as noted by Herberlein (2012), the association between attitudes and behaviour can be weak, and although attitudes are important, more investigation is required to successfully predict behaviour. This is because, while positive attitudes towards the environment are essential to enable effective conservation, these attitudes do not always result in 'positive' behaviour (Kühl *et al.*, 2009). Kühl *et al.* (2009) note that the personal circumstances of an individual will influence their behaviour directly and can overrule their positive attitudes, and may result in 'negative' behaviours (those that are detrimental to the natural environment).

What people say and what their attitudes are may be different from the behaviour that they exhibit (Kühl *et al.*, 2009; Herberlein, 2012). Therefore it is important when investigating what may influence behaviour to take into account demography, social affiliations, moral obligations, subjective and social norms, as well as attitudes (St John *et al.*, 2010; Herberlein, 2012). In addition, questions which focus directly on behaviour are needed (St John *et al.*, 2010). This will allow for more detailed information and a better understanding of behaviour and will allow for more effective management planning.

To date the social research on the populations surrounding the Kayas has examined a limited numbers of communities, or has focused on a limited range of questions about attitudes towards the Kayas, belief systems and local laws. The questions have been more open and have not looked at the contrast between information given and actual behaviour. For example, Nyamweru (1997) asked interviewees about their opinions about rules and regulations, and their resource needs. However, these questions were framed in a way which aimed at finding out how people felt about restriction. While the answers implied that most people did not break these restrictions, additional information on whether or not this was investigated further was not given. The conclusions were drawn from the information on attitudes alone and more detailed questions exploring other behavioural drivers were not asked. Again in a study by Kibet and Nyamweru (2008), broader questions investigating attitudes were conducted which inferred behaviour, but the disparity between attitudes and behaviours was not addressed. While these studies give valuable information on the attitudes and values of the local people, they are limited in their scope due to the small number of people interviewed, the lack of consideration of social dynamics and norms that may influence behaviour beyond attitudes, and the lack of more detailed questions on behaviour. In order to address the limited scope of the social research to date, this study

involved interviewing a greater number of people in a range of communities surrounding sacred natural sites (SNS) across the Kilifi District. In order to analyse the perceptions of the Kayas three sets of questions were posed: i) how do people think about the Kayas?, ii) in what ways do people think that the Kayas are important?, and iii) do people think that the Kayas are sacred? If there is a difference in how people think about the Kayas conceptually and the reasons why they think they are important, this may highlight differences in people's attitudes, values and behaviour towards the sites.

In order to create a comparable framework for interpreting the responses about words associated with Kayas and why they are important, the MEA terminology was evaluated. As outlined in Chapter 1.1.5 the MEA has a list of ecosystem services which provides an existing framework that allows the categorisation of how people may perceive nature, and the reasons that it may be useful. It therefore has the potential to be a useful tool for grouping the responses into recognisable categories that can be used both within and across the sites in this research, but would also allow for comparison with communities and sites on a global scale. While the ecosystem services (ES) list is useful, as noted in Chapter 1.1.6, it also has its limitations. Therefore while using the MEA list as a way of conceptualising and analysing the data collected in this survey, the applicability of the MEA ES listings as a tool for comparison was also investigated.

The sanctity of the sites is core to their current existence (as outlined in Chapter 1.2) and is the basis for the existing management plan (Spear, 1978; Githitho, 2003; Matiku, 2003; Bresnahan, 2010; Metcalfe *et al*., 2010; Wanza & Njuguna, 2012). Therefore investigating if people still believe the sites to be sacred is important for establishing effective conservation management of the sites. As noted in Chapter 1.1.2 religion and belief systems as well as the moral obligations and social norms associated with them have a significant influence on people's attitudes and behaviour (Grob, 1995; St John, 2010). In addition as noted in Chapter 4.5.1 and 4.5.4, the religious affiliations and belief in traditional faith varies amongst the respondents. Therefore understanding people's perceptions towards the sanctity of the sites is important.

Awareness of local laws and people's adherence to them was also investigated. In the studies by Nyamweru (1997), and Kibet and Nyamweru (2008), people's perceptions of the laws, how restrictions affected them, and their understanding of the repercussions of breaking the

laws were all investigated. However, research focusing on the level of awareness of the laws and adherence to them was lacking. As the current management system is based on the traditional laws (NMK, 2008), the level to which the local population know and follow them is central to its efficacy. As highlighted in Chapter 1.2.7, both the management plan and some of the previous research suggest that the local populations follow these laws, yet the degradation of the sites brings this into question (NMK, 2008). It has been argued that knowledge and ability to perform a particular action are needed for behaviour to occur (Kühl *et al.*, 2009; St John *et al.*, 2010; Herberlein, 2012). With reference to the traditional laws associated with the Kayas, if people are not aware of the laws, it is not possible for them to intentionally follow them, regardless of whether or not they believe they should do so. Therefore investigating the level of awareness of the laws among the local population is important for assessing how effective the current management approach is.

By investigating these questions of awareness and adherence to the laws in the light of the understanding that what people say and what they do are not always the same thing, may help to explain the disparity between what is said in interviews (i.e. people respect the traditions and laws) and what is observed (the degradation of the sites and resource extraction) (Grob, 1995; Nyamweru, 1997; Githitho, 1998; Githitho, 2003; Kibet and Nyamweru, 2008; Nyamweru and Kimaru, 2008; Kühl *et al.*, 2009; Bresnahan, 2010; St John *et al.*, 2010; Herberlein, 2012).

5.2.2 Research Questions

Main Question: Is the way in which contemporary local communities think about and behaive towards the Kayas different from what would be expected compared to traditional customs?- If so how does this affect conservation of the SNS?

Null Hypothesis: The way in which contemporary local communities think about and act towards the Kayas is no different than would be expected compared to traditional customs

Sub questions

1. How do local people conceptualise the Kaya? - Is there any diversity across the different demographic groups or compared to what would be expected according to traditional customs?

Null Hypothesis: There is no difference among the groups in the way that they conceptualise the Kayas, everyone does so in line with traditional customs

2. In what ways do the local people think that the Kayas are important? - Is there any diversity across the different demographic groups or compared to what would be expected according to traditional customs?

Null Hypothesis: There is no difference among the groups in why they think the Kayas are important, everyone does so in line with traditional customs

3. Is there a difference in how people conceptualise the Kayas and why they think the Kayas are important?

Null Hypothesis: There is no difference in how people conceptualise the Kayas and why they think they are important

4. Do people think that they Kayas are sacred? – Are there any differences across the demographic groups as to whether or not they think they are sacred?

Null Hypothesis: There is no difference across the groups as to whether or not people think they are sacred – the perceptions are in line with traditional customs in that everyone thinks that the Kayas are sacred

5. Do people know and adhere to the traditional laws associated with the Kayas? – Are there any differences across the demographic groups?

Null Hypothesis: There is no difference across the groups in knowledge of and adherence to the traditional laws associated with the Kayas – everyone knows the laws and follows them

6. Are the ways in which people think about and act towards the Kayas likely to have any effect on the conservation of the Kayas?

Null Hypothesis: The ways in which people think about and act towards the Kayas is not likely to have any impact on their conservation

5.3 Methods

The data in this chapter were collected using questionnaires (Appendix 1) in accordance to the methodology outlined in chapter 2.5. As highlighted in chapter 2.5.1 the survey was collected in a random stratified manner, seeking to obtain equal proportions of male and female respondents from a range of age groups. Data were input into Access (2010,

Microsoft) the database was then formatted in Excel (2010, Microsoft) before being analysed in SPSS (version 21, IBM) as outlined in chapter 2.7.1. The data were analysed individually and in relation to one-another using a range of descriptive statistics including histograms, percentages, word clouds, chi-square and post hoc tests as outlined in chapter 2.7.1.1. In addition, binary logistic regression and multinomial regression were used to investigate relationships further as described in Chapter 2.7.1.2. Word clouds were created using the top 80 words mentioned most often in answer to the relevant questions. The word clouds were created using the online software package 'Wordle' (http://www.wordle.net) as outlined in Chapter 2.7.1.3.

Variables

Words people associate with the Kayas – Used to investigate how people perceive the Kayas. Respondents gave a list of five answers in response to an open question which was coded according to their answers

Reasons the Kayas are important – Respondents gave a list of five answers in response to an open question which was coded according to their answers

Sanctity of the Kaya forests – Respondents rated how strongly they agree with the statement 'The Kayas are not sacred to me'

Knowledge of traditional laws associated with the Kayas – Rspondents were asked if they knew any traditional laws associated with the Kayas ('law' was defined in this research in accordance to the description provided in the questionnaire in Appendix 1)

Adherence to traditional laws associated with the Kayas – Respondents were asked if they followed the traditional laws associated with the Kayas

The responses to the above independent variables were tested across the following dependent variables:

Gender

Age – Grouped into five categories (as outlined in Chapter 2.7.1 and 4.3)

Ethnicity – Grouped into seven northern Mijikenda tribes, other Mijikenda tribes (Digo and Duruma0, or 'other' (non-Mijikenda tribes)

Religion –Self identified and grouped accordingly (traditional faith noted as 'Pagan'in the analysis and discussion)

Marital Status – 'Single', 'Married' 'Divorces/Separated', or 'Widowed'

Ethnicity of Parents – Respondents were asked if both parents were Mijikenda, and if not were asked to specify which ethnicity parents were

Spatial Variation – To investigate responses at different spatial scales Location (finest scale), Division (medium spatial scale), and sub-district (largest spatial scale) were used.

Belonging to a Kaya – Comparrison between those who belong to a Kaya and those who do not.

Importance of cultural identity – Comparrisons made according to how important repondents felt their cultural identity was

Belief in traditional belief system – Comparrisons made according to whether or not respondents believe in the traditional belief system

5.4 Results

5.4.1 Words associated with the Kayas

To understand how the local people conceptualise the Kayas respondents were asked to list up to 5 words that came to mind when thinking of the Kayas (Q. 71). The results show that there were a variety of words that were associated with the Kayas (Figure 5.1) and the most common words were those that referred to culture (15% of responses). The second most common words associated with the Kayas were in reference to them being sacred places. Chi-square test shows that there was a significant difference in the words that were associated with the Kayas according to their gender, age, ethnicity religion, and Division (Table 5.1).

A post-hoc z-test shows (Table 5.2) that a greater proportion of women mentioned agriculture/farming, social factors and firewood/charcoal than men. However a greater proportion of men mentioned 'culture', 'water' and 'demons/sin' (demons in local culture refers to evil spirits who will do people harm [Shepheard-Walwyn, pers. obs. 2012]). Neither gender mentioned one category significantly more than any other. As shown in Table 5.3, a significantly greater proportion than expected of respondents in the age group 56+ gave answers responding to 'culture', 'social factors (such as family'), and/or 'laws/justice' than those in the age group 17 – 25 years, whereas a greater proportion of people in the age groups 17 – 25 and 26 – 35 mentioned 'animals and/or trees' compared to those in the age group 56+. A significantly greater proportion of those in the 26 – 35 age group mentioned 'witches or witchcraft' compared to those in the 36 – 45, 46 – 55 and 56+ age groups. There were also significant differences in the words specific age groups mention more than others (Table A3.4, Appendix 3). For example, a significantly greater proportion of those in the age
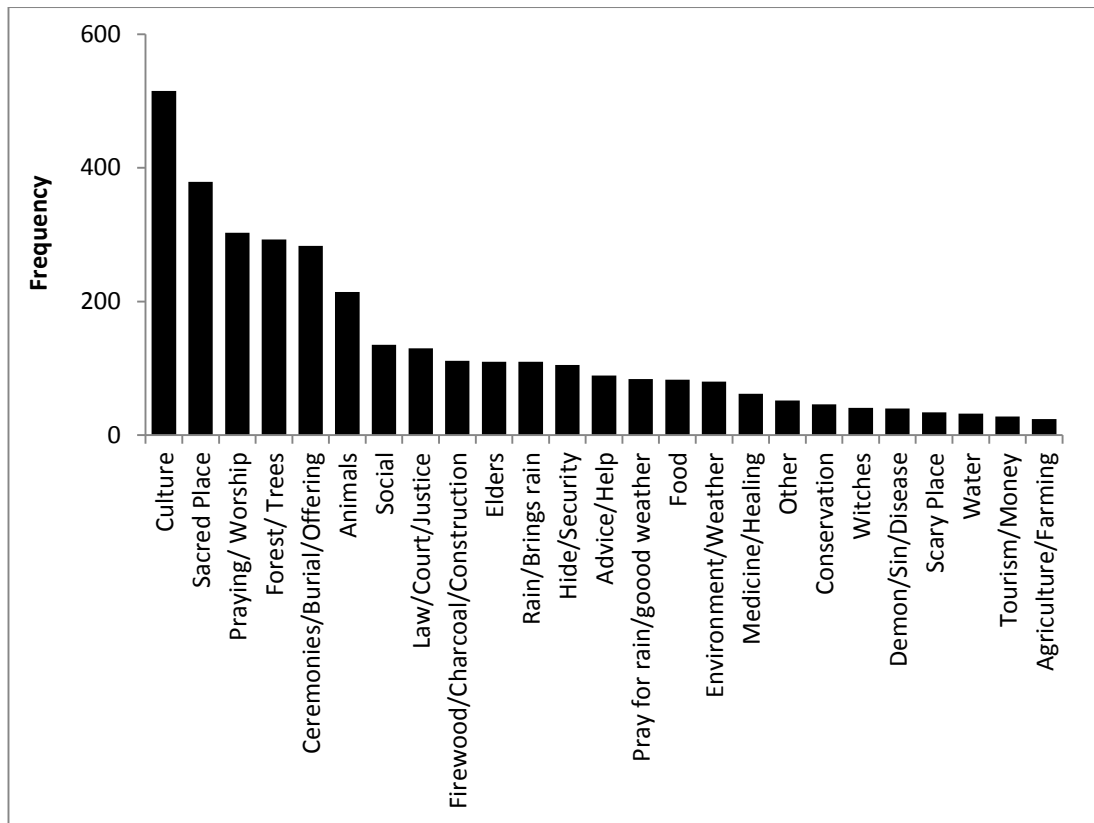
Figure 5.1: Frequency of different categories of words associated with the Kayas

Table 5.1: Chi-square results for analysis of the words people associate with the Kayas
Legend: [1] = χ^2 Monte Carlo Exact Test and Bootstrapped Cramer's V analysis conducted to account for violations in assumptions of the model
[A] 41% cells have expected count less than 5, minimum expected count is 0.48

Variable	χ^2	Degrees of freedom (df)	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	49.8	24	**0.010**			0.122		
Age	206.5	96	**< 0.001**			0.126		
Ethnicity	1941.8	192	**< 0.001**	< 0.001	< 0.001	0.268	0.263	0.296
Religion[1][A]	145.2	72	**< 0.001**	< 0.001	< 0.001	0.158	0.158	0.225
Division	814.9	72	**< 0.001**	< 0.001	< 0.001	0.283	0.264	0.325

group 17 – 25 were likely to list 'forest and trees' than 'culture', 'laws and justice' or 'social factors', whereas a greater proportion of those in the age group 26 - 35 mentioned 'witches' compared to 'conservation' and 'ceremonies'. A z-test also shows (Table 5.3) that a greater proportion of those who identify as Pagan associate praying and worship with the Kayas compared to either Christian or Muslim respondents (Table 5.4). A significantly greater

Table 5.2: Cross-tabulation of words associated with Kayas with gender
Legend: Sig = Significance. [*] Denotes that there is a significant difference between proportions on that row to the p = 0.05 level. NS = not significant. Different letters denote proportions (based on observed count compared to expected count) that are significantly from each other. Where: a = Greatest proportion; b = significantly less than 'a' and significantly greater than 'c' etc.

| | | Gender | | Sig |
		Male	Female	
Words Associated with Kayas	Agriculture/Farming	7_b	17_a	*
	Culture	302_a	210_b	*
	Social (family/teaching etc.)	60_b	75_a	*
	Firewood/Charcoal/ construction	44_b	65_a	*
	Demons/Sin/ Disease/Evil	28_a	12_b	*

Table 5.3: Cross-tabulation of words associated with Kayas with age groups
For legend see Table 5.2

| | | Age in Groups | | | | | Sig |
		17 - 25	26 - 35	36 - 45	46 - 55	56 +	
Words Associated with Kayas	Culture	76_b	$87_{a, b}$	$113_{a, b}$	$87_{a, b}$	138_a	*
	Animals	60_a	44_a	$43_{a, b}$	$33_{a, b}$	27_b	*
	Forest/Trees	88_a	$56_{a, b}$	$61_{a, b, c}$	$38_{b, c}$	38_c	*
	Laws/Court/Justice	17_b	$23_{a, b}$	$29_{a, b}$	$16_{a, b}$	42_a	*
	Social (family/teaching etc.)	18_b	$30_{a, b}$	$25_{a, b}$	$17_{a, b}$	44_a	*
	Witches	$15_{a, b}$	16_a	$5_{b, c}$	1_c	1_c	*

Table 5.4: Cross-tabulation of words associated with Kayas with religion
For legend see Table 5.2

| | | Religion | | | | Sig |
		Christian	Muslim	Pagan	None	
Words Associated with Kayas	Praying/worship	132_b	39_b	16_a	$11_{a, b}$	*
	Social (family/teaching etc.)	33_b	27_a	$0_{a, b}$	$1_{a, b}$	*
	Pray for rain/good weather	60_a	4_b	$1_{a, b}$	$0_{a, b}$	*

proportion of people in Kaloleni and Kikambala Divisions think of the Kayas as a place for 'advice/help' than those in Ganze. Whereas significantly fewer of those in Chonyi Division than expected thought of words associated with 'culture' than people in any other division (Table 5.5). The results show that there were also differences across the ethnicities (Table A3.5, Appendix 3). For example, a significantly greater proportion of Giriama and Kambe respondents than expected mentioned words associated with 'culture' compared to the Chonyi or Ribe. Whereas, a greater proportion of Chonyi

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Table 5.5: Cross-tabulation of words associated with Kayas with Division
For legend see Table 5.2

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
Words Associated with Kayas	Advice/Help	72_a	$11_{a,b}$	2_b	4_a	*
	Culture	363_a	39_b	94_a	19_a	*
	Conservation	40_a	0_b	$6_{a,b}$	$0_{a,b}$	*
	Animals	157_a	17_b	39_a	0_b	*
	Forest/Trees	$188_{b,c}$	32_c	$55_{a,b}$	17_a	*
	Praying/worship	174_b	111_a	10_c	$8_{a,b}$	*
	Ceremonies/burials/offerings	123_b	89_a	66_a	$5_{a,b}$	*
	Laws/Court/Justice	97_a	6_b	23_a	$4_{a,b}$	*
	Sacred Place	169_b	116_a	79_a	15_a	*
	Firewood/Charcoal/ construction	91_a	18_a	2_b	$0_{a,b}$	*
	Elders	78_a	6_b	23_a	$3_{a,b}$	*
	Environment/weather	76_a	1_b	2_b	$1_{a,b}$	*
	Tourist/money	11_b	9_b	1_b	7_a	*
	Food/Fruit/Meat	68_a	15_a	0_b	$0_{a,b}$	*
	Hide/Security	88_a	6_b	$11_{a,b}$	$0_{a,b}$	*
	Scary Place	$24_{a,b}$	0_b	10_a	$0_{a,b}$	*
	Pray for rain/good weather	5_c	60_a	15_b	$4_{b,c}$	*
	Witches	38_a	0_b	$3_{a,b}$	$0_{a,b}$	*

respondents than expected mentioned 'praying/worship' compared to Giriama, Jibana, Kauma Rabai or Ribe. Ethnic group was found to be the strongest predictor of the words people associate with the Kayas (Table 5.1).

When looking at the words that people associate with the Kayas, one way to group their responses was via the ES which they refer to. The classification of words into ES groups is given in Appendix 4. When linking the responses given with the ES outlined by the MEA, a number of the words associated with the Kayas fit into the pre-defined categories. However, not all responses do so. One issue with the categories listed in the MEA was cross-over between categories which made it difficult to determine which category the responses should be put into. Since a number of the responses were more generalised than these categorisations allow, they were grouped together in the analysis. Cross-categorisation is not the only limitation to the MEA list of ES. Another issue was with services that are not included within the current list. For example, a number of individuals mentioned social factors associated with the Kayas, such as 'a place for meetings', 'getting advice', 'a place to hide/a

place of security', and 'connecting with society and family'. These factors could all be considered as social services. While they could be associated with cultural services, at present they have not been included in the MEA lists and I argue that they are a separate set of services from cultural services. There was also no mention of the value of SNS for conservation in the MEA listing. In the analysis it was classified under regulating / supporting services. In addition, the MEA list does not include the intrinsic value of plants and animals. Whilst there was a classification for aesthetic enjoyment, this does not include the importance of sites for plants and animals themselves, which was mentioned by the interviewed population. Therefore the responses were grouped according to the categories shown in Figure 5.2. Under the new categorisation results show that the greatest proportion (56%) of responses are in the category 'cultural' (which includes spiritual services).

A multinomial regression was conducted looking at the words people associated with the Kayas as the dependant variable. Due to the low frequency, the categories of 'Cultural and Provisioning' and 'Cultural and Trees/animals' were included into the category 'other' for the analysis. The model was run with age, use of Kayas and ethnicity as the predictor variables. The output from the multinomial regression (Figure 5.3, Table A3.6 Appendix 3) shows that people who use the Kayas (compared to those who do not) were over two times more likely to associate provisioning services with the Kayas than words in the 'other' category. Those who were in the ethnic group Chonyi (rather than Ribe) are nearly four times (Exp (B) = 3.88)
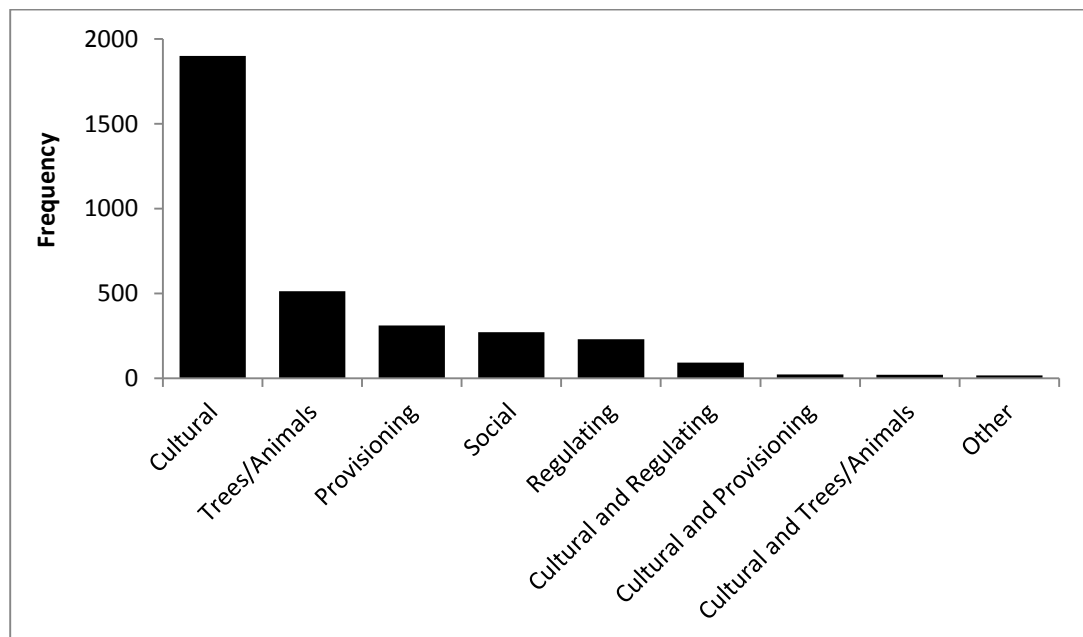
Figure 5.2: Words people associate with the Kayas coded by ecosystem services
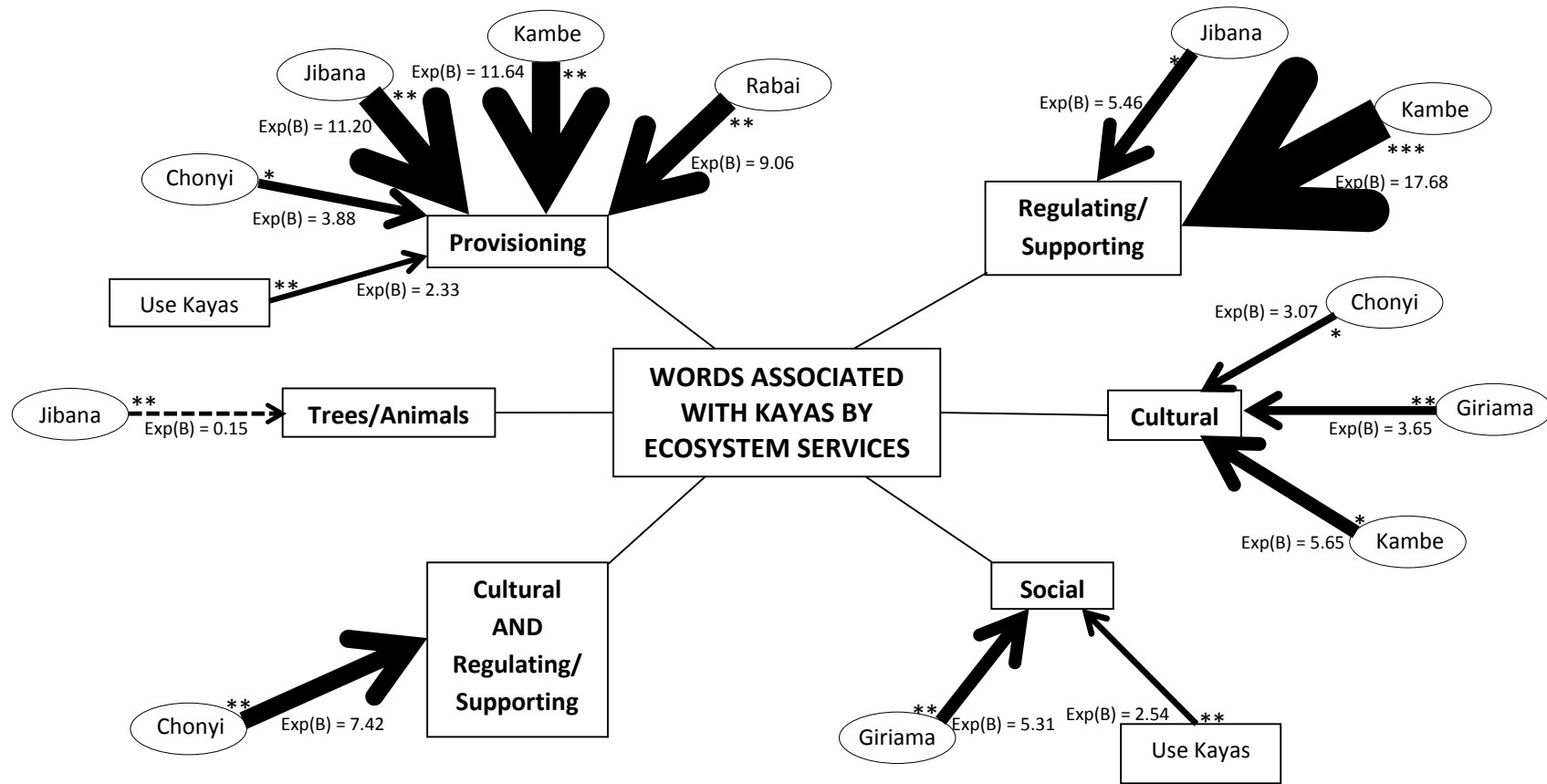
Figure 5.3: Visualisation of Multinomial Logistic Regression output of words associated with the Kayas

Legend: Likelihood of response of words people associate with the Kayas compared the category "Other". Weights of lines are equal to odds ratio (Exp (B)) values. Significant factors under Wald test to the level of: *** p =< 0.001, ** p = ≤ 0.001, * p = ≤ 0.05 or less. Solid lines = More likely to give response, Dashed lines = less likely to give response. Reference categories are: Use Kayas – No; Tribal Group – Ribe. ⬭ = Tribal group; ▭ = Use Kayas

more likely to think of words to do with provisioning over the category 'other', the Rabai are nine times, and the Jibana and Kambe are over 11 times more likely to do so. Those in Jibana ethnic group (rather than Ribe) were five times more likely to think of regulating and supporting services than words in the category 'other' and those in Kambe are over 17 times (Exp (B) =17.7) more likely to associate words to do with regulating and supporting services. Those in Chonyi and Giriama ethnic groups (rather than Ribe) were three times more likely to associate cultural services with the Kayas than 'other'.

Those who use the Kayas (rather than those who do not) were also two and a half times more likely to associate the Kayas with social factors than "other" and those in the Giriama ethnic group (rather than Ribe) were over five times more likely to do so. Those who were Chonyi (rather than Ribe) were seven times more likely to think of words that were associated with the Kayas that were combined cultural and regulating/supporting services compared to "other" and those that were Kambe were over five times more likely to do so. When examining the response trees/animals the respondents in the Jibana ethnic group (instead of Ribe) were 85.4% less likely to think of words associated with this category than to think of words in the "other" category. The Goodness of Fit and Nagelkerke R squared results show that the model was a good fit for the data (χ^2 = 3427.5, p < 0.001, df = 2910; R^2 = 0.279 respectively). All predictors were significant in explaining the difference in the words people associate with the Kayas (Age: χ^2 = 26.9, p < 0.001, df = 6; Use of Kayas: χ^2 = 51.6, p < 0.001, df = 6; χ^2 = 815.2, p < 0.001, df = 36). The classification accuracy produced by the model was 57.5% which was greater than the proportional by chance accuracy criteria (0.360, or 36% - calculated using the square of proportions of each category). The maximum by chance criterion was 70.38% (based on the high rate of responses which fall into the 'Cultural' category – 56.3% calculated by a 25% increase over the largest group). This was higher than the overall fit for the model, showing that the usefulness of the relationship between the demographic variables and the words that they associate with the Kayas may be questionable. However, the model was still found to be a good fit for the data. The multinomial regression uses a reference variable to calculate the B-coefficients, Wald test statistics and the odds ratios. The reference category for the response variable is "Other". The reference category for Use of Kayas is "No" (i.e. those who do not use the Kayas), and the reference category for the ethnic groups is Ribe.

Chi-square shows a significant difference between age, ethnicity, and religion, however there was no significant difference between the genders (Table. 5.6). The results from a post-hoc z-test show (Table 5.7) that a greater proportion of people in the age group 56+ thought of words associated with cultural services than those in the age groups 17 − 25 and 36 − 45. Whereas a greater proportion of those in the age group 17 − 25, 36 −35 and 36 − 45 mentioned trees/animals (intrinsically) than those in the age groups 56+, and a greater proportion of those in the age group 17 − 25 mentioned them than those in the 36 − 45 age group. A post-hoc z-test also shows (Table 5.8) that a significantly greater proportion of Pagans than expected associated words which were classified as cultural services to the Kayas compared to Christian or Muslim respondents. A greater proportion of Muslims noted social services compared to Christians whereas a greater proportion of Christians associated

Table 5.6: Chi-square results for analysis of the words people associate with the Kayas grouped by ecosystem services. For legend see Table 5.1
[A] 31.1% of cells have an expected counts less than 5
[B] 31.7% of cells have an expected counts less than 5, minimum expected count is 0.89
[C] 33.3% of cells have an expected counts less than 5, minimum expected count is 0.33

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	6.54	8	0.587					
Age[1] [A]	92.1	32	**< 0.001**	< 0.001	< 0.001	0.084	0.077	0.116
Ethnicity[1] [B]	1080.1	64	**< 0.001**	< 0.001	< 0.001	0.200	0.187	0.223
Religion[1] [C]	61.6	24	**< 0.001**	< 0.001	< 0.001	0.103	0.090	0.158

Table 5.7: Cross-tabulation of words associated with Kayas grouped by ecosystem services with Age. For legend see Table 5.2

		Age in Groups					Sig
		17 - 25	26 - 35	36 - 45	46 - 55	56 +	
Words Associated with Kayas by Ecosystem Services	Provisioning	47$_a$	47$_a$	74$_a$	61$_a$	71$_a$	NS
	Regulating/Supporting	35$_a$	34$_a$	56$_a$	50$_a$	48$_a$	NS
	Cultural	354$_b$	331$_{a, b}$	384$_a$	311$_{a, b}$	461$_a$	*
	Social	39$_a$	55$_a$	55$_a$	41$_a$	69$_a$	NS
	Cultural and Regulating	25$_a$	16$_a$	18$_a$	14$_a$	19$_a$	NS
	Cultural and Provisioning	2$_a$	5$_a$	5$_a$	4$_a$	7$_a$	NS
	Cultural and trees/animals	7$_a$	6$_a$	4$_a$	1$_a$	1$_a$	NS
	Trees/animals (no use)	151$_a$	100$_{a, b}$	104$_b$	74$_{b, c}$	66$_c$	*
	Other	3$_a$	3$_a$	6$_a$	1$_a$	4$_a$	NS

Table 5.8: Cross-tabulation of words associated with Kayas grouped by ecosystem services with Religion. For legend see Table 5.2

		Religion				Sig
		Christian	Muslim	Pagan	None	
Words Associated with Kayas by Ecosystem Services	Provisioning	112_a	47_a	4_a	4_a	NS
	Regulating/Supporting	84_a	24_a	5_a	7_a	NS
	Cultural	725_b	257_b	53_a	$49_{a, b}$	*
	Social	85_b	50_a	$1_{a, b}$	$7_{a, b}$	*
	Cultural and Regulating	66_a	5_b	$1_{a, b}$	$0_{a, b}$	*
	Cultural and Provisioning	3_b	$4_{a, b}$	2_a	$0_{a, b}$	*
	Cultural and trees/animals	9_a	6_a	0_a	0_a	NS
	Trees/animals (no use)	201_a	89_a	5_a	15_a	NS
	Other	8_a	3_a	0_a	0_a	NS

words which were both cultural and social (such as praying for rain) to the Kayas compared to Muslims. Significant differences were also noted for the ethnic groups (Post-hoc z-test in Table A3.7, Appendix 3), for example a significantly greater proportion of Jibana respondents listed words which were categorised as provisioning compared to all other northern Mijikenda ethnicities. Whereas a significantly greater proportion of Giriama respondents noted words which were cultural compared to the Jibana, Kambe, Rabai and Ribe.

5.4.2 Reasons Kayas are Important

The respondents were asked to list up to five reasons why the Kayas are important (Q. 73, Appendix 1), and the results show that the responses were varied (figure 5.4). Under chi-square analysis there was no significant difference in the responses given by gender. However there were significant differences between the age groups, Division and whether or not someone uses the Kayas (Table 5.9). Post-hoc z-tests with adjusted p-values (Bonferroni method) show (Table 5.10) that proportionately more individuals in the 26 – 35 age group thought that the Kayas are important for animals (intrinsically) compared to those in the age groups 46 – 55 and 56+. Proportionately more respondents in the 17 – 25 age group thought that the Kayas were important for weather-related services, such as bringing rain and giving clean air compared to those in the 26 – 35, 36 – 45 and 56+ age groups. The results highlight (Table 5.11) that a greater proportion of pagans than expected note the importance of the Kayas for agriculture compared to Christians. Whereas a greater proportion of Christians said that the Kayas were important for conservation and for good
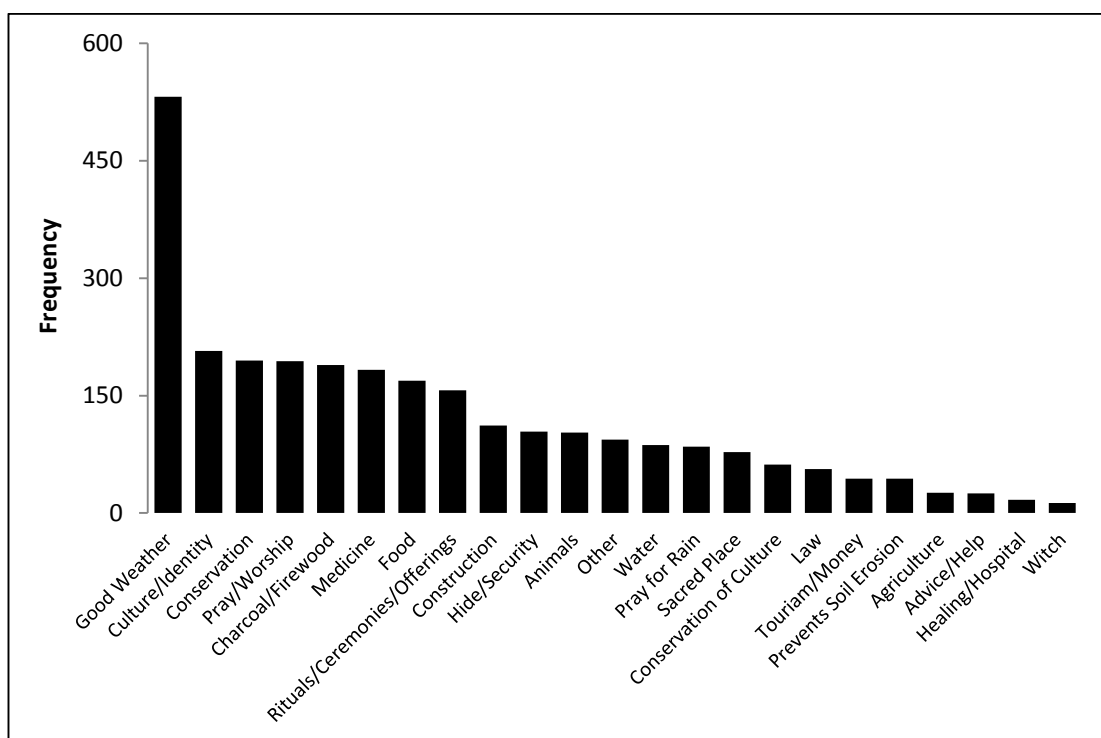
Figure 5.4: Frequency of categories of reasons the Kayas are important

Table 5.9: Chi-square results for analysis of the reason people think the Kayas are important. For legend see Table 5.1

[A] 40.6% cells have expected count less than 5, minimum expected count is 0.03
[B] 48.9% of expected counts are less than 5, minimum expected count is 0.31
[C] 30.4% of expected counts are less than 5, minimum expected count is 0.19

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	26.4	22	0.237					
Age	158.2	88	**< 0.001**			0.122		
Ethnicity[1] [A]	956.7	176	**< 0.001**	< 0.001	< 0.001	0.208	0.206	0.246
Religion[1] [B]	190.1	66	**< 0.001**	< 0.001	< 0.001	0.206	0.190	0.291
Division[1] [C]	540.0	66	**< 0.001**	< 0.001	< 0.001	0.255	0.240	0.302
Use of Kayas	184.4	22	**< 0.001**			0.260		

weather (bringing rain/clean air) compared to Muslims or Pagans. A greater proportion of Pagans also said that the Kayas were important for praying/worship and as sacred sites than either Muslims or Christians, and a greater proportion of Pagans noted the importance of the Kayas for rituals/ ceremonies/ offerings and witches/ witchcraft compared to Christians. There were also significant differences highlighted across the ethnicities (Table A3.8 Appendix 3).

Table 5.10: Cross-tabulation of Reasons Kayas are important with Age
For legend see Table 5.2

		Age in Groups					Sig
		17 - 25	26 - 35	36 - 45	46 - 55	56 +	
Reasons why the Kayas are Important	Animals (home for animals)	$18_{a, b}$	32_a	$19_{a, b}$	12_b	20_b	*
	Weather - Rain and clean air	131_a	$92_{b, c}$	$98_{b, c}$	$97_{a, b}$	95_c	*
	Pray for rain	$15_{a, b}$	$17_{a, b}$	$15_{a, b}$	7_b	31_a	*

Table 5.11: Cross-tabulation of Reasons Kayas are important with Religion
For legend see Table 5.2

		Religion				Sig
		Christian	Muslim	Pagan	None	
Reasons why the Kayas are Important	Agriculture	6_b	$4_{a, b}$	3_a	$0_{a, b}$	*
	Conservation (Animal/ plants/ environment)	104_a	16_b	0_b	$2_{a, b}$	*
	Pray	54_b	29_b	12_a	$6_{a, b}$	*
	Rituals/Offerings/ Ceremonies	35_b	$24_{a, b}$	8_a	$3_{a, b}$	*
	Sacred Place	14_b	13_b	9_a	$1_{a, b}$	*
	Weather - Rain and clean air	221_a	63_b	6_b	$11_{a, b}$	*
	Witch/ Witchcraft	3_b	$2_{a, b}$	2_a	$0_{a, b}$	*

When investigating differences across geographic divisions, the results show that proportionately more individuals in Ganze thought that the Kayas are important for advice and for help compared to those in Kaloleni and Chonyi. In addition, proportionately more of those in Kaloleni thought the Kayas are important for medicine compared to those in Chonyi and Ganze, whereas proportionately more people in Chonyi Division thought that the Kayas are important for good weather (getting rain and clean air) compared to those in Kaloleni and Ganze (Table 5.12). A post-hoc Z test (Table 5.13) also shows that a greater proportion of those who use the Kayas thought that they are important for medicine, praying/worship, rituals/ceremonies, as a sacred place, for culture/identity, and for praying for rain compared to those who do not use the Kayas. However, a greater proportion of those who do not use the Kayas thought that they are important for conservation, animals (intrinsically), Charcoal/firewood, and weather.

The responses for why the Kayas are important were also divided by ES as was performed for the words that people associate with the Kayas (see above). Again the divisions were based on the modified list of ES outlined in 5.4.1. When divided by ES there were a variety of responses given (Figure 5.5). The most frequent response was for Regulating/Supporting

services. There was also a more even distribution of responses across the categories "Provisioning", "Regulating/Supporting" and "Cultural". The results show that 29.5% of people thought the Kayas are important for regulating/supporting services, 28.0% think that

Table 5.12: Cross-tabulation of Reasons Kayas are important with Division
For legend see Table 5.2

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
Reasons Why the Kayas are Important	Advice/solve family cases	8_b	3_b	13_a	$1_{a, b}$	*
	Agriculture	10_b	13_a	$3_{a, b}$	$0_{a, b}$	*
	Medicine	144_a	26_b	11_b	$2_{a, b}$	*
	Conservation (Animal/ plants/ environment)	97_b	88_a	8_c	$1_{a, b, c}$	*
	Rituals/Offerings/ Ceremonies	53_c	$25_{a, b}$	74_a	$5_{b, c}$	*
	Water	49_b	11_b	27_a	$0_{a, b}$	*
	Charcoal/Firewood	139_a	47_a	0_b	1_a	*
	Law	$37_{a, b}$	4_b	14_a	$1_{a, b}$	*
	Culture/identity	154_a	7_b	42_a	4_a	*
	Timber/construction	92_a	19_a	1_b	$0_{a, b}$	*
	Food	129_a	36_a	2_b	$1_{a, b}$	*
	Prevents soil erosion	33_a	1_b	9_a	$1_{a, b}$	*
	Weather - Rain and clean air	309_b	154_a	60_b	$7_{a, b}$	*
	Pray for rain	48_b	$14_{a, b}$	20_a	$3_{a, b}$	*
	Other and combined answers	72_a	9_b	$10_{a, b}$	$3_{a, b}$	*

Table 5.13: Cross-tabulation of Reasons Kayas important with if a person uses the Kayas
For legend see Table 5.2

		Do use Kayas?		Sig
		Yes	No	
Reasons Why the Kayas are Important	Advice/solve family cases	23_a	2_b	*
	Medicine	141_a	40_b	*
	Conservation (Animal/ plants/ environment)	79_b	109_a	*
	Animals (home for animals)	51_b	48_a	*
	Pray	149_a	44_b	*
	Rituals/ Offerings/ Ceremonies	122_a	33_b	*
	Sacred Place	60_a	17_b	*
	Charcoal/Firewood	106_b	81_a	*
	Culture/ Identity	148_a	55_b	*
	Conservation of Culture	51_a	11_b	*
	Weather - Rain and clean air	261_b	262_a	*
	Pray for rain	63_a	22_b	*
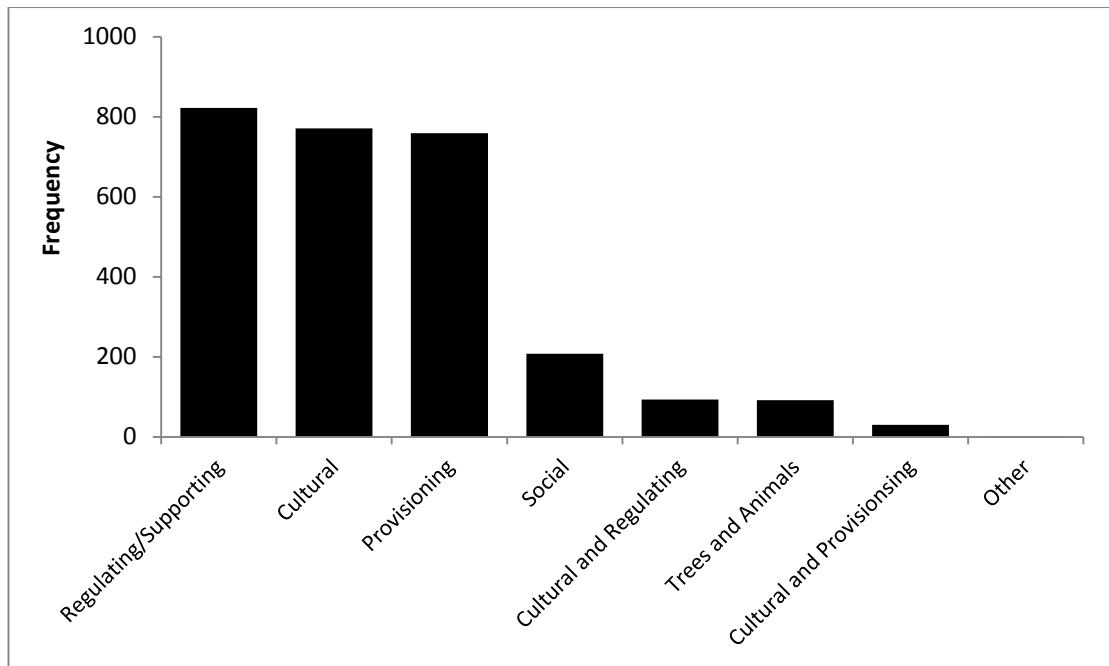
Figure 5.5: Frequency of categories of the reasons why the Kayas are important divided into ecosystem service categories

the Kayas are important for cultural services and 27.5% thought they are important for provisioning.

A multinomial regression was conducted to analyse the reasons people believe why the Kayas are important (Figure 5.6, Table A3.9 in Appendix 3). The model was run with age, use of Kayas, ethnicity, and Division as the predictor variables. The results show that those who use the Kayas (rather than those who do not) were more than twice as likely to think the Kayas are important for provisioning services rather than trees/animals. Respondents who were either Jibana or Kambe tribes (rather than Ribe) were over five times more likely to think the Kayas are important for provisioning services than trees/animals, whereas the Rabai were over three times more likely to do so. Those who were in Chonyi Division were nearly twelve times more likely to think that the Kayas were important for provisioning services than trees/animals. The Giriama (rather than Ribe) were three times more likely to think the Kayas are important for regulating/supporting services than trees/animals, the Jibana nearly five times (Exp (B) = 4.97), the Kauma and Rabai nine times, and the Kambe over 22 times more likely to do so.

Those who use the Kayas (rather than those who do not) were three times more likely to think the Kayas are important for cultural services than trees/animals. Respondents who
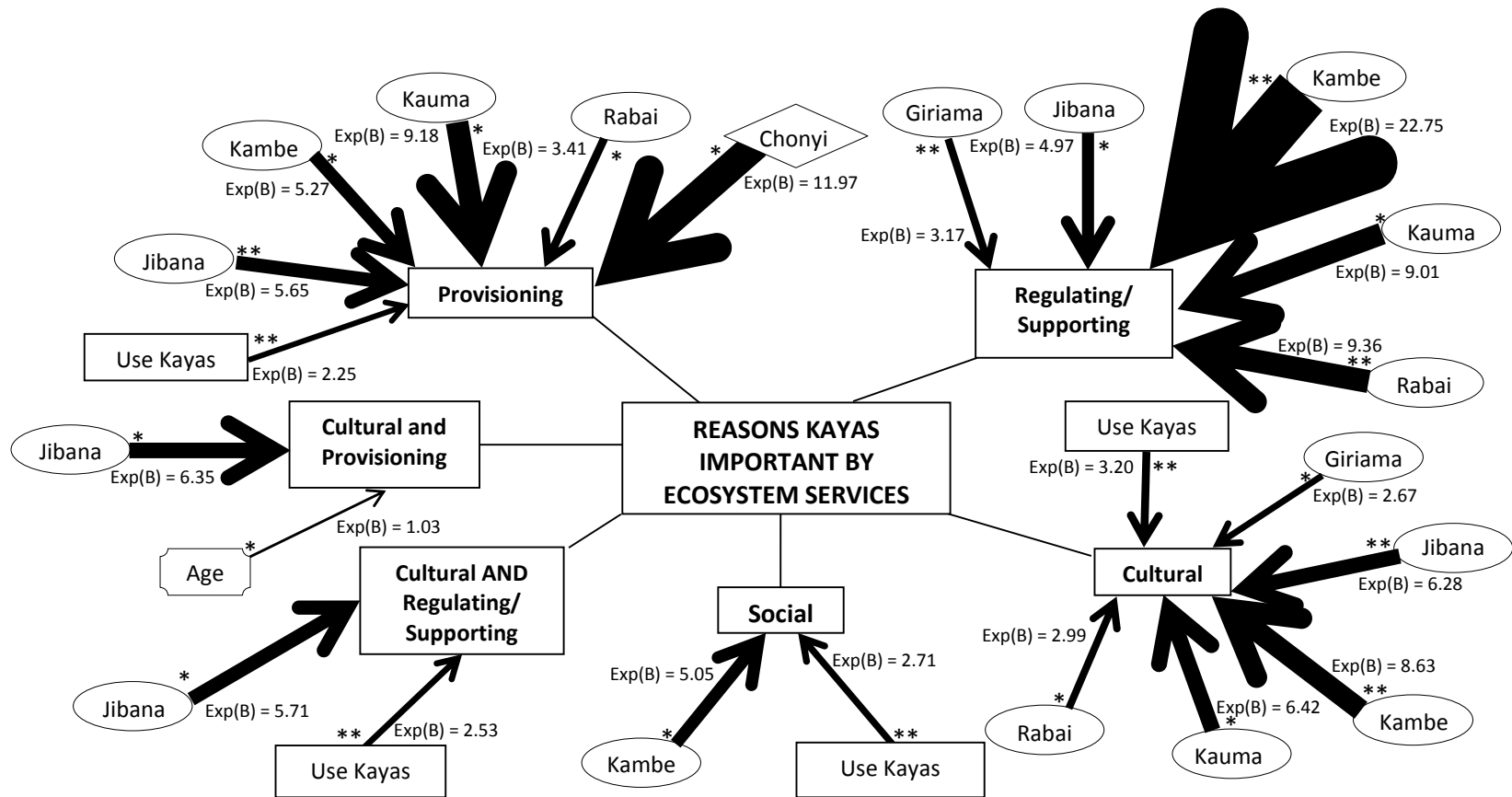
Figure 5.6: Visualisation of Multinomial Logistic Regression output of reasons Kayas are important

Legend: Likelihood of response of the reasons people think the Kayas are important compared to the reference category "Trees/animals". Weights of lines are equal to odds ratio (Exp (B)) values. Significant factors under Wald test to the level of *** p = ≤ 0.001, ** p = ≤ 0.001, * p = ≤ 0.05 or less. Reference categories are: Use Kayas – No; Tribal Group – Ribe; Division – Kikambala. Key: ☐ = Use of Kayas; ⬭ = Ethnic Group; ◇ = Division

were either Giriama or Rabai (rather than Ribe) were over twice as likely to think the Kayas were important for cultural services than trees/animals. The Jibana and Kauma were both over six times more likely to think the Kayas are important for cultural services compared to trees/animals, whereas those who were Kambe (rather than Ribe) were over eight times more likely to do so. Respondents who use the Kayas (rather than those who do not) were nearly three times more likely to think the Kayas are more important for social services than trees/animals, and the ethnic group Kambe (rather than Ribe) were five times more likely to do so.

The Cultural and Regulating/Supporting (referring to responses such as 'praying for rain') results show that for every unit increase in age the respondents were 1.7% more likely to think the Kayas were important for Cultural and Regulating/Supporting services compared to trees/animals. Those who use the Kayas were two and a half times more likely to think the Kayas are important for Cultural and Regulating/Supporting services than trees/animals, and the Jibana were nearly six times (Exp (B) = 5.71) more likely to do so. In addition, for every unit increase in age the respondents were 2.6% more likely to think the Kayas are important for combined Cultural and Provisioning services (such as praying to get resources, or resources for cultural practices) than trees/animals, and respondents who were Jibana (rather than Ribe) were six times more likely to do so. The results show that the reasons people think the Kayas are important varies across the ethnic groups.

The Goodness of Fit and Model fitting Likelihood Ratio tests were significant and therefore show the model was a good fit. In addition Nagelkerke R^2 results were moderate supporting the model as a good fit for the data (χ^2 = 3278.7, p < 0.001, df = 2664; χ^2 = 495.0, p < 0.001, df = 66; Nagelkerke R^2 = 0.181). The classification accuracy produced by the model was 40.4% which is greater than the proportional by chance accuracy criteria (0.248 or 24.8% - calculated using the square of proportions of each chance accuracy criteria), and the maximum by chance criterion (36.8% based on the high rate of responses which fall into the Regulating/Supporting category calculated by a 25% increase over the largest group). The by chance accuracy results were lower than the overall fit for the model, showing that the accuracy of the model was better than by chance, suggesting that the relationship between the independent variables and the reasons people think the Kayas are important was useful. The multinomial regression was conducted with "Trees/Animals" as the reference category as the dependent variable. For the predictor variables, the control values were: Use of Kayas

– No (i.e. those that do not use the Kayas), Ethnic group – Ribe, area Division – Kikambala. The independent variables: Age, Use of Kayas, Ethnic Group and Division, are all significant predictors in the model (Age: χ^2 = 21.8, p = 0.001, df = 6; Use of Kayas: χ^2 = 71.4, p < 0.001, df = 6; Ethnic Group: χ^2 = 144.6, p < 0.001, df = 36; Division: χ^2 = 64.1, p < 0.001, df = 18).

Chi-square tests show there was no significant difference between genders for the reasons the Kayas are important when responses were grouped by ecosystem services (Table 5.14). However, there were significant differences in age groups, ethnicities, and religions (Table 5.15). A post-hoc z-test with adjusted p-values shows that the differences across the religions occur for the regulating/supporting services and cultural services (Table 5.15). Proportionately more Christians thought the Kayas are important for regulating/ supporting services compared to Muslims and Pagans. Whereas proportionately more Pagans thought that the Kayas are important for cultural services compared to both Christians and Muslims, and proportionately more Muslims thought so than Christians. Post-hoc z-tests for age groups and ethnicity also showed significant differences (as was seen in the multinomial

Table 5.14: Chi-square results for analysis of the reason people think the Kayas are important divided by ecosystem services. For legend see Table 5.1
[A] 32.1% cells have expected count less than 5, minimum expected count is 0.63

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	8.23	7	0.312					
Age	84.0	28	**< 0.001**			0.087		
Ethnicity	309.1	42	**< 0.001**			0.135		
Religion[1 (A)]	112.7	21	**< 0.001**	< 0.001	< 0.001	0.158	0.129	0.212

Table 5.15: Cross-tabulation of reasons Kayas are important by ecosystem services with Religion. For legend see Table 5.2

		Religion				Sig
		Christian	Muslim	Pagan	None	
Reasons Kayas are important grouped by ecosystem services	Provisioning	292$_a$	112$_a$	14$_a$	21$_a$	NS
	Regulating/Supporting	366$_a$	90$_b$	6$_b$	15$_{a, b}$	*
	Cultural	195$_c$	130$_b$	42$_a$	19$_{b, c}$	*
	Social	50$_a$	32$_a$	2$_a$	4$_a$	NS
	Cultural and Regulating	20$_a$	15$_a$	3$_a$	2$_a$	NS
	Cultural and Provisioning	11$_a$	2$_a$	1$_a$	0$_a$	NS
	Trees and Animals	32$_a$	17$_a$	0$_a$	6$_a$	NS
	Other	0$_a$	1$_a$	0$_a$	0$_a$	NS

regression (Tables A3.10 and A3.11, Appendix 3). A significantly greater proportion of those in the age group 36 – 45 listed the Kayas as being important for 'provisioning' services compared to those in the 17 – 25 age group, whereas a significantly greater proportion of those in the 17 – 25 age group mentioned words associated with regulating/supporting services than all other age groups. In addition a significantly greater proportion of those in the 56+ age group listed reasons associated with 'cultural' services compared to those in the 17 – 25 age group. When investigating the ethnicities the results show that a significantly greater proportion of Jibana respondents listed provisioning services compared to the Chonyi, Kambe and Kauma. However, a greater proportion of Kauma respondents think the Kayas are important for social services compared to all other ethnicities except for the Ribe.

5.4.3 Comparison between words associated with Kayas and reasons Kayas are important
The results from the histograms in Figures 5.1 and 5.4 indicate a difference in the words associated with the Kayas and the reasons that the respondents said that Kayas are important. Word-clouds were used to compare the words that were most often associated with the Kayas and the reasons they think the Kayas are important (Figure 5.7, Full lists of words in Appendix 4). The word clouds show that the most common words people associate with the Kayas were cultural and spiritual words. The most common was "praying" and others included "home", "sacred" and "elders". Other words that people commonly associated with the Kayas included "rain", "trees", and "animals". In contrast the words most frequently used for why the Kayas are important were in reference to regulating/ supporting and provisioning services. The word that was mentioned the most is "rain", other dominant words were "firewood", "brings", "gives", and "medicine". In addition "praying" is still very common. Words that were often seen in response to both questions were "rain", "trees" and "forest". The results show that while there was some overlap, in general the way that people conceptualise the Kayas (the words they associate with them) and what they regard makes them important are different.

Figure 5.7: Word cloud of top 80 words given by respondents generated using Wordle (http://www.wordle.net) a) Words associated with Kayas, b) Reasons Kayas are important.

5.4.4 Sanctity of the Kaya Forests

Interviewees were asked to rate how strongly they agreed with the statement that "The Kayas are not sacred to me" (Q. 72e, Appendix 1). Approximately 51% of respondents either disagreed or strongly disagreed with the statement, and 33.3% agreed or strongly agreed with it. While these results show that the majority of people do still believe that the Kayas are sacred, this figure is lower than would be expected if all Mijikenda people adhered to traditional beliefs associated with the Kayas.

A multinomial logistic regression was conducted on the response to the statement as the dependent variable with importance of spiritual belief system, belief in traditional belief system, use of Kayas, if Kayas are important, and if the traditional belief system is still important, as the independent variables. The importance of spiritual belief system was input as a continuous variable to account for the ranking in the answers provided. The results show that for every unit increase in how important a person feels their spiritual belief system is they were 42% more likely to strongly disagree with the statement that the Kayas are not sacred (Figure 5.8, Table A3.12, Appendix 3). Those who believe in the traditional belief system were 99% more likely to strongly disagree with the statement rather than strongly agree with it. Respondents who strongly agree that the Kaya forests are important (compared to those who strongly disagree) were over four times more likely, to strongly disagree with the statement than to strongly agree with it.

Whether or not a respondent believes that the local traditional belief system is still important was also associated with whether or not they think that the Kayas are sacred. Those who strongly disagree that the local belief system is no longer important (compared to those who strongly agree) were nearly 15 times more likely to strongly disagree with the statement "the Kayas are not sacred to me" compared to strongly agreeing with it. Those who disagree with the statement that the local belief system is no longer important (compared to those who strongly agree) were nearly 10 times (Exp (B) = 9.88) more likely to strongly disagree that the Kayas are not sacred than to strongly agree with it. Those who are neutral (do not agree or disagree) to the statement 'the local belief system is no longer important' were over four times more likely to strongly disagree with the statement 'the Kayas are not sacred' than to strongly agree with it. Those who agree that the local belief system is no longer important rather than strongly agreeing with it, were over six times more likely to strongly disagree with the statement that the Kayas are not sacred than to strongly agree with it. Individuals
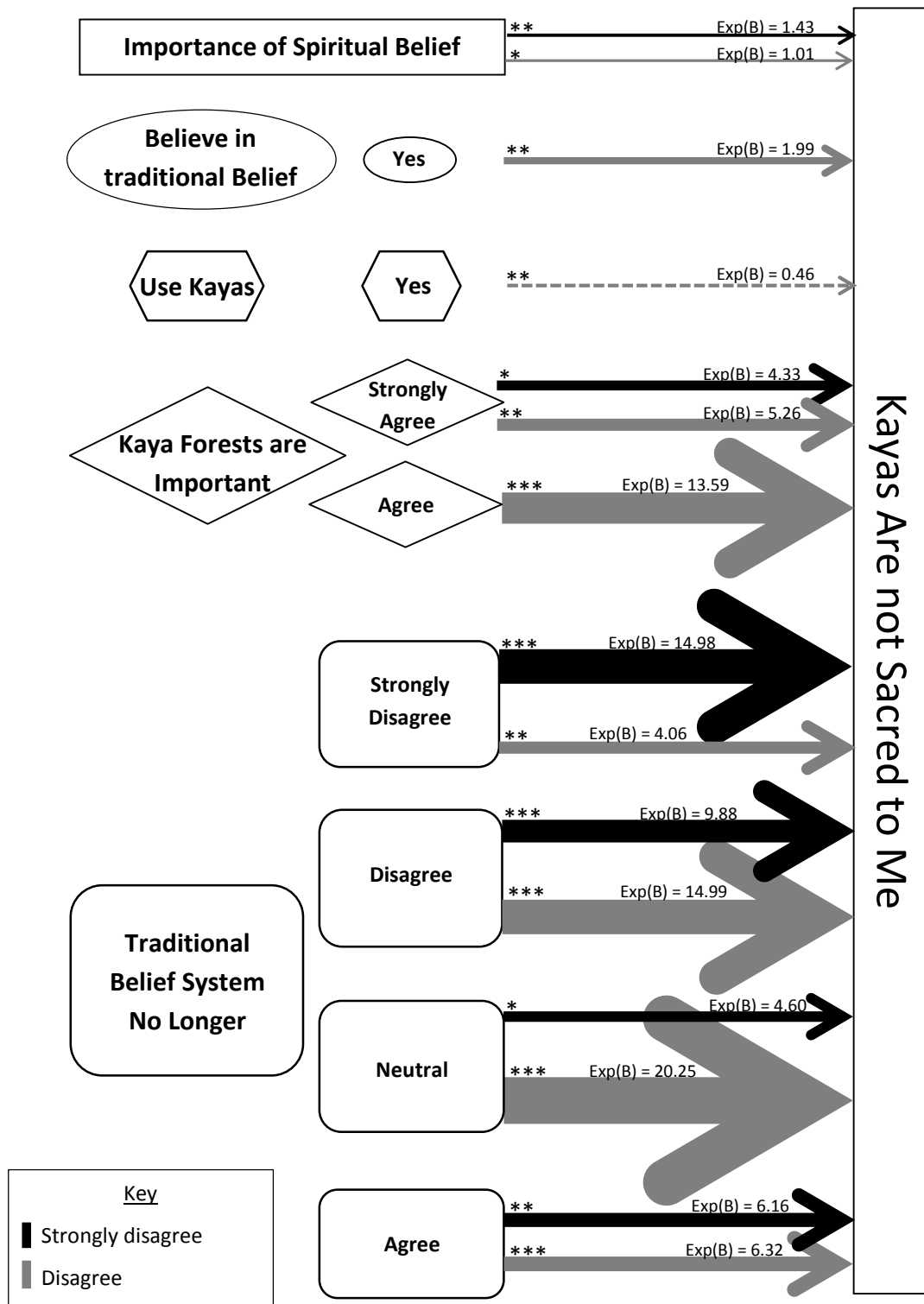
Figure 5.8: Visualisation of Multinomial Logistic Regression output of response to statement 'Kayas are not sacred to me'

Likelihood of response, 'Strongly Disagree' or 'Disagree' with statement "The Kayas are not sacred to me" compared to strongly agreeing. Weights of lines are equal to odds ratio (Exp (B)) values. Solid lines = more likely to strongly disagree/disagree, Dashed lines = less likely to strongly disagree/disagree. Significant factors under Wald test to the level of: *** p ≤ 0.001, ** p = ≤ 0.01, *** p = ≤ 0.05. 'Importance of Spiritual Belief System' input as scale variable. Reference categories are: Use Kayas – No; Kayas are important – Strongly Disagree; Traditional Belief System No Longer Important – Strongly agree

who use the Kayas (rather than those who do not) were 54% less likely to disagree with the statement that the Kayas are not sacred than to strongly agree with it. The regression shows that the more important a person's spiritual belief system is the more likely they were to disagree/strongly disagree with the statement that the Kayas are not sacred. In addition if respondents believe in the traditional belief system they were also more likely to disagree, or strongly disagree with the statement than to strongly agree with it compared to those who do not.

The Likelihood ratio test confirms that the model was a good fit for predicting our response rate and Nagelkerke R Square results are moderate to high (χ^2 = 698.6; df = 44; p < 0.001; Nagelkerke R^2 = 0.506). The classification accuracy produced by the model was 52.9% which is greater than the proportional by chance accuracy criteria (0.224 - calculated using the square of proportions of each category) and the maximum chance criterion 0.344 (or 34.4% - calculated based on the answer with the highest frequency of responses "Disagree"). These results therefore confirm that the model increases the overall accuracy of prediction compared to by chance prediction. Likelihood ratio tests show that importance of spiritual belief system, belief in the traditional belief system, use of the Kayas, if Kayas are important, and if local belief system is still important, were all significant predictors in the model for explaining the difference in whether or not a person believes the Kayas are sacred (χ^2 = 26.3, p < 0.001, df = 4; χ^2 = 12.5, p = 0.014, df = 4; χ^2 = 33.2, p < 0.001, df = 4; χ^2 = 218.6, p < 0.001, df = 16; and χ^2 = 154.2, p < 0.001, df = 16 respectively).

Chi-square tests show that there was no significant difference across the genders in whether or not they think the Kayas are sacred (Table 5.16). However, there were significant differences across the age groups and religions, and there was also a significant difference in the age groups when split by genders (5.17). A post-hoc z–test with adjusted p-values shows (Table 5.17) that a significantly greater proportion of people aged 56+ either disagreed or strongly disagreed with the statement "the Kayas are not sacred" than those in the age group 17 – 25. A significantly greater proportion of people in the age groups 17 – 25 and 26 – 35 gave a neutral response than those who are 56+. A significantly greater proportion of people in the age group 17 – 25 agreed with the statement than those in the age groups 46 – 55 and 56+. A significantly greater proportion of people in the age groups 17 – 25 and 26 – 35 strongly agreed with the statement compared to those in the age group 56+. Z-tests also show (Table 5.18) that for male respondents a significantly greater proportion of people in

Table 5.16: Chi-square results for analysis of response to "The Kayas are not sacred to me"
For legend see Table 5.1
[A] 32.1% cells have expected count less than 5, minimum expected count is 0.63

Variable	χ^2	df	p	Monte Carlo Exact 99% CI Upper bound	Monte Carlo Exact 99% CI Lower bound	Cramer's V	Bootstrapped 99% CI Upper bound	Bootstrapped 99% CI Lower bound
Gender	7.75	4	**0.101**					
Age	75.9	16	**< 0.001**			0.124		
Religion[1] [A]	37.0	12	**< 0.001**	< 0.001	< 0.001	0.125	0.093	0.191
Age and Men	54.1	16	**< 0.001**			0.147		
Age and Women	3.33	16	**0.007**			0.117		

Table 5.17: Cross-tabulation of 'Kayas are not sacred' responses with 'age groups' post-hoc z-test. For legend see Table 5.2

		Age in Groups 17 - 25	26 - 35	36 - 45	46 - 55	56 +	Sig
Kayas not sacred to me	Strongly Disagree	35_c	$35_{b, c}$	$43_{b, c}$	$43_{a, b}$	68_a	*
	Disagree	76_c	$65_{b, c}$	$95_{a, b, c}$	$75_{a, b}$	100_a	*
	Neutral	55_a	43_a	$39_{a, b}$	$26_{a, b}$	22_b	*
	Agree	86_a	$60_{a, b}$	$71_{a, b}$	33_b	42_b	*
	Strongly Agree	36_a	36_a	$22_{a, b}$	$14_{a, b}$	13_b	*

Table 5.18: Cross-tabulation of 'Kayas are not sacred' responses with 'age groups' Layered by age post-hoc z-test. For legend see Table 5.2

			Age in Groups 17 - 25	26 - 35	36 - 45	46 - 55	56 +	Sig
Male	Kayas not sacred to me	Strongly Disagree	16_b	17_b	25_b	$22_{a, b}$	46_a	*
		Disagree	35_a	30_a	54_a	36_a	54_a	NS
		Neutral	28_a	24_a	22_a	13_a	13_a	NS
		Agree	43_a	$20_{a, b}$	$31_{a, b}$	$15_{a, b}$	19_b	*
		Strongly Agree	14_a	19_a	11_a	8_a	9_a	NS
Female	Kayas not sacred to me	Strongly Disagree	19_a	18_a	18_a	21_a	22_a	NS
		Disagree	41_b	34_b	$40_{a, b}$	$38_{a, b}$	46_a	*
		Neutral	27_a	19_a	17_a	13_a	9_a	NS
		Agree	42_a	39_a	40_a	18_a	22_a	NS
		Strongly Agree	22_a	17_a	11_a	6_a	4_a	NS

the age group 56+ strongly disagreed with the statement "the Kaya forests are not sacred to me" than those in the age groups 17 – 25 and 26 – 35, and a greater proportion of those in the age group 17 – 25 agreed with the statement than those who are in the 56+ age group. For the female respondents a significantly greater proportion of people in the age group 56+ disagreed with the statement than those in the age groups 17 – 25 and 26 – 35. The results also indicate that a greater proportion of Muslims strongly disagreed with the statement compared to Christians, whereas a significantly greater proportion of Christians and Pagans disagreed with the statement 'the Kayas are not sacred' than Muslims.

5.4.5 Knowledge and Adherence to Traditional Laws

Analysis of the awareness of traditional laws shows that of those that responded to the question (n = 1314), 64% said that they were aware of traditional laws (Figure 5.9). While the majority of respondents were aware of traditional laws, nearly one third were not. A binary logistic regression was conducted to investigate awareness of traditional laws with Age, Gender, Use of Kayas, and Belief in the traditional belief system as the predictor variables. The results show that when all other variables were held constant, a one unit increase in age corresponds to a 1.9% increase in the likelihood of being aware of the traditional laws (shown in Table 5.19). A respondent being female results in a 15.2% decrease in the likelihood of a
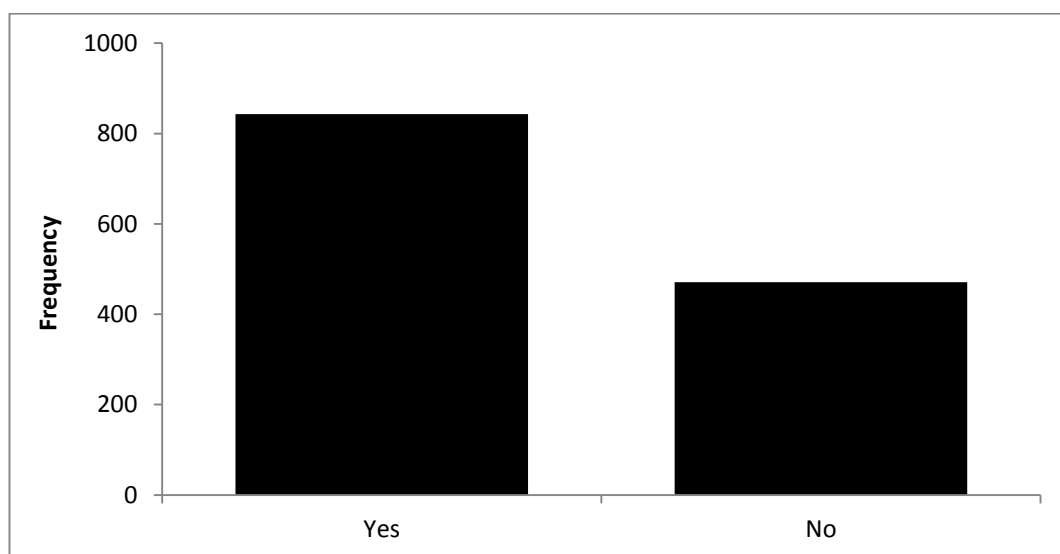
Figure 5.9: Histogram showing if respondents are aware of traditional laws

Table 5.19: Binary Regression Output for awareness of traditional laws
Legend: Independent Variables: Age, Gender, Use of Kayas, and Belief in traditional faith as predictor variables. Variables entered on step 1. Significance tested with Wald test statistic.
Coding for predictor variables: Gender: 1 = Male, 2 = Female. Use of Kayas 1 = Use, 2 = Do not use, Belief in Faith 1 = Believe, 2 = Do not believe.

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Age	.018	.005	16.192	1	**.000**	1.019	1.010	1.028
Gender	-.165	.137	1.448	1	.229	.848	.648	1.110
Use the Kayas	-.944	.144	42.696	1	**.000**	.389	.293	.516
Believe in the Traditional Belief System	-1.726	.151	131.425	1	**.000**	.178	.133	.239
Constant	4.342	.455	90.881	1	**.000**	76.872		

respondent being aware of the traditional laws. Those who do not use the Kayas were 61.1% less likely to be aware of the traditional laws, and those that do not believe in the traditional belief system were 82.2% less likely to be aware of the traditional laws when all other variables were held constant.The results show that if it was assumed that the response was yes for all respondents then the results show that if it was assumed that the response was yes for all respondents then there would be a 64.1% accuracy of prediction. However, a Wald test statistic (θ) shows there was a significant difference in the awareness of the traditional laws (θ = 95.5, p < 0.001, df = 1). Nagelkerke R square test shows that the model was a good fit and the Hosmer and Lemeshow (HL) Test supports this (Nagelkerke R^2 = 0.330; HL: χ^2_{HL} = 12.7, df = 8; p = 0.124,). The classification Table shows that the model was a good fit for predicting the response for awareness of traditional laws with a 74.3% success rate (which is a 10.2% increase in the prediction success).

Chi square tests show that there was a significant difference in the awareness of traditional laws across genders, age groups, ethnicities, use of Kayas (Table 5.20). A post hoc z-test with adjusted p-values shows that a significantly greater proportion of men were aware of the traditional laws than women (Table 5.21). In addition results from a post-hoc z-test also show that greater proportions of older respondents were aware of the laws than younger respondents (Table A3.13, Appendix 3) which correlate with the results from the binary regression.

Table 5.20: Chi-square results for If respondents are aware of the traditional laws. For legend see Table 5.1

Variable	χ^2	df	p	Cramer's V
Gender	5.99	1	**0.014**	0.068
Age	90.1	4	**< 0.001**	0.266
Ethnicity	76.9	8	**< 0.001**	0.239
Religion	17.2	3	**< 0.001**	0.145
Use Kayas	137.6	1	**< 0.001**	0.326
Awareness of traditional laws	275.7	1	**< 0.001**	0.460

Table 5.21: Cross-tabulation of awareness of traditional laws with gender
For legend see Table 5.2

		Gender		Sig
		Male	Female	
Aware of traditional laws	No	216_b	252_a	*
	Yes	447_a	393_b	*

A post-hoc z-test highlights (Table 5.22) that proportionately fewer respondents in the ethnic group Ribe were aware of the traditional laws than any other ethnic group, and proportionately less Rabai were aware of the laws than those in the Chonyi, Giriama and Jibana ethnic groups. Table 5.23 shows that 100% of those who are pagan were aware of the traditional laws. Under a post-hoc z-test with adjusted p-values (Bonferroni method) results show that proportionately more Pagan respondents were aware of the traditional laws than Christians, Muslims or those who do not identify as having any religion. Results also indicate that a significantly greater proportion of those that use the Kayas were aware of the traditional laws than those who do not. In addition, a significantly higher proportion of those who believe in the traditional belief system were aware of the traditional laws than those who do not. When comparing the different variables, belief in the traditional belief system was found to be the strongest predictor for the awareness of the traditional laws Table 5.20).

Along with the awareness of traditional laws, it was also important to investigate the level of adherence to the traditional laws. Of those that responded to the question (n = 1170), there was variation in the level of adherence to traditional laws (Figure 5.10). The results show that 46% of people said that they followed the traditional laws, 19.4% said they only follow them sometimes and 34.5% said they did not follow them at all.

Table 5.22: Cross-tabulation of awareness of traditional laws with ethnic group
For legend see Table 5.2

		Ethnic Group									Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
Aware of	No	64_c	74_c	17_c	$53_{b, c}$	$42_{b, c}$	127_b	80_a	$9_{a, b, c}$	$3_{a, b, c}$	*
traditional laws	Yes	178_a	180_a	58_a	$99_{a, b}$	$107_{a, b}$	164_b	46_c	$8_{a, b, c}$	$2_{a, b, c}$	*

Table 5.23: Cross-tabulation of awareness of traditional laws with religion
For legend see Table 5.2

		Religion				Sig
		Christian	Muslim	Pagan	None	
Aware of traditional laws	No	227_a	101_a	0_b	17_a	*
	Yes	325_b	115_b	19_a	16_b	*
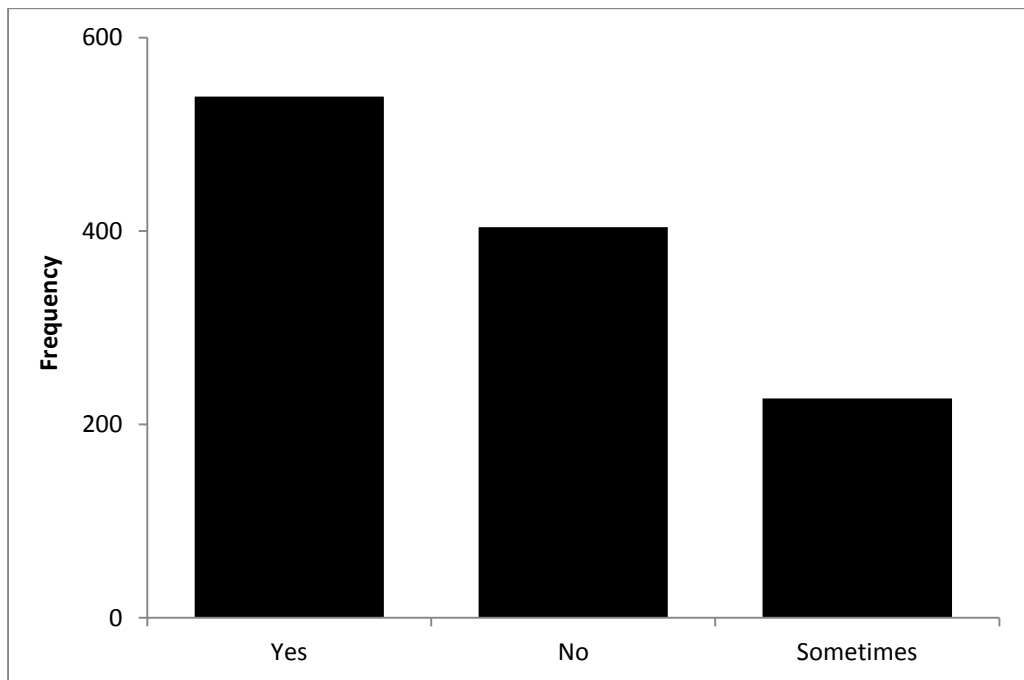
Figure 5.10: Histogram showing if respondents follow the traditional laws

In order to investigate the relationships between demographic and behavioural factors and if people state that they follow traditional laws a multinomial logistic regression was performed. The analysis was conducted with age, use of the Kayas, belief in the traditional belief system, and ethnic groups as the predictor variables. The results show (Table 5.24) that, based on the odd's ratios (Exp (B)), for every unit increase in age respondents were 1.6% more likely to follow the traditional laws rather than only following them sometimes. Those that believe in the traditional faith system were four times more likely to follow the traditional laws than to only follow them sometimes. The different ethnic groups also show variation in the likelihood of following the traditional laws. Those who were Chonyi (rather than Ribe) were nearly four times (Exp (B) = 3.96) more likely to follow the traditional laws than to only do so sometimes, those who were Giriama were over seven times more likely to follow the traditional laws, the Jibana were over eight times more likely to do so and the Kambe nearly five times (Exp (B) = 4.86). Those who were Kauma (rather than Ribe) were 61.5% more likely to follow the traditional laws than to only do so sometimes and the Rabai were over twice as likely to do so.

When investigating the likelihood of not following the traditional laws, compared to doing so sometimes, those who use the Kayas were 42.1% less likely not to follow the laws than to only do so sometimes. Results also show that those who believe in the traditional faith system were 78% less likely not to follow the traditional laws than to only do so sometimes. Respondents who were Chonyi (rather than Ribe) were 65.1% less likely not to follow the laws than to only do so sometimes. If respondents were Giriama, Jibana, Kauma, and Rabai (rather than Ribe) they were also less likely not to follow the laws than to only do so sometimes (55.3%; 65.4%; 74.8%; and 59.2% respectively). The Likelihood ratio test shows that the model was a good fit and the Nagelkerke R square results were moderate which supports that the model is a good fit (χ^2 = 615.4, p < 0.001, df = 18; Nagelkerke R^2 = 0.492). The overall accuracy of the model was 68.7% which was higher than both the proportional by chance accuracy criteria (0.3706 or 37.06% - calculated using the square of proportions of each category) and the maximum chance criterion (0.5764 or 57.64% - calculated based on the answer with the highest frequency of responses "Follow the laws"). These results show that the model increases accuracy of prediction over by chance predictions and that the relationship between demographic variables and whether or not people follow the traditional laws was useful. The results of the likelihood ratio tests for the different variables showed them all to be significant predictors in the model (Age: χ^2 = 14.2, p < 0.001, df = 2;

Table 5.24: Multinomial logistic regression output of if respondents follow traditional laws
Legend: Predictor Variables = Age, Use of Kayas, Belief in traditional systems and Ethnic Groups.
Reference Category for comparison is "Sometimes" (when evaluating those who do/do not follow
the traditional laws); (b) This parameter is set to zero because it is redundant.

		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
Follow the Laws	Intercept	-2.611	.512	25.978	1	.000			
	Age	.016	.006	8.073	1	**.004**	1.016	1.005	1.027
	Use Kayas	.620	.199	9.729	1	**.002**	1.859	1.259	2.745
	Don't Use Kayas	0b	.	.	0	.	.	.	.
	Believe in Traditional Belief system	1.389	.198	49.418	1	**.000**	4.012	2.724	5.910
	Don't believe in Traditional Belief system	0b	.	.	0	.	.	.	.
	Chonyi	1.376	.463	8.832	1	**.003**	3.959	1.598	9.812
	Giriama	1.996	.473	17.826	1	**.000**	7.358	2.913	18.584
	Jibana	2.148	.572	14.112	1	**.000**	8.571	2.794	26.293
	Kambe	2.635	.538	24.020	1	**.000**	13.939	4.860	39.978
	Kauma	1.426	.483	8.712	1	**.003**	4.162	1.615	10.728
	Rabai	.859	.463	3.450	1	.063	2.362	.954	5.850
	Ribe	0b	.	.	0	.	.	.	.
Do not Follow the laws	Intercept	2.288	.374	37.368	1	.000			
	Age	-.007	.006	1.308	1	.253	.993	.981	1.005
	Use Kayas	-.547	.203	7.267	1	**.007**	.579	.389	.861
	Don't Use Kayas	0b	.	.	0	.	.	.	.
	Believe in Traditional Belief system	-1.516	.216	49.227	1	**.000**	.220	.144	.335
	Don't believe in Traditional Belief system	0b	.	.	0	.	.	.	.
	Chonyi	-1.053	.345	9.347	1	**.002**	.349	.177	.685
	Giriama	-.806	.364	4.905	1	**.027**	.447	.219	.911
	Jibana	-1.060	.533	3.953	1	**.047**	.346	.122	.985
	Kambe	-.110	.451	.060	1	.807	.896	.370	2.170
	Kauma	-1.378	.404	11.613	1	**.001**	.252	.114	.557
	Rabai	-.897	.326	7.550	1	**.006**	.408	.215	.773
	Ribe	0b	.	.	0	.	.	.	.

Use of Kayas: $\chi^2 = 34.8$, p < 0.001, df = 2; Belief in traditional faith system: $\chi^2 = 244.8$, p < 0.001, df = 2; Ethnic Group: $\chi^2 = 92.1$, p < 0.001, df = 12).

The results indicate a contradiction in the answers respondents gave with regards to awareness of the laws and whether or not they follow the laws. For those that were aware of the traditional laws, 809 respondents answered the question, 15.5 % said that they do not follow the laws and 21.9% said they only follow the laws sometimes (Figure 5.11). Of those that said they were not aware of the traditional laws, 344 answered the question. 6.4% (22 individuals) said they do follow the laws, and 14.2% (49 individuals) said they follow them sometimes. These results may lead to anomalies in the analysis due to some people who do not know the laws stating that they do still follow them. However, despite these conflicts, analysis shows that 53.9% of respondents admit to either only following the laws sometimes or not following the laws at all. This shows that the majority of individuals do not follow the laws all the time including 37.4% of those that know the laws.

Split chi-square tests analysing awareness of laws with adherence to laws were conducted in order to investigate the adherence to laws that accounted for the issues of responses based
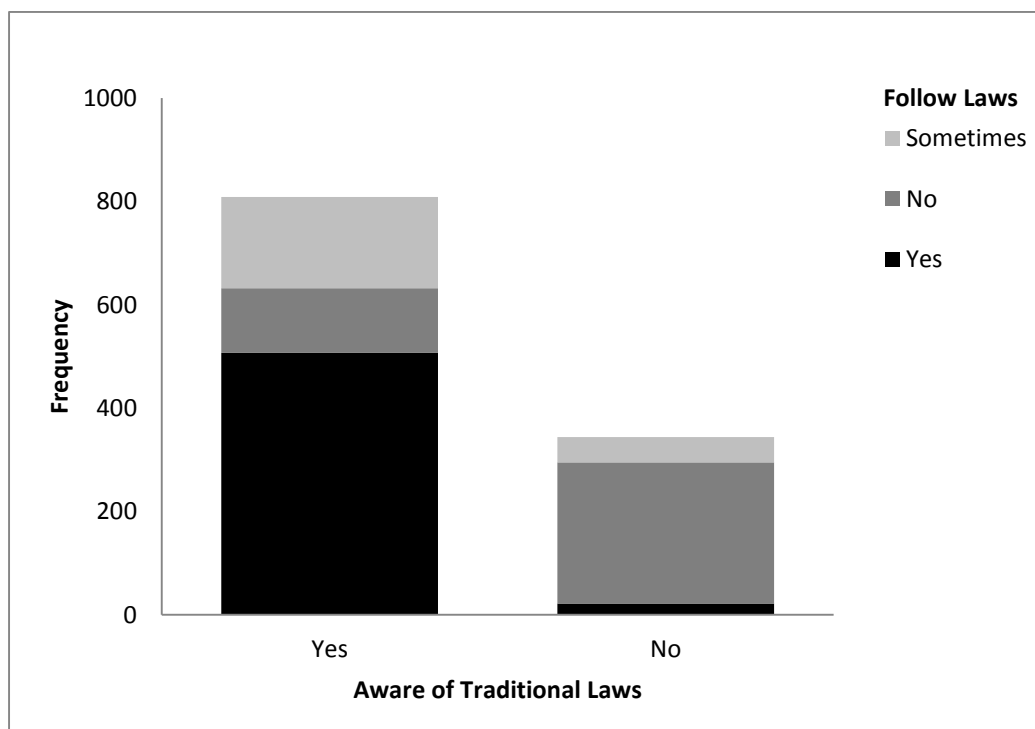
Figure 5.11: Stacked Histogram showing if respondents follow the traditional laws split by awareness of traditional laws

on awareness of laws. The results show that there was no significant difference across genders; however, there were significant differences across the age groups, ethnicities, religions, and Divisions, use of Kaya, and belief in the traditional faith (Table 5.25). A post-hoc z-test with adjusted p-values (Bonferroni method) shows that for those that were aware of the laws a greater proportion of those in the age group 56+ follow the laws compared to those in the age groups 17 − 25, 26 − 35 and 36 − 45, whereas proportionately less of those in the age group 26 − 35 follow the laws than those in the 46 − 55 age group (Table 5.26). A greater proportion of respondents than expected in the age groups 17 − 25 and 26 − 35 do not follow the laws compared to those in the age groups 46 − 55 and 56+, and a greater proportion of individuals in the age groups 26 − 35 and 36 − 45 only follow the laws sometimes compared to those in the age group 56+. Results also show that there were significant differences across the ethnic groups (Table A3.14 appendix 3). For example, for those that were aware of the laws a significantly greater lower proportion of Ribe respondents follow the laws than expected compared to the Chonyi, Giriama, Jibana, Kambe and Kauma. A post hoc z-test with adjusted p-values shows (Table 5.27) that for those that are aware of the laws a greater proportion of than expected of Pagan respondents follow the traditional laws than any other religious group, and a greater proportion of Muslims follow the traditional laws than the Christians.

The results also show that for those that do not know the laws, a significantly greater proportion than expected in Kaloleni and Kikambala Divisions stated they do not follow the laws compared to those in Ganze division, where as a greater proportion of respondents in Ganze division stated they only follow the laws sometimes (Table 5.28). For those that do know the laws, a significantly greater proportion of respondents in Ganze Division than expected follow the laws than those in Chonyi or Kikambala, whereas a significantly greater proportion of respondents in Kikambala do not follow the laws than those in any other division. A post-hoc z-test with adjusted p-values (Bonferroni method) shows (Table 5.29) that for respondents who are not aware of any traditional laws a significantly greater proportion of those who use the Kayas were likely to follow the laws than those who do not. For those that are aware of the traditional laws, a greater proportion of those who use the Kayas follow the laws compared to those who do not use the Kayas. Results also indicate (Table 5.30) that for those that are not aware of the traditional laws a significantly greater proportion of respondents who believe in the traditional belief system say they follow the laws than those who do not believe. For those that are aware of the traditional laws,

Table 5.25: Chi-square results for if people follow the laws and awareness split by awareness of the laws. For legend see Table 5.1

[A] 51.9% of cells have expected count less than 5%, minimum expected count is 0.13
[B] 33.3 % of cells have expected count less than 5%
[C] 41.7 % of cells have expected count less than 5%

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Aware and gender	4.32	2	0.115					
Not aware and gender	1.46	2	0.482					
Aware and age	44.6	8	**< 0.001**			0.239		
Not aware and age	6.76	8	0.571					
Aware and ethnicity	95.4	16	**< 0.001**			0.243		
Not aware and ethnicity[1] [A]	77.0	16	**< 0.001**	< 0.001	< 0.001	0.335	0.263	0.476
Aware and religion	26.7	4	**< 0.001**	< 0.001	< 0.001	0.141	0.121	0.247
Not aware and religion	1.82	4	0.812					
Aware and Division	28.6	6	**< 0.001**			0.133		
Not aware and Division[1] [C]	61.8	6	**< 0.001**	< 0.001	< 0.001	0.300	0.180	0.440
Aware and use of Kayas	65.9	2	**< 0.001**			0.287		
Not aware and use of Kayas	12.3	2	**0.002**			0.190		
Aware and belief in traditional faith	181.2	2	**< 0.001**			0.475		
Not aware and belief in traditional faith	52.8	2	**< 0.001**			0.393		

Table 5.26: Cross-tabulation of following traditional laws with age layered by awareness of laws. For legend see Table 5.2

			Age in Groups					Sig
			17 - 25	26 - 35	36 - 45	46 - 55	56 +	
Not aware of traditional laws	Follow laws?	Yes	6a	5a	5a	2a	4a	NS
		No	95a	65a	55a	29a	22a	NS
		Sometimes	13a	11a	7a	8a	7a	NS
Aware of traditional laws	Follow laws?	Yes	64b, c	73c	104b, c	96a, b	149a	*
		No	32a	33a	26a, b	13b	18b	*
		Sometimes	28a, b	42a	45b	32a, b	27b	*

Table 5.27: Cross-tabulation of Following traditional laws with religion layered by awareness of laws. For legend see Table 5.2

			Religion				Sig
			Christian	Muslim	Pagan	None	
Not aware of laws	Follow laws?	Yes	8_a	5_a		0_a	NS
		No	141_a	72_a		8_a	NS
		Sometimes	15_a	9_a		2_a	NS
Aware of laws	Follow laws?	Yes	145_c	69_b	18_a	$10_{b,c}$	*
		No	82_a	18_a	0_a	2_a	NS
		Sometimes	86_a	25_a	0_a	3_a	NS

Table 5.28: Cross-tabulation of following traditional laws with Division layered by awareness of laws. For legend see Table 5.2

			Division				Sig
			Kaloleni	Chonyi	Ganze	Kikambala	
Not aware of laws	Follow laws?	Yes	15_a	3_a	3_a	1_a	NS
		No	216_a	$17_{a,b}$	13_b	27_a	*
		Sometimes	21_a	4_a	20_b	4_a	NS
Aware of laws	Follow laws?	Yes	$323_{a,b,c}$	90_c	84_a	$9_{b,c}$	*
		No	75_b	26_b	13_b	11_a	*
		Sometimes	112_a	44_a	19_a	2_a	NS

Table 5.29: Cross-tabulation of Following traditional laws with use of Kayas layered by awareness of laws. For legend see Table 5.2

			Do use Kayas?		Sig
			Yes	No	
Not aware of laws	Follow laws?	Yes	12_a	10_b	*
		No	64_b	205_a	*
		Sometimes	18_a	30_a	NS
Aware of laws	Follow laws?	Yes	356_a	148_b	*
		No	43_b	79_a	*
		Sometimes	82_b	90_a	*

Table 5.30: Cross-tabulation of Following traditional laws with belief in traditional belief system layered by awareness of laws. For legend see Table 5.2

			Believe in traditional belief system		Sig
			Yes	No	
Not aware of traditional laws	Follow laws?	Yes	15_a	7_b	*
		No	29_b	243_a	*
		Sometimes	13_a	35_b	*
Aware of traditional laws	Follow laws?	Yes	416_a	89_b	*
		No	28_b	97_a	*
		Sometimes	92_b	82_a	*

a significantly higher proportion than expected of those who believe in the traditional belief system follow the laws. However, a significantly greater proportion of those that do not believe only follow the laws sometimes than is expected compared to those that do believe in the traditional faith.

5.5 Discussion

5.5.1 How people think of the Kayas and why they are important

Previous studies have suggested that local people think that the Kayas are still sacred and important to their cultural identity (Spear, 1978; Kibet and Nyamweru, 2008). When investigating what people think about the Kayas, the results follow this trend with the majority of words that people associate with the Kayas being cultural (Figure 5.1 and 5.2). However, there are differences in how people think about the Kayas according to their age, gender, religion, ethnic group and Division (Tables 5.1 – 5.8, and Figure 5.3). These differences in how people think about the Kayas may influence how they interact with the sites. For example, Pagans are more likely to think that the sites are important for prayer/worship, and therefore they may use the sites as places to pray. Whereas Muslims are more likely to associate them with social factors so may be more likely to use them for meetings or other social practices. Older individuals and men are more likely to think of the Kayas as a cultural area, whereas younger people think of the Kayas more in environmental terms. As well as reflecting how people may interact with the sites, these results may also be useful in finding ways to engage people in their conservation. For example, if younger people associate the sites with environmental factors (such as soil retention), it may be possible to

engage them in conservation of the sites using these factors, rather than by drawing on the paradigm within cultural traditions (which younger people are less likely to associate with the sites). However, as noted in chapter 4.5.1, the results here also show that the Kayas are associated with evil as well as witchcraft by some respondents. These findings highlight that there are some negative associations with the Kayas which may cause conflict within the communities and hinder conservation efforts.

In the past reports have suggested that the majority of the community see the Kayas as sacred sites, and as places important to the local culture, which these findings support. However, previous studies have then concluded that local people partake in traditional cultural practices including following the laws associated with the sites. While this investigation highlights the importance of the SNS as cultural sites, it also reveals other factors that are important to the local community. Age, division, ethnic group, religion, and use of Kayas all showed significant differences in the reasons why people thought the Kayas were important (Tables 5.9 – 5.14 and Figure 5.6). Younger individuals think the Kayas are important for animals and good weather compared to older respondents. Those who are members of the pagan faith were most likely to think that the Kayas were important as places of prayer, sacred sites and places of ritual compared to Christians and Muslims. Individuals in Kaloleni and Chonyi Divisions were more likely to think the Kayas were important for charcoal/firewood and food compared to those in Ganze.

The reasons why people think the sites are important could also be an indication of how they interact with the sites. If individuals think the Kayas are important for rituals and ceremonies they may be more likely to use the Kayas for such practices compared to those who do not. However, if individuals believe they are important for timber, firewood, food, or other extractive purposes, they may be more likely to extract such products from the forests. The most common reason that the Kayas are regarded as important is their function in regulating weather, in particular bringing rain (Figure 5.4 and 5.5). The region has suffered drought in the past (Mbithi and Wisner, 1972; IRIN 2004; van 't Land and Wekesa, 2008), and it is evident that this is still a major concern to the local people. This response shows that the local community perceive there to be a link between the forests and the weather, with at least a basic understanding that forests are important for local weather systems, especially with reference to the water cycle and regulating rain. Some responses note the connection between the forests and the weather as being cultural, in that traditionally the protection

of the forests was thought to benefit the communities (including helping with the harvests), and a number of ceremonies that are done in the Kayas are associated with the promotion of good weather (Spear, 1978).

In addition other individuals also noted the connection between the forests and the weather in a more pragmatic manner, including phrases such as "Forests help to bring rain". These responses show that while the way people think may be different, they can draw the same conclusion – in this instance the forests are important for helping to ensure favourable weather. Such differences in perceptions could lead to conflicts and/or inconsistencies in conceptualisations of nature and approaches to conservation management (Kanowski and Williams, 2009). However, as both groups (those who perceive things culturally and those who perceive them scientifically) think that the Kayas are important for good weather, which they rely on, then they may want to protect the Kayas for the same purposes. Therefore if management plans can be created in a way which acknowledges both perceptions and can work with both groups to reach a common goal, conservation of the sites is likely to be more effective in the long term.

The identification of the sites as being important for extractive resources indicates that the local population uses the sites for this purpose, which is not only a potential threat to the site (due to degradation) but is also in direct contradiction to the laws. This suggests that people do not follow the laws as has been previously assumed. This therefore shows that although the sites are thought of as cultural and sacred places, and their cultural/spiritual aspects are important to the communities, they use them in ways which do not follow the laws associated with the sites, which could hinder conservation if not monitored and managed.

For some groups, the results of this chapter highlight contradictions in how they think about the Kayas and the local culture. For example, the Kambe were noted in Chapter 4 as being proportionately more likely to belong to a Kaya (table 4.15) than all other ethnic groups other than the Jibana. This suggests that the Kambe are still practicing traditional customs. In addition, the Kambe were the most likely to think that the local traditional belief system is still important (Figure 4.3). These findings together would suggest that the Kambe are likely to think of the Kayas in line with traditional cultural and spiritual perspectives and to believe they are important for these aspects. However the results of this chapter (Figures 5.3 and

5.6) show that the Kambe are more likely to think of the Kayas in relation to provisioning and regulating/ supporting, and that they are more likely to think that they are important for regulating/ supporting services. These results show an inconsistency with the responses given by this ethnic group, highlighting the issues associated with investigating peoples beliefs/attitudes and the behavious they are likely to exhibit towards sites important to environmental conservation.

The contradiction between the perception of the sites being cultural and spiritual while being used for resources in violation of traditional laws shows a separation between people's attitudes and behaviours. As noted by Kühl *et al*. (2009) such situations may arise when personal circumstances overrule attitudes and values. As there are high levels of poverty in the area this could be the case for these communities. The need for resources may overrule an individual's personal values. Due to the circumstances, and the importance of the sites for resources the conservation plans for the sites needs to reflect this. It has been noted in past research that the restrictions of taking resources from the forests has had a negative response from some individuals (Nyamweru and Kimaru, 2008), Resource use from sacred sites and the use of specific animals against customary laws and practices have also been found in other countries such as Uganda and Madagascar, and it has been argued that it may lead to the degradation of sites and loss of species (Banana et al., 2008; Tengö and von Heland, 2011; Andriamarovololona and Jones, 2012).

Therefore, alternatives to these resources, or a sustainable use approach, will be needed to enable effective conservation of the sites. Sustainable resource use, in this research is defined in line with the Convention of Biological Diversity, which interprets it as using "natural resources at a rate that the Earth can renew them", and it is noted that such use is key to the effective conservation of biodiversity (CBD, 2010). The sustainable use of resources by indigenous groups has been found in a number of regions. For example, the Maloca people of the north-west Amazon, extract resources in line with an ethos of cautious use which has helped to ensure that they maintain their local environment (Richel, 2012). In addition there are examples of sustainable resource use from SNS by communities undergoing cultural change that have been found amongst the Tandory people in Androy in Madagascar (Tengö and von Heland, 2011). However, Tengö and von Heland (2011) note that resource extraction must be managed appropriately in a way that is agreeable to the local communities and with repercussions for those who break the rules. If the local people

are going to continue to use the Kayas for resources, this process of extraction must be incorporated into the management plans of the sites so that continued use is sustainable. These issues as well as the types of plants and animals used are discussed further in chapter seven.

The results showed a clear difference in the trends between the words that people associated with the Kayas and the reasons that they think the Kayas are important (Figure 5.7). These differences highlight the issues noted by Kühl *et al*. (2009), St John *et al*. (2010) and Herberlein (2012) in how people's views may be different from their actions. If interviewers ask the local people what they think about the Kayas, it is likely that the majority of the responses would be cultural and spiritual associations, however, if they asked only about the importance or use of the sites then they would get more of a functional perspective which includes the supply of resources, and the importance of climate regulation. The most commonly noted reasons that the sites are important are those focusing on their function in climate regulation, therefore it may be possible to work with the communities to find alternative access to resources, or a system of sustainable use that is effective, in order to preserve the sites to their function in climate regulation. In addition, a number of individuals noted the importance of the sites for the conservation of the environment, plants and animals. Therefore the value of conservation is already accepted by some members of the community. If interventions and management plans can work with the existing understandings and perceptions of the local communities of the roles that the Kayas play in their lives beyond their social and cultural functions, this may provide more effective conservation strategies, as well as involving those who no longer view the sites as culturally or spiritually important.

5.5.2 Using the MEA as a coding framework

As perception is based on culture and experience, the ways in which indigenous communities conceptualise the natural environment, especially with regards to SNS, is often different from how people from different countries, or academics and scientists may view and conceptualise them (Bayliss-Smith *et al*., 2003; Foley, 2003; Rist *et al.*, 2003; Selin, 2003; Kanowski and Williams, 2009; Karanth & DeFries, 2010). Finding ways to group answers into meaningful categories allows for a clearer understanding of trends in the data, enable comparison across sites and communities, and if done within an existing and accepted framework can help to do so in a way that is understandable to people with a range of

different experiences and perceptions (such as across disciplines, as well as between scientists and the general public). There are few existing frameworks that have sought to group the ways in which people use, conceptualise and interact with their natural environment, however, the MEA is one such framework. The development of the list and categories of the ecosystem services involved the input of different countries, and communities (MEA, 2005), and has the potential to be a useful tool for assessing information on uses and perceptions of local communities.

This study found that the MEA ecosystem services categories had some major limitations when used with responses given by real communities (rather than international committees). One issue with the categories was that some of the terms were rather nebulous, therefore making it difficult to really understand what would be included within that category. For example, "inspiration" and "sense of place" are very subjective terms, and how local communities may interpret them could be different from how policy makers and academics do so. It was also found that when applying the MEA categories to field-research the separation of categories such as regulating and supporting services was more specific than how local communities think and talk about the environment. Many answers such as "they bring rain" can be grouped under both regulation of climate, or water cycling. There is also a division between cultural and environmental services within the MEA's listings that does not exist for the communities interviewed in this study. Numerous individuals mentioned the Kayas as being places to pray for rain, or perform ceremonies to bring rain, which are both a cultural and regulating/ supporting services combined. It was also found that the existing MEA categories lack any reference to social services, such as a place to settle disputes, a place to meet and a place for one to connect with the community (responses given in this survey). Whilst it may be argued that social services could be included within the cultural services category (as educational services are done), the results of this survey would suggest that social ecosystem services are different from cultural services. The grouping of all social services into cultural categories demonstrates a significant inconsistency in how those who drew up the MEA view the services of the environment. While the environmental services are categorised in ways which are very specific (to a point which may not make sense to local communities), all social and/or cultural services are grouped together.

The results of this survey suggest that social services are distinct from cultural and spiritual services. However as noted above, none of the categories are truly separate in the minds of the local community and cannot necessarily fit neatly into one or other category. Therefore if using the MEA as a framework for comparison between communities, both for this research, as well as on a global scale, it can be argued that an additional category of social ecosystem services needs to be included. In addition it should be possible to allow the coding of data into joint categories such as 'cultural and regulating'. These changes would allow for better clarification within the listings, and also enable more flexibility in the way that the terms are interpreted. However, if used in this way for future projects, researchers must explain how and why the categories are grouped together so that results are still comparable across different communities.

5.5.3 Sanctity of the Kayas

It has been noted that if the sites are sacred, it is more likely that the local community will seek to protect the sites and will follow the traditional laws associated with them (Gadgil and Vartak, 1976; Grob, 1995; Rist *et al.*, 2003; Dudley *et al.*, 2005, Bhagwat and Rutte, 2006; Bhagwat *et al.*, 2011). As discussed in Chapters 1.2.7 and 4.2 the management of the SNS assumes that the local population believe that the sites are sacred and will follow the laws associated with them, which are based on the traditional faith system (NMK, 2008; Bresnahan, 2010). While this management plan follows the current literature and suggestions for managing SNS (Dudley *et al.*, 2005), the results from this study show that a large proportion of the community (33%) do not believe the Kayas are sacred. The likelihood of believing that the Kayas are sacred varies based on a range of demographic and social factors as well as attitudes and beliefs (Figure 5.8; Tables 5.15 and 5.16). A reduction in the perception of the sanctity of a site can lead to the degradation of the sites (Githitho, 2003; Sheridan and Nyamweru, 2008; Banana *et al.,* 2008; Berhane-Selassie, 2008; Fukamachi and Rackham, 2012). For example in Japan, Uganda and Ethiopia, the decrease in the respect for traditions along with individuals no longer viewing sites as sacred has led to use of the sites against the traditional customs and practices and in ways which have led to the degradation of sacred groves (Banana *et al.,* 2008; Berhane-Selassie, 2008; Fukamachi and Rackham, 2012). In addition, during the course of this research stories were told about how a number of the Mijikenda sites on both the south and north coast had been used in violation of the traditions which resulted in their desecration. As the sites which were no longer perceived to be sacred the rules associated with their use were no longer enforced and they were

subsequently used in an unsustainable manner and eventually converted into farmland. Therefore understanding if local people think the sites are sacred is important. For those that agree, conservation management needs to be conducted in a way that does not violate the sanctity, and for those that do not, other ways to engage them in the conservation of the sites will be vital so that the sites are not damaged further or lost completely.

It was also found that a number of both Muslim and Christian respondents said that their Kayas were sacred to them, highlighting that for some members of the community they hold a combination of beliefs connected to both the traditional faith and introduced religions. People who hold multiple faiths may feel conflict in their own attitudes between belief systems therefore predicting their behaviour is more complicated. Positive attitudes towards a site means that positive behaviour is more likely (Kühl, 2009). Therefore it is likely that those who think the sites are sacred are more likely to engage in their conservation. However, even if people state that they find the sites to be sacred, this does not necessarily mean that they follow the laws associated with them. Therefore understanding the awareness and adherence to traditional laws is important for evaluating the likely success of the existing management plan.

5.5.4 Awareness of, and adherence to, traditional laws

St John *et al*., (2010) note that when investigating human behaviour, specific behaviours need to be addressed rather than looking at general attitudes alone. In addition, positive attitudes and beliefs are not enough to determine behaviour. A person must have both the knowledge and ability to be able to perform the activity (Kühl *et al*., 2009; St John *et al*., 2010; Herberlein, 2012). Therefore it follows that for an individual to be able to abide by a set of laws, they must first know what the laws are. To understand the efficacy of the current management system, it is important to investigate both the awareness of the traditional laws, as well as whether or not people follow them. To date, none of the studies that have focused on the communities surrounding the Kayas have asked people directly about their awareness and adherence to the traditional laws.

The results show that over one third of the population are not aware of the laws, and even if people are aware of the laws they do not necessarily follow them (Figures 5.9 and 5.11). Less than 44% of people were aware of the laws and said they followed them. This shows that the majority of the population are either not aware of the laws, are aware of them and

do not follow them, or are aware of them and only follow them sometimes. This shows that the knowledge and adherence to the traditional laws is low. This is likely to have significant impacts on the efficacy of the conservation of the sites as the current management plan is based solely on the traditional laws.

The results show that awareness of the laws varied according to gender, age group, ethnic group, religion, use of the Kayas, and belief in the traditional faith (Tables 5.17 – 5.20). Older respondents were more likely to be aware of the traditional laws, which indicates that there has been a loss in traditional knowledge among younger generations. Women are less likely to be aware of the traditional laws than men. If adherence to traditional laws is connected to participation in the traditional culture, these findings coincide with the findings in Chapter 4 where women were less likely to think their cultural identity is important (Figure 4.2), or believe in the traditional belief system (Table 4.21). As the traditional laws are based on the traditional belief system, then it follows that as fewer women believe in this belief system then fewer women will be aware of these laws. In addition women are not involved in the law making, or enforcement associated with the traditional laws. The Kaya Elders, who are all men, are responsible for making and enforcing the laws. The result of women being less active in the traditional culture and not partaking in the setting or implementing of laws, is likely to negatively influence their awareness of the traditional laws associated with the Kayas.

The results also showed that all those who identified as Pagan were aware of the traditional laws and that they were more likely to know them than any other religious group. These results are expected as 'Pagan' is the term that was used to describe the animistic faith in the questionnaire coding. As the laws are based on the traditional faith it is understandable that those who identify themselves with this faith know the laws and follow them. However, as there is a decrease in knowledge amongst the Christians, Muslims, and those with no religion, this shows that conversion to mainstream faiths, and/or departure from the traditional faith may lead to a loss of traditional knowledge. As noted in Chapter 4.5.1 and 4.5.4, there can be a conflict between traditional and mainstream faiths (Bhagwat *et al*., 2011). The conversion of communities to mainstream faiths (particularly Christianity) across Africa has led to the reduction of adherence to traditional customs and practices, the decrease in the legitimacy of traditional institutions and the laws that they seek to enforce (Sheridan, 2008). As such those who have converted may be less inclined to learn about or

follow traditional laws associated with the animistic/ancestral faith. For example, in the Tandory community in Madagascar the traditional faith requires practices which are in direct contradiction to Christian teachings, therefore those who have converted no longer take part in these traditions, or follow the laws that are associated with them (Tengö and von Heland, 2011).

The differences in awareness of laws based on ethnicity could result in greater levels of resource use than allowed by the rules among communities whose knowledge of traditional laws is limited. People cannot follow the laws if they do not know what they are. Therefore, as a large number of the population are not aware of the laws associated with the sites, outreach and education needs to be done to inform the local communities. An understanding of those members of each community that lack knowledge of traditional laws can help to focus future projects to make sure that the right people are being targeted. Ideas on ways to address decreased transmission of knowledge are addressed in greater detail in Chapter Eight.

A number of people who said that they are not aware of the traditional laws still claimed to follow them, or to do so sometimes (Figure 5.11). These answers may have been given as people are reluctant to admit to behaviour which may be perceived as wrongful (such as not following laws), they may also have given such answers if they were concerned about it being found out that they do not following the laws, or they may believe that even if they do not know the laws they behave well so must still follow the laws. Whilst it may be logical for them to give these responses, it is not possible for them to knowingly follow the laws when they do not know what they are. If in the past people have been asked questions aimed at investigating if they follow the traditional laws, it is possible that adherence to them could have been over-estimated due to people claiming to follow laws regardless of knowledge.

Adherence to traditional laws varied according to age, Division, ethnic group, religion, use of Kayas and belief in the traditional belief system (Tables 5.21 – 5.27). As noted with the awareness of the laws, older people were more likely to follow the laws as were Pagans, those who stated they believed in the traditional belief system, and respondents who use the Kayas. All of these responses are similar to the awareness of the laws, which is expected, as those who are aware of the laws are more likely to follow them than those who are not. Adherence to the traditional rules is a vital part of the management of these sites, as it is

based upon them. However, a large number of people do not follow the laws or only do so sometimes (Figure 5.10). These findings help to explain in part why the sites are continuing to undergo degradation (as was noted in Chapter Three). If people do not follow the laws associated with the SNS, then it is not possible for the management based on these laws to be effective at conserving the sites and their biodiversity. In addition, the current management of the Kayas is based on the understanding that when local people break the laws associated with the sites, they will be reprimanded by the elders and that this will prevent it from happening again in the future (NMK, 2008). However, either the rules are not being enforced, or people are not being caught, or the reprimands are not great enough to prevent the behaviour.

The poverty surrounding the sites (Githitho, 2003; Matiku, 2003, Nyamweru et al., 2008; Bresnahan, 2010; Metcalfe *et al.*, 2010) and the local populations reliance on the sites for resources (as outlined in sections 5.4.2 and Figure 5.7) may help to explain why people violate the laws associated with the sites. If this is the case, reprimands will not be effective, as the use of resources is based on necessity, and it is likely that increased punishment will cause conflict between communities and those wanting to use the sites and their resources (Kühl *et al.*, 2009). In order to achieve more effective conservation, the needs of the community need to be met, and the rules associated with the sites need to be followed. The current system is no longer effective, and a greater level of support is needed so that rules associated with the sites are enforced. The questions of whom should be in charge of the conservation of the sites, and how organisations should work with the local communities is explored further in chapter eight.

5.6 Conclusion

The results indicate that the words people associate with the Kayas (and how they think about them) are not the same as the reasons they think that the Kayas are important. They also show that people's perceptions and values towards the Kayas vary according to age, gender and social interactions (such as tribe or religion). They also highlight that while the majority of people still think that the Kayas are sacred they may hold multiple belief systems, and as the majority of the respondents either do not adhere to the laws or only do so sometimes, the sanctity of the Kayas is not enough to ensure its protection. The management plan is based solely on the traditional laws, which are in direct conflict to a number of reasons that the local people think the Kayas are important (such as for resource extraction), and

relies on people to know and follow the traditional laws, which many people do not. These results highlight the conflict between what people in the local communities say (that the sites are sacred and culturally important) and what is being observed (the degradation of the sites). Managers need to be aware that although people may have different perspectives they may seek to achieve the same goals. Therefore projects should seek to encourage the incorporation of different people's values whilst seeking to achieve common aims. The conservation management plan for the SNS needs to be updated to reflect the values that the local community have now and the reasons that the people believe the Kayas are important. If management does not take the resource value of the sites into account then protection will not be sustainable, and this is likely to continue to create conflict and make it difficult to work with the communities. Mechanisms that allow for sustainable resource extraction from the sites need to be put in place, or if that is not possible, alternative access solutions created for the local communities. In addition, once the new management plan is designed interventions need to be undertaken to ensure that all members of the local communities are aware of the rules associated with the sites.

Chapter 6: Use of Sacred Sites

6.1 Abstract

Anthropogenic use of the natural environment can be an important driver of both degradation and conservation. While unregulated use can result in the disturbance and degradation of habitats as well as local extinction of species, the value that sites can have for both cultural and other ecosystem services may help to foster support for conservation initiatives. To date the level of use of the sacred natural sites (SNS) in Kilifi District has not been comprehensively analysed, despite its potential role in both the continued protection of some sites and possible damage to others. The current management plan assumes that the communities surrounding the sites adhere to the customary practices and laws associated with using the sites; however, research suggests that the level of adherence to traditional customs and laws is limited (Chapter 5.4.5) and therefore the efficacy of management practices is brought into question. This study aimed to investigate the current use of the sites, which may give an indication of the importance of the sites to the local populations, as well as to investigate if the trends in the different uses of the sites are associated with traditional practices. The results show that not all people use the SNS, those who do, do so in accordance with expected trends associated with location and ethnicity; however, use of the sites is infrequent. While most of those who visit the sites indicate that it is for rituals and ceremonies, the reduction of use indicates a shift away from traditional practices by the majority. As the current management practices are based solely on traditional values and practices, these results bring their efficacy and longevity into question. Management plans need to account for both the sanctity of the sites and their cultural importance, yet be redesigned to incorporate the observed changes in the behaviour towards, and use of, the sites.

6.2.1 Introduction

As shown in chapter 4.4.7, many of the respondents in this study believe in traditional belief systems, but hold multiple beliefs and display a mix of attitudes and values towards traditional culture and sacred natural sites (SNS) (including the Kayas). Attitudes and values, while important indicators, can differ from actual behaviour (Kühl et al., 2009), and this was shown to be the case for the communities living around the Mijikenda SNS in Chapter five. Therefore, as outlined by St John et al. (2010) when seeking to understand behaviours

associated with areas of interest for conservation, direct questions are important. I therefore sought to investigate: (i) if local people still see themselves as users of the Kayas and sacred sites (SS)? (ii) if so which sites? and (iii) how often and when do they say they use them?

This chapter focuses on whether or not individuals identify themselves as 'users' of the Kayas and SS. This will help to further investigate how people view, understand, and report their own interactions with the SNS. The definition of use was not specified to allow individuals to use their own understanding of what 'using' the Kayas and SNS meant to them. The findings from this chapter are used to look at any consistencies and contradictions in people's perceptions and actions associated with the SNS when investigating the 'use' of resources from the Kayas in Chapter Seven.

The use of SNS can have both positive and negative effects on habitats and their biodiversity. Use of sites can result in the degradation of habitats, disturbance, increase in invasive species, and shifts in ecosystem functions; all of which contribute to the local extinction of plants and animals (Mauchamp, 1997; Brandon et al., 1998; Woodroffe & Ginsberg, 1998; Matiku, 2003; Wright, 2003; Crowl et al., 2008; Hoddle, 2014). However, if people use the sites, it is more likely that they will value them, thereby facilitating support for conservation programmes (Kellert, 1996; Chawala, 1998; Jepson and Canney, 2003; Turvey et al., 2010). However, the ways in which the sites are used needs to be monitored and accounted for in conservation planning so that it does not lead to further degradation of the sites.

The information from this survey will help to inform conservation management plans and interventions about which sites are under threat of degradation due to use and/or abandonment (which could result in over-exploitation or conversion), and which areas may have populations who will support conservation of the sites for their value to the communities. Understanding who uses the sites, when, as well as what level of pressure the local people are putting on the natural environment will allow for more informed approaches to conservation. In addition by adapting management practices to address current local values towards, and use of, the sites, it will enable more effective and sustainable conservation which is likely to have greater levels of support from local communities.

6.2.2 Research Question

Main research question: Is there a difference across demographic groups as to which individuals perceive themselves as 'users' of the SNS (and does this differ from what would be expected traditionally)? If so when do they claim to use the sites, and how might this impact the conservation of the sites?

Null Hypothesis: There is no difference across the demographic groups as to which individuals perceive themselves as 'users' of the SNS – all individuals claim to use the sites as would be expected in traditional customs and it is not likely to have any impact on the conservation of the SNS

Sub Questions

1. Who identifies themselves as a Kaya user? Is there a difference across demographic groups?

Null Hypothesis: There is no difference in which individuals identify as using the Kayas – everyone does in accordance to traditional customs

2. Do people claim to use different Kayas? If so are there differences across various demographic groups?

Null hypothesis: Thre is no difference as to which Kayas people claim to use

3. Is there any difference in how often people visit the Kayas across demographic groups or compared to traditional customs?

Null Hypothesis: There is no difference in how often people visit the Kayas across the different demographic groups, or in comparison to traditional customs

4. Is there any difference in when people visit the Kayas across demographic groups?

Null Hypothesis: There is no difference in when people visit the Kayas across the different demographic groups

5. Who claims to use other SNS? Are there differences across demographic groups?

Null Hypothesis: There is no difference in which individuals identify as using other SNS – everyone does in accordance to traditional customs

6. Is there any difference in how often people visit other SNS across demographic groups or compared to traditional customs?

Null Hypothesis: There is no difference in how often people visit other SNS across the different demographic groups, or in comparison to traditional customs

7. Is there any difference in when people visit other SNS across demographic groups?
Null Hypothesis: There is no difference in when people visit other SNS across the different demographic groups

8. Are the differences amongst those who do/do not claim to use the Kayas and/or other SNS likely to have an impact on the conservation of these sites? Are differences in when people state they use the sites likely to impact their conservation?
Null Hypothesis: If differences occur in if people identify as using the Kayas and other SNS, and when they do so, it is not likel to have an impact on the conservation of these sites

6.3 Methods

The data in this chapter were collected using questionnaires (Appendix 1) in face-to-face interviews in accordance with the methodology outlined in Chapter 2.5.1. As highlighted in Chapter 2.5.1 the survey was collected in a random stratified manner, seeking to obtain equal proportions of male and female respondents from a range of age groups. Data were input into Access (2010, Microsoft) the database was then formatted in Excel (2010, Microsoft) before being analysed in SPSS (version 21, IBM) as outlined in Chapter 2.7.1. The data were analysed individually and in relation to one-another using a range of descriptive statistics including histograms, percentages, chi-square and post hoc tests as outlined in chapter 2.7.1.1. In addition binary logistic regression was used to investigate relationships further as described in Chapter 2.7.1.2.

Variables
Use of Kayas– Do respondents think of themselves as users of the Kayas? Repondents were asked if they use the Kayas
Which Kayas Use – If respondents stated they use the Kayas they were asked which one they use
How often visit Kayas – Repondents were asked to note how often they use the Kays in accordance to a list of frequency options decided upon by local invigilators and CFCU staff that would make sense to the local communities

When Visit Kayas – Respondents were asked at what time of year they use the Kayas in accordance to different seasons (identified by CFCU staff as outlined in Chapter 2.5.1)

Use of other SNS – Do respondents think of themselves as users of other SNS? Repondents were asked if they use other SNS

How often visit other SNS – Repondents were asked to note how often they use the other SNS in accordance to a list of frequency options decided upon by local invigilators and CFCU staff that would make sense to the local communities

When visit other SNS – Respondents were asked at what time of year they use the other SNS in accordance to different seasons (identified by CFCU staff as outlined in Chapter 2.5.1)

The responses to the above independent variables were tested across the following dependent variables:

Gender

Age – Grouped into five categories (as outlined in Chapter 2.7.1 and 4.3)

Ethnicity – Grouped into seven northern Mijikenda tribes, other Mijikenda tribes (Digo and Duruma0, or 'other' (non-Mijikenda tribes)

Religion –Self identified and grouped accordingly (traditional faith noted as 'Pagan'in the analysis and discussion)

Marital Status – 'Single', 'Married' 'Divorces/Separated', or 'Widowed'

Ethnicity of Parents – Respondents were asked if both parents were Mijikenda, and if not were asked to specify which ethnicity parents were

Spatial Variation – To investigate responses at different spatial scales Location (finest scale), Division (medium spatial scale), and sub-district (largest spatial scale) were used.

Belonging to a Kaya – Comparrison between those who belong to a Kaya and those who do not.

Importance of cultural identity – Comparrisons made according to how important repondents felt their cultural identity was

Belief in traditional belief system – Comparrisons made according to whether or not respondents believe in the traditional belief system

6.4 Results

6.4.1 Use of Kayas

Figure 6.1 shows that while the majority of people do not use the Kayas (52.7%) almost half of the respondents do (47.3%). Binary Logistic Regression was conducted with the use of the

Kayas as the dependent variable and age, gender and importance of cultural identity (used as a continuous variable to account for ordinality) as the independent variables. The regression was run looking at the likelihood that individuals did not use the kayas. The test found that age, 'belonging to a Kaya', and 'importance of cultural identity' were all significant to the level of $p < 0.001$ (Table 6.1). The results for age showed that there was a negative relationship between an individual's age and the likelihood of them not using the kayas. When all other variables are held constant, for every unit increase in age a person was 2.2% less likely not to use the Kayas (therefore the older a person is the more likely they are to use the Kayas). There was also a negative relationship with belonging to a Kaya. Those that do belong to a Kaya were 70.2% less likely not to use the Kayas than those who do not belong to a Kaya. Importance of cultural identity was ranked on a scale of 1 – 5 with 1 being very important and 5 being not important at all. The results show that when all other variables were held constant with every unit increase (less likely to think that cultural identity is important), there was a 48.1% increase in the likelihood that an
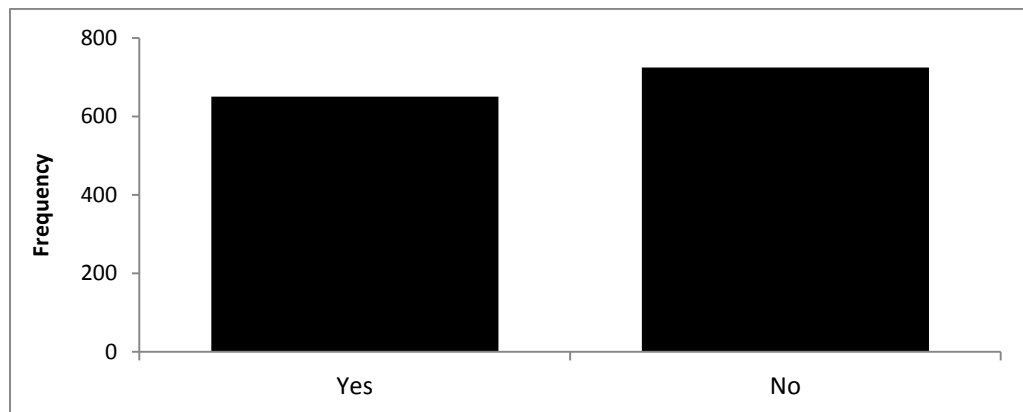
Figure 6.1: Do respondents use the Kayas

Table 6.1: Binary logistic regression output of if respondents use the Kayas

Legend: Dependent variable: Use of kayas; Reference category = Not using the Kaya. Independent Variables: Age, Gender and Importance of Cultural Identity. Coding: Gender: 1 = Male, 0 = Female. All independent variable(s) entered on step 1

	B	S.E.	Wald	df	Sig.	Exp(B)
Gender	-.144	.127	1.281	1	.258	.866
Age	-.023	.004	33.484	1	**.000**	.978
If they belong to a Kaya	-1.211	.243	24.866	1	**.000**	.298
Importance of Cultural Identity	.393	.041	90.604	1	**.000**	1.481
Constant	1.156	.318	13.261	1	**.000**	3.179

individual will not use the kayas. This shows that there was a positive relationship between cultural identity and their use of the kayas.

An equal split classification was found to give a 51.2% success rate at predicting if someone uses the Kayas. The model was found to be a good fit with classification verification which shows that the model had a greater level of accuracy than an equal split classification (accuracy of prediction increases by 17.8%), a Hosmer and Lemeshow test indicates that the data fits the model well, and Nagelkerke R Square shows that there was a moderate relationship between the independent and dependent variables (Model accuracy = 69.0%; Hosmer and Lemeshow: χ^2 = 14.5, p = 0.069, df = 8; Nagelkerke R^2 = 0.244).

Chi-square tests show there was a significant difference in whether or not people use the Kayas according to their gender, age, ethnicity, religion, their marital status, the sub-district and Division that they are from, if they belong to a Kaya, and the importance of their cultural identity (Table 6.2). In addition using split chi-square tests results show there were differences in the marital status when split by age, and differences across the age groups when separated by gender (Table 6.2).

Results indicate that men were more likely to use the Kayas than women. In addition, a post-hoc z-test with corrected p-values using a Bonferroni method (done for all z-tests in the analysis) shows (Table 6.3) that the differences across the age groups are not the same for both men and for women. Results from the chi-square analysis were in accordance with the binary regression showing that older people were more likely to use the Kayas

Table 6.2: Chi-square results for analysis of if people Use Kayas
Legend: [1] = χ^2 Monte Carlo Exact Test and Bootstrapped Cramer's V analysis conducted to account for violations in assumptions of the model

Variable	χ^2	Degrees of freedom (df)	p	Cramer's V
Gender	8.19	1	**0.004**	0.077
Age	98.3	4	**< 0.001**	0.272
Ethnicity	135.8	8	**< 0.001**	0.314
Religion	34.9	4	**< 0.001**	0.200
Marital Status	83.9	3	**< 0.001**	0.260
Sub-District	125.8	5	**< 0.001**	0.303
Division	104.2	3	**< 0.001**	0.275
Belong to Kayas	8.19	1	**0.004**	0.007
Importance of Cultural Identity	204.2	4	**< 0.001**	0.392
Age and male	67.6	4	**< 0.001**	0.320
Age and female	34.2	4	**< 0.001**	0.227
Marital status and 36 - 45	10.5	3	**0.015**	0.202

Table 6.3: Cross tabulation of use of Kayas with age split by gender

Legend: Sig = Significance. [*] Denotes that there is a significant difference between proportions on that row to the p = 0.05 level. Different letters denote proportions (based on observed count compared to expected count) that are significantly from each other. Where: a = Greatest proportion; b = significantly less than 'a' and significantly greater than 'c' etc.

			Age in Groups					
			17 - 25	26 - 35	36 - 45	46 - 55	56 +	Sig
Male	Do use kayas?	Yes	43_c	41_c	77_b	$63_{a, b,}$	112_a	*
		No	95_a	77_a	71_b	$40_{b, c}$	42_c	*
Female	Do use kayas?	Yes	46_b	54_b	75_a	$47_{a, b}$	64_a	*
		No	116_a	94_a	62_b	$59_{a, b}$	47_b	*

than younger individuals (Table 3.15 Appendix 3). When investigating age and gender together results show that for men, there was greater variation in the use of the Kayas across the age groups than there was for women. However, it was found that for both genders older individuals (those in the 56+ group) were more likely to use the Kayas than those in the younger age groups (17 - 25 and 26 – 35). The results also showed that a significantly greater proportion of married people than expected use the Kayas than those who are single (Table 6.4). According to a post-hoc z-test (Table 6.3), single respondents were proportionately less likely to use the Kayas than Married or Widowed respondents, and separated people were less likely to use the Kayas than widowed people. The post-hoc z-test conducted on a split chi-square investigating the difference in the use of Kayas based on marital status across age groups showed that there was a significant difference for in the 36 – 45 age group (Table 6.5), highlighting that a significantly greater proportion of married respondents than expected use the Kayas than single respondents.

A post-hoc z-test also indicated that Muslims were proportionately more likely to use the Kayas than Christians. For the ethnic groups the results showed (Table 6.6) that those who identify as Chonyi and Ribe were less likely to use the kayas than those in any of the other Northern Mijikenda tribes. Those in Ganze were more proportionately likely to use the Kayas than those in any other Division. Those in Kaloleni were more likely to use the Kayas than those in Chonyi or Kikambala. Those who belong to a Kaya were more likely to use the Kayas than those who were not. In addition it was found that people for whom cultural tradition is very important were proportionately more likely to use the Kayas than those who think is quite important, of little importance or of no importance at all (Table A3.16 appendix 3).

Table 6.4: Cross-tabulation of use of Kayas with marital status. For legend see Table 6.3

			Marital Status				
			Single	Married	Separated	Widowed	Sig
Do use kayas?	Yes	Count	91_c	$443_{a, b}$	$15_{b, c}$	48_a	*
	No	Count	238_a	$358_{b, c}$	$26_{a, b}$	24_c	*

Table 6.5: Cross-tabulation of Use of Kayas with marital status split by age group.
For legend see Table 6.3

			Marital Status				
			Single	Married	Separated	Widowed	Sig
17 - 25	Do use kayas?	Yes	57_a	26_a	2_a		NS
		No	156_a	38_a	2_a		NS
26 - 35	Do use kayas?	Yes	19_a	62_a	3_a	1_a	NS
		No	57_a	94_a	5_a	1_a	NS
36 - 45	Do use kayas?	Yes	6_b	123_a	$5_{a, b}$	$8_{a, b}$	*
		No	15_a	87_b	$10_{a, b}$	$4_{a, b}$	*
46 - 55	Do use kayas?	Yes	3_a	88_a	4_a	7_a	NS
		No	7_a	68_a	5_a	4_a	NS
56 +	Do use kayas?	Yes	3_a	127_a	1_a	29_a	NS
		No	2_a	61_a	2_a	15_a	NS

Table 6.6: Cross-tabulation of use of Kayas with ethnic group. For legend see Table 6.3

		Ethnic Group									
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	Sig
Use kayas	Yes	66_g	$157_{a, b, c, d, e, f}$	$53_{a, c, d}$	$83_{c, e}$	$108_{a, b}$	$139_{e, f}$	38_g	$5_{c, d, e, f, g}$	$2_{a, b, c, d, e, f, g}$	*
	No	195_a	$110_{b, c, d, e, f, g}$	$25_{d, e, g}$	$79_{c, e}$	$43_{f, g}$	$160_{b, c}$	90_a	$13_{a, b, c, d, e}$	$7_{a, b, c, d, e, f, g}$	*

6.4.2 Which Kaya Used

When investigating which Kayas respondents use, the one noted most frequently was Kaya Fungo, and second was Kaya Kauma (Figure 6.2). Chi square tests show that the Kaya a person uses was significantly different across the genders, age groups, ethnicities, locations, Divisions and which Kaya they belong to (Table 6. 7). A post-hoc z-test shows that a significantly greater proportion of men use Kaya Jibana than expected compared to women,
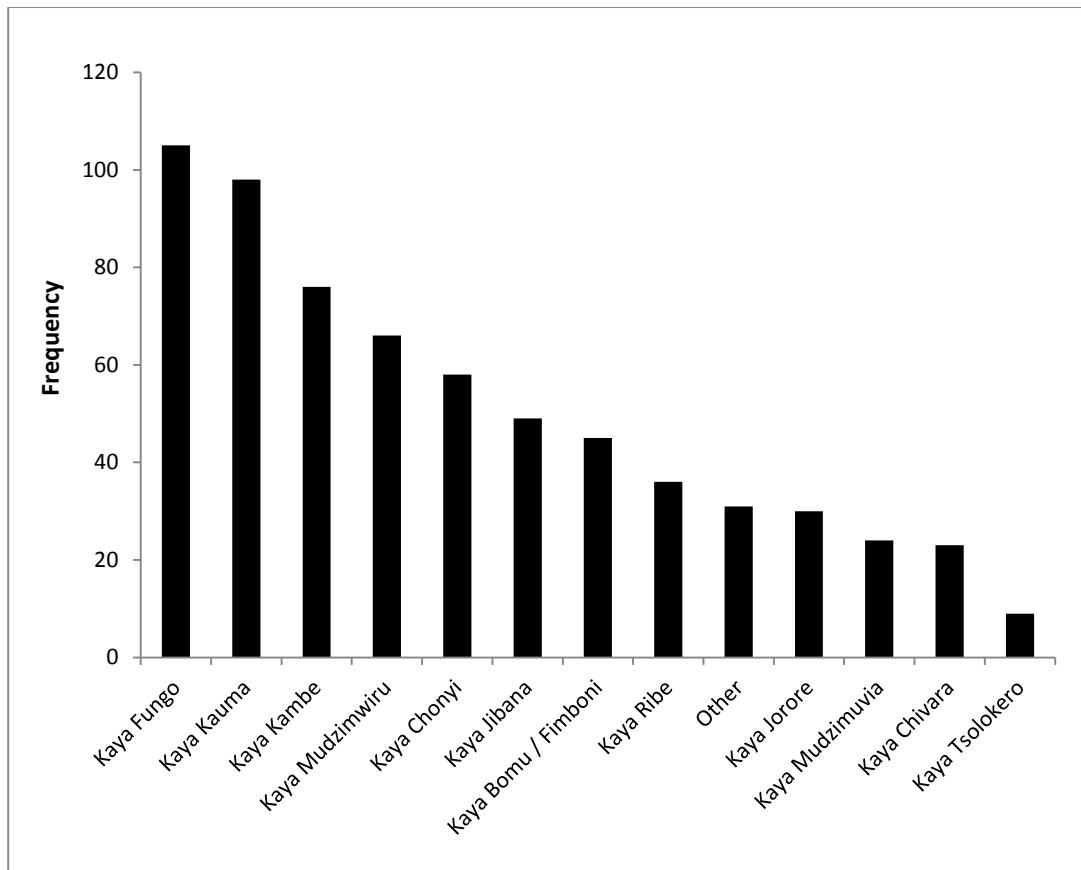
Figure 6.2: Kayas Used

whereas a significantly greater proportion of women use Kaya Mudzimwiru than expected compared to men (Table 6.8). Results also highlight that a significantly greater proportion of respondents in the 26 – 35 age group use Kaya Fungo than expected compared to those in the age groups 36 – 45 and 46 – 55 (Table 6.9). Whereas, a significantly greater proportion of respondents in the age group 46 – 55 then expected use Kaya Jorore than those in the age groups 56 +.

Post-hoc z-tests also showed that a significantly greater proportion of Chonyi respondents use Kaya Chonyi than expected compared to all other Mijikenda tribes (Table 6.10). However, a significantly greater proportion of Rabai respondents use Kaya Bomu/Fimboni and Kaya Mudzimwiru than those in all other northern Mijikenda tribes. All Kayas show that the Ethnic groups with the greatest proportions when investigating use were those that are traditionally associated with the Kayas in the local culture. Results show that a significantly lower proportion of those in Jibana, Kambe, Kaya Fungo, Mwarakaya and Rabai locations use Kaya Chivara than those in Chivara and Jaribuni locations, whereas a significantly greater

Table 6.7: Chi-square results for analysis of which Kaya people use
For legend see Table 6.2
[A] 24.6% of cells have expected counts are less than 5;
[B] 56.4% of cells have expected counts are less than 5, minimum expected count is 0.03
[C] 74.7% of cells have expected counts are less than 5, minimum expected count is 0.04
[D] 46.2% of cells have expected counts are less than 5, minimum expected count is 0.18
[E] 79.5% of cells have expected counts are less than 5, minimum expected count is 0.04

Variable	χ^2	df	p	Monte Carlo Exact 99% CI Upper bound	Lower bound	Cramer's V	Bootstrapped 99% CI Upper bound	Lower bound
Gender	24.9	12	**0.015**			0.196		
Age[1] [A]	85.5	48	**< 0.001**	< 0.001	< 0.001	0.185	0.187	0.275
Ethnicity[1] [B]	3280.4	96	**< 0.001**	< 0.001	< 0.001	0.795	0.772	0.871
Location[1] [C]	4758.4	156	**< 0.001**	< 0.001	< 0.001	0.782	0.757	0.812
Division[1] [D]	1600.0	36	**< 0.001**	< 0.001	< 0.001	0.907	0.832	0.976
Kaya Belong To	6268.5	168	**< 0.001**	< 0.001	< 0.001	0.901	0.877	0.927

Table 6.8: Cross-tabulation of which Kayas respondents use with gender
For legend see Table 6.3

		Gender Male	Female	Sig
Which Kaya Respondents Use	Kaya Chivara	13$_a$	10$_a$	NS
	Kaya Chonyi	36$_a$	22$_a$	NS
	Kaya Bomu/ Fimboni	24$_a$	20$_a$	NS
	Kaya Fungo	55$_a$	49$_a$	NS
	Kaya Jibana	39$_a$	10$_b$	*
	Kaya Jorore	15$_a$	14$_a$	NS
	Kaya Kambe	41$_a$	35$_a$	NS
	Kaya Kauma	44$_a$	54$_a$	NS
	Kaya Mudzimuvia	13$_a$	11$_a$	NS
	Kaya Mudzimwiru	27$_b$	39$_a$	*
	Kaya Ribe	22$_a$	14$_a$	NS
	Kaya Tsolokero	3$_a$	6$_a$	NS
	Other	15$_a$	15$_a$	NS

Table 6.9: Cross-tabulation of which Kayas respondents use with age
For legend see Table 6.3

		Age in Groups					Sig
		17 - 25	26 - 35	36 - 45	46 - 55	56 +	
	Kaya Chivara	6_a	3_a	3_a	0_a	10_a	NS
	Kaya Chonyi	5_a	7_a	13_a	13_a	19_a	NS
	Kaya Bomu/ Fimboni	9_a	5_a	14_a	9_a	6_a	NS
	Kaya Fungo	$15_{a,b}$	26_a	18_b	10_b	$35_{a,b}$	*
	Kaya Jibana	3_a	6_a	12_a	7_a	15_a	NS
	Kaya Jorore	$3_{a,b}$	$5_{a,b}$	$8_{a,b}$	9_a	2_b	*
Which Kaya	Kaya Kambe	6_a	8_a	26_a	13_a	22_a	NS
Respondents Use	Kaya Kauma	13_a	10_a	18_a	24_a	30_a	NS
	Kaya Mudzimuvia	7_a	8_a	$4_{a,b}$	0_b	$3_{a,b}$	*
	Kaya Mudzimwiru	9_a	11_a	11_a	10_a	19_a	NS
	Kaya Ribe	3_a	3_a	13_a	6_a	11_a	NS
	Kaya Tsolokero	2_a	2_a	2_a	1_a	2_a	NS
	Other	7_a	2_a	9_a	7_a	5_a	NS

Table 6.10: Cross-tabulation of which Kayas respondents use with ethnicity
For legend see Table 6.3

		Ethnic Group									Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
	Kaya Chivara	$1_{c,d,e}$	0_e	$0_{c,d,e}$	$4_{a,b,c,d,e}$	$16_{b,c}$	$0_{d,e}$	$0_{c,d,e}$	$2_{a,b}$	$0_{a,b,c,d,e}$	*
	Kaya Chonyi	56_a	0_c	0_c	0_c	0_c	0_c	0_c	$0_{b,c}$	$2_{a,b}$	*
	Kaya Bomu/ Fimboni	0_b	1_b	0_b	0_b	0_b	43_a	0_b	$0_{a,b}$	$0_{a,b}$	*
	Kaya Fungo	$1_{b,c}$	101_a	$1_{b,c,}$	0_e	0_c	1_c	$0_{b,c}$	$1_{a,b}$	$0_{a,b,c,}$	*
	Kaya Jibana	1_b	4_b	44_a	0_b	0_b	0_b	0_b	0_b	$0_{a,b}$	*
Which Kaya Respondents Use	Kaya Jorore	0_b	30_a	0_b	0_b	0_b	0_b	0_b	$0_{a,b}$	$0_{a,b}$	*
	Kaya Kambe	$1_{b,c,d,e}$	$3_{b,c,d,e}$	$2_{b,c,d,e}$	65_a	$1_{d,e}$	$1_{c,d}$	$2_{b,c,d,e}$	1_b	$0_{a,b,c,d,e}$	*
	Kaya Kauma	0_b	1_b	1_b	3_b	92_a	1_b	0_b	0_b	$0_{a,b}$	*
	Kaya Mudzimuvia	0_c	0_c	$0_{b,c}$	0_c	0_c	$22_{a,b}$	$1_{a,b,c}$	1_a	$0_{a,b,c}$	*
	Kaya Mudzimwiru	0_b	0_b	0_b	0_b	0_b	66_a	0_b	$0_{a,b}$	$0_{a,b}$	*
	Kaya Ribe	0_b	0_b	0_b	0_b	0_b	0_b	36_a	0_b	0_b	*
	Kaya Tsolokero	2_a	4_a	3_a	0_a	0_a	0_a	0_a	0_a	0_a	NS
	Other	3_a	17_a	1_a	5_a	3_a	2_a	0_a	0_a	0_a	NS

proportion of those in Chasimba and Mwarakaya locations use Kaya Chonyi than those in all other locations (Table A3.17, Appendix 3). There was a significant difference across the use of all the main Kayas based on the location, and in line with expectations, the locations that use the Kayas are typically those closest to the Kaya. A post-hoc Z-test showed that a significantly greater proportion of individuals in Ganze Division use Kaya Chivara than those in Kaloleni and Chonyi Divisions (Table 6.11). Whereas, a significantly greater proportion of those in Chonyi Division use Kaya Chonyi than those in any other Division. Those in Kaloleni Division use Kaya Fungo, Kaya Kambe, and Kaya Mudzimwiru more than those in Chonyi or Ganze Divisions. The results showed what was expected in that for all Kayas the respondents were significantly more likely to use the Kayas that they belong to than other Kayas (Kaya Rabai is another name for Kaya Bomu/Fimboni) (Table 6.12).

When investigating the relationships between the independent and dependent variables (using Cramer's V analysis) the results show that Division was the strongest predictor for the Kayas that respondents use. Location, ethnic group and which Kaya someone belongs to were also very strong predictors. The results therefore suggest that an individual's ethnicity, their affiliation to a Kaya and where they live had the strongest impact on which Kaya they use.

Table 6.11: Cross-tabulation of which Kayas respondents use with Division
For legend see Table 6.3

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
	Kaya Chivara	0_b	0_b	23_a	$0_{a, b}$	*
	Kaya Chonyi	0_b	57_a	0_b	0_b	*
	Kaya Bomu/ Fimboni	44_a	$0_{a, b}$	0_b	$0_{a, b}$	*
	Kaya Fungo	104_a	$0_{b, c}$	0_c	$1_{a, b}$	*
	Kaya Jibana	48_a	$0_{a, b}$	0_b	1_a	*
	Kaya Jorore	30_a	$0_{a, b}$	0_b	$0_{a, b}$	*
Which Kaya Respondents Use	Kaya Kambe	74_a	0_b	1_b	$1_{a, b}$	*
	Kaya Kauma	0_b	0_b	98_a	0_b	*
	Kaya Mudzimuvia	24_a	$0_{a, b}$	0_b	$0_{a, b}$	*
	Kaya Mudzimwiru	66_a	0_b	0_b	$0_{a, b}$	*
	Kaya Ribe	36_a	$0_{a, b}$	0_b	$0_{a, b}$	*
	Kaya Tsolokero	1_b	0_b	0_b	8_a	*
	Other	23_a	2_a	4_a	2_a	NS

Table 6.12: Cross-tabulation of which Kayas respondents use with the Kaya they belong to. For legend see Table 6.3

| | | Which Kaya Use | | | | | | | | | | | | | |
		Kaya Chivara	Kaya Chonyi	Kaya Bomu/ Fimboni	Kaya Fungo	Kaya Jibana	Kaya Jorore	Kaya Kambe	Kaya Kauma	Kaya Mudzimuvia	Kaya Mudzimwiru	Kaya Ribe	Kaya Tsolokero	Other	Sig
Kaya belong to	Rabai	$0_{a,b,c}$	0_c	11_a	$0_{b,c}$	$0_{b,c}$	$0_{a,b,c}$	$0_{b,c}$	$0_{b,c}$	$2_{a,b,c}$	$0_{b,c}$	$0_{a,b,c}$	$0_{a,b,c}$	$0_{a,b,c}$	*
	Chivara	21_a	0_b	0_b	0_b	0_b	0_b	0_b	2_b	0_b	0_b	0_b	0_b	1_b	*
	Chonyi	0_b	58_a	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	3_b	*
	Fimboni	0_b	0_b	28_a	0_b	0_b	0_b	0_b	0_b	0_b	1_b	0_b	0_b	1_b	*
	Fungo	$0_{b,c}$	0_c	0_c	103_a	0_c	0_c	0_c	0_c	0_c	0_c	0_c	$0_{b,c}$	12_b	*
	Jibana	0_b	0_b	0_b	0_b	48_a	0_b	0_b	0_b	0_b	0_b	0_b	0_b	1_b	*
	Tsolokero	0_b	0_b	0_b	0_b	1_b	0_b	0_b	0_b	0_b	0_b	0_b	9_a	0_b	*
	Jorore	0_b	0_b	0_b	0_b	0_b	26_a	0_b	0_b	0_b	0_b	0_b	0_b	2_b	*
	Kambe	$0_{b,c}$	$0_{b,c}$	$0_{b,c}$	0_c	$0_{b,c}$	$0_{b,c}$	75_a	0_c	$0_{b,c}$	$0_{b,c}$	$0_{b,c}$	$0_{b,c}$	5_b	*
	Kauma	0_b	0_b	0_b	0_b	0_b	0_b	0_b	92_a	0_b	0_b	0_b	0_b	1_b	*
	Mudzimwiru	0_b	0_b	2_b	0_b	0_b	0_b	0_b	0_b	0_b	55_a	0_b	0_b	0_b	*
	Ribe	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	36_a	0_b	0_b	*
	Mudzimuvia	0_b	0_b	1_b	0_b	0_b	0_b	0_b	0_b	19_a	2_b	0_b	0_b	0_b	*
	Other	0_a	0_a	0_a	0_a	0_a	0_a	0_a	1_a	0_a	0_a	0_a	0_a	2_a	NS
	None	1_a	0_a	2_a	2_a	0_a	4_a	0_a	2_a	3_a	7_a	0_a	0_a	2_a	NS

6.4.3 How often people visit the Kayas

Figure 6.3 shows that how often people use the Kayas varies, with the most common responses being a few times a year and only for ceremonies and rituals. Chi-square tests showed that there was no significant difference across the age groups, but there were significant differences in how often people visit the Kayas across genders, ethnicities, religions, locations and Divisions (Table 6.13). The results from a post-hoc z-test showed that a significantly greater proportion of men visit the Kayas every day than women (Table 14). In addition the results indicate that a significantly greater proportion of Jibana respondents visit the Kayas every day than expected compared to Chonyi, Kauma and Rabai. Results also highlight that that a significantly greater proportion of Kauma respondents than expected visit the Kayas for just rituals and ceremonies than expected compared to Giriama, Jibana, Kambe and Rabai, whilst significantly more Jibana visit the Kayas a few times a year and for ceremonies than Chonyi, Kambe, Kauma and Rabai (Table 5.14).
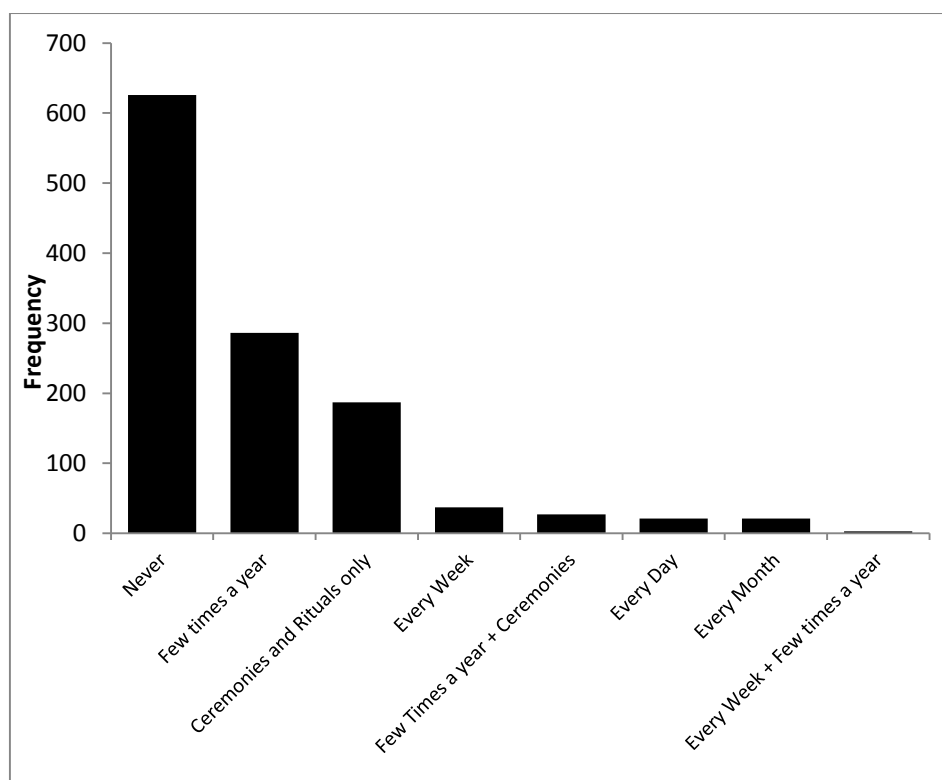
Figure 6.3: Frequency of use of Kayas

Table 6.13: Chi-square results for analysis of how regularly people visit the Kayas
For legend see Table 6.2
[A] 25.0% of cells have expected counts are less than 5, minimum expected count 0.42
[B] 70.8% of cells have expected counts are less than 5, minimum expected count 0.01
[C] 57.1% of cells have expected counts are less than 5, minimum expected count 0.06
[D] 78.0% of cells have expected counts are less than 5, minimum expected count 0.01
[E] 65.6% of cells have expected counts are less than 5, minimum expected count 0.02

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender[1] [A]	18.3	7	**0.006**	0.004	0.008	0.178	0.122	0.280
Age	30.5	28	0.340					
Ethnicity[1] [B]	155.0	56	**< 0.001**	< 0.001	< 0.001	0.195	0.173	0.270
Religion[1] [C]	40.4	18	**0.011**	0.008	0.013	0.209	0.132	0.361
Location[1] [D]	367.3	91	**< 0.001**	< 0.001	< 0.001	0.301	0.264	0.392
Division[1] [E]	73.8	21	**0.016**	0.012	0.019	0.356	0.167	0.285

A post hoc z-test highlights (Table 6.15) that significantly fewer respondents in Mwarakaya (Chonyi) and Rabai locations visit the Kayas every day than those in Jibana and Kaya Fungo locations. A significantly greater proportion of respondents in Chasimba location visit the Kayas only a few times a year than those in Chivara, Jaribuni, Junju, Kauma, Kaya Fungo,

Table 6.14: Cross-tabulation of how often respondents visit Kayas with gender
For legend see Table 6.3

		Gender		Sig
		Male	Female	
How often visit Kaya?	Every Day	19_a	2_b	*
	Every Week	26_a	11_a	NS
	Every Month	10_a	10_a	NS
	Few Times a Year	162_a	123_a	NS
	Ceremonies and Rituals	107_a	80_a	NS
	Every Week + Few Times Year	3_a	0_a	NS
	Few Times Year + Ceremonies	11_a	16_a	NS
	Few Times Year + Never	1_a	0_a	NS

Table 6.15: Cross-tabulation of how often respondents visit Kayas with ethnicity
For legend see Table 6.3

		Ethnic Group									Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
How often visit Kaya?	Every Day	0_b	$11_{a,b}$	7_a	$1_{a,b}$	0_b	1_b	$1_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	Every Week	$5_{a,b}$	6_b	$2_{a,b}$	11_a	$4_{a,b}$	$9_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	Every Month	5_a	8_a	1_a	2_a	0_a	3_a	1_a	0_a	0_a	NS
	Few Times a Year	52_a	64_a	17_a	32_a	21_a	72_a	24_a	2_a	2_a	NS
	Ceremonies and Rituals	$39_{a,b}$	45_b	6_b	16_b	32_a	36_b	$13_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	Every Week + Few Times Year	0_a	0_a	0_a	3_a	0_a	0_a	0_a	0_a	0_a	NS
	Few Times Year + Ceremonies	1_b	$16_{a,b}$	7_a	0_b	0_b	3_b	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	Few Times Year + Never	0_a	0_a	0_a	0_a	1_a	0_a	0_a	0_a	0_a	NS

Mwarakaya (Chonyi) and Tsangatsini locations. Significantly greater proportion of respondents in Chivara stated that they visit the Kayas for just ceremonies and rituals than those in Chasimba, Mwanamwinga and Mwarakaya (Chonyi) locations. In addition, significantly fewer in Kambe, Mwarakaya (Chonyi) and Rabai location stated that they visit the locations a few times a year and for ceremonies than those in Jibana and Tsangatsini (Table A3.18 Appendix 3). Results also indicated that a greater proportion of respondents in Kikambala stated that they visit the Kayas every month than expected compared to those

in Kaloleni or Ganze Divisions (Table 6.16). Whereas, a greater proportion of respondents in Ganze Division stated that they visit the Kayas only for 'rituals and ceremonies' as well as 'every week and a few times a year', than expected compared to those in Kaloleni Division. A post-hoc z-test shows (Table 6.17) that a significantly fewer Christians than expected stated that they visit the Kayas every week and a few times a year than expected compared to those with no religion, and a significantly fewer Christians than expected visit the Kayas a few times a year and for ceremonies than Muslims.

Table 6.16: Cross-tabulation of how often respondents visit Kayas with Division
For legend see Table 6.3

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
How often visit Kaya?	Every Day	21_a	0_a	0_a	0_a	NS
	Every Week	27_a	4_a	4_a	2_a	NS
	Every Month	14_b	$4_{a, b}$	0_b	2_a	*
	Few Times a Year	214_a	$48_{a, b}$	21_b	$2_{a, b}$	*
	Ceremonies and Rituals	110_b	$37_{a, b}$	37_a	$3_{a, b}$	*
	Every Week + Few Times Year	1_b	$0_{a, b}$	2_a	$0_{a, b}$	*
	Few Times Year + Ceremonies	26_a	1_a	0_a	0_a	NS
	Few Times Year + Never	0_a	0_a	1_a	0_a	NS

Table 6.17: Cross-tabulation of how often respondents visit Kayas with religion
For legend see Table 6.3

		Religion				Sig
		Christian	Muslim	Pagan	None	
How often visit Kaya?	Every Day	3_a	1_a	0_a	1_a	NS
	Every Week	12_a	7_a	1_a	1_a	NS
	Every Month	6_a	3_a	1_a	2_a	NS
	Few Times a Year	93_a	50_a	10_a	8_a	NS
	Ceremonies and Rituals	56_a	27_a	7_a	4_a	NS
	Every Week + Few Times Year	0_b	$0_{a, b}$	$0_{a, b}$	1_a	*
	Few Times Year + Ceremonies	2_b	11_a	$0_{a, b}$	$0_{a, b}$	*

6.4.4 When Respondents Visit Kayas

The time at which respondents visit the Kaya varies both according to the time of day and the time of year (Figure 6.4). Respondents stated that they visit the Kayas most often in the morning and between December - April. Chi-square tests were used to investigate the
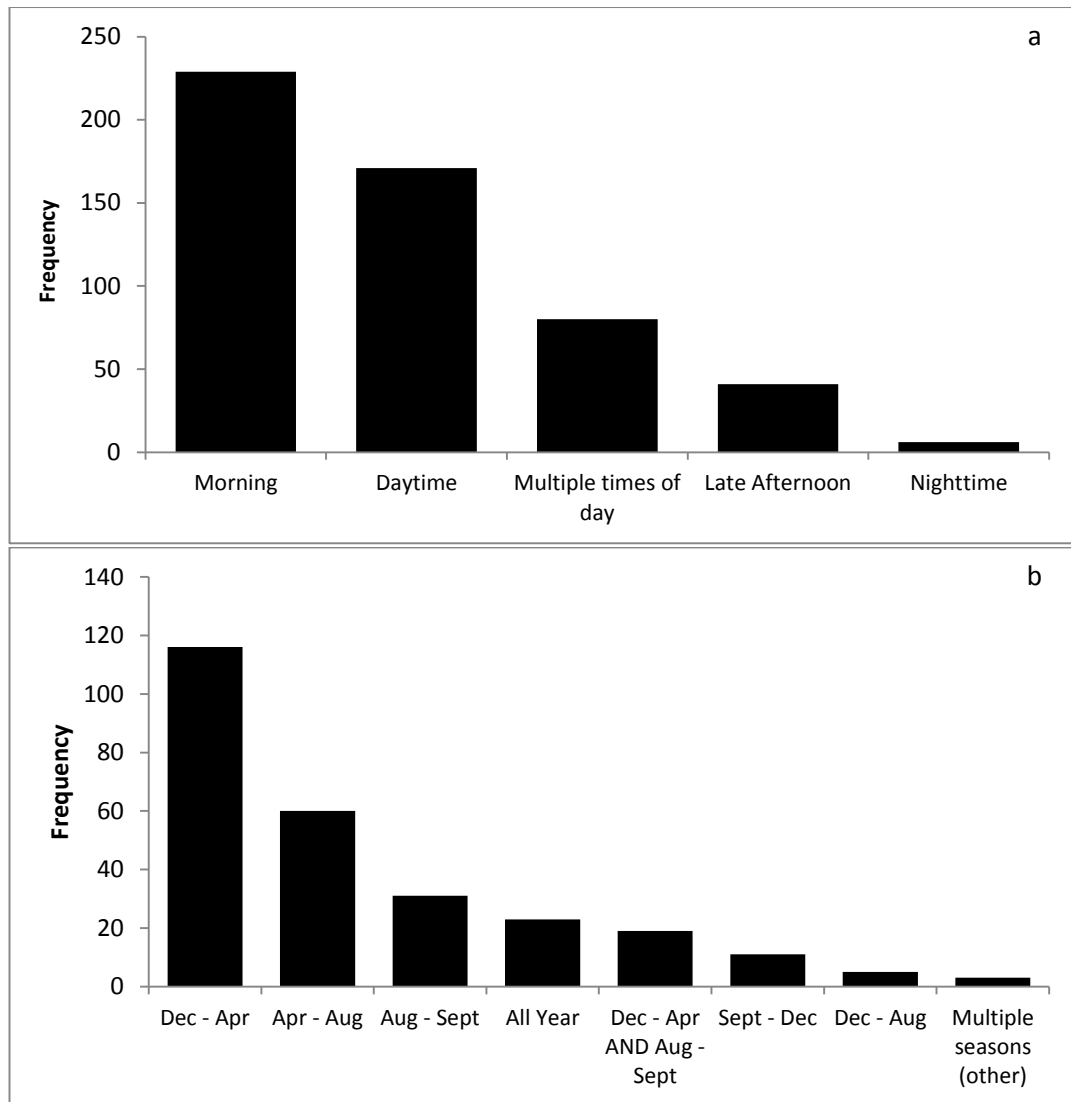
Figure 6.4: When the Kayas are used a) Time of day, b) Time of year
Legend: Histograms of frequency of response for each option. Respondents were
allowed to select more than one option, and combined answers are given in figure.

differences in the time of day that people visit the Kayas. Results show that there were
significant differences across the genders, age groups, ethnicities, religions and Divisions
(Table 6.18). Results also show that there were significant differences when people visit the
Kayas in the year across the ethnicities, religions and Divisions. However, there was no
significant difference between the genders, age groups or religions (Table 6.19).

A post-hoc z-test shows that a greater proportion of men than expected visit the Kayas in the
morning compared to women, whereas a greater proportion of women than expected visit
the Kayas in the daytime (Table 6.20). In addition a greater proportion of respondents in the
$17-25$ and $26-35$ age groups stated that they visit the Kayas in the daytime/early afternoon

Table 6.18: Chi-square results for analysis of when visit Kayas in the day
For legend see Table 6.2
[A] 46.7 % of cells have expected counts are less than 5, minimum expected count 0.01
[B] 40.0 % of cells have expected counts are less than 5, minimum expected count 0.17
[C] 45.0 % of cells have expected counts are less than 5, minimum expected count 0.10

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	10.4	4	**0.034**			0.141		
Age	28.4	16	**0.029**			0.118		
Ethnicity[1] [A]	186.0	32	**< 0.001**	< 0.001	< 0.001	0.297	0.258	0.358
Religion[1] [B]	58.3	12	**< 0.001**	< 0.001	< 0.001	0.262	0.198	0.370
Division[1] [C]	77.7	12	**< 0.001**	< 0.001	< 0.001	0.222	0.160	0.360

Table 6. 19: Chi-square results for analysis of when visit Kayas in the year
For legend see Table 6.2
[A] 80.0 % of cells have expected counts are less than 5, minimum expected count 0.02
[B] 65.6 % of cells have expected counts are less than 5, minimum expected count 0.07

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	9.86	7	**0.197**					
Age	38.7	28	0.087					
Ethnicity[1] [A]	148	42	**< 0.001**	< 0.001	< 0.001	0.303	0.258	0.344
Religion	32.1	21	0.057					
Division[1] [B]	69.7	21	**0.002**	0.001	0.003	0.294	0.239	0.413

Table 6.20: Cross-tabulation of what time of day respondents visit Kayas with gender
For legend see Table 6.3

		Gender		Sig
		Male	Female	
What time of the day use Kayas	Morning	146$_a$	82$_b$	*
	Daytime/ Early Afternoon	85$_b$	85$_a$	*
	Late Afternoon / Early Evening	23$_a$	18$_a$	NS
	Night-time	2$_a$	4$_a$	NS
	Multiple times of the day	41$_a$	39$_a$	NS

than those in the 56+ age group (Table 6.21). Results also show that a significantly greater proportion of Kambe respondents visit the Kayas in the morning compared to all other Mijikendas, whereas a significantly greater proportion of Kauma and Ribe stated that they

Table 6.21: Cross-tabulation of what time of day respondents visit Kayas with age
For legend see Table 6.3

		Age in Groups					Sig
		17 - 25	26 - 35	36 - 45	46 - 55	56 +	
What time of the day use Kayas	Morning	29_a	27_a	49_a	49_a	70_a	NS
	Daytime/ Early Afternoon	31_a	34_a	$44_{a, b}$	$28_{a, b}$	28_b	*
	Late Afternoon / Early Evening	6_a	6_a	14_a	6_a	7_a	NS
	Night-time	1_a	1_a	1_a	1_a	2_a	NS
	Multiple times of the day	9_a	15_a	14_a	8_a	28_a	NS

visit the Kayas in the daytime/early evening compared to Chonyi, Giriama, Jibana and Kambe respondents. Whereas, a greater proportion of Chonyi visit the Kayas in the later afternoon than the Giriama Jibana, Kambe and Kauma, whereas greater proportions of Giriama and Jibana stated that they visit the Kayas at multiple times of the day than the Chonyi and Kambe (Table 6.22). When investigating the time of year that the different ethnicities use the Kayas, the results show that a significantly greater proportion of Kambe respondents visit the Kayas during December – April than the Chonyi, Giriama, Rabai and Ribe (Table 6.23). A significantly greater proportion of Chonyi visit the Kayas April – August than the Giriama, Kambe or Rabai, whereas a greater proportion of Giriama stated that they visit the Kayas during both seasons December – April and August –September than the Chonyi or Rabai. Significantly fewer Chonyi respondents said they visit the Kaya at all times of the year compared to all other ethnic groups (no Chonyi respondents gave this answer).

Post-hoc z-tests also show that a significantly greater proportion of Muslims stated that they visit the Kayas in the daytime/early afternoon compared to Christians. A greater proportion of Pagans visit the Kayas in the late afternoon / early evening than Christians, and a greater proportion of Pagans and Muslims stated that they visit the Kayas at multiple times of the day than Christians (Table 6.24). In addition, results show (Table 25) that a significantly greater proportion of those in Ganze stated that they visit the Kayas during the Daytime/early afternoon than those in Kaloleni or Chonyi Divisions, whereas a significantly greater proportion of those in Chonyi Division visit the Kayas in the late afternoon/early evening than those in Kaloleni and Ganze. Significantly fewer of those in Kaloleni visit the

Table 6.22: Cross-tabulation of what time of day respondents visit Kayas with ethnic group. For legend see Table 6.3

		Ethnic Group									Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
What time of the day use Kayas	Morning	35_b	54_b	20_b	54_a	20_b	32_b	13_b	0_b	$1_{a,b}$	*
	Daytime/ Early Afternoon	$22_{b,c,d,e,f,g}$	$48_{c,d}$	$2_{d,e,f}$	$5_{f,g}$	29_a	$41_{a,b,c}$	22_a	$2_{a,b,c}$	$0_{a,b,c,d,e,f,g}$	*
	Late Afternoon / Early Evening	20_a	9_b	$1_{a,b}$	0_b	0_b	$10_{a,b}$	$1_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	night-time	2_a	4_a	0_a	0_a	0_a	0_a	0_a	0_a	0_a	NS
	Multiple times of the day	3_c	40_a	13_a	0_c	$1_{a,b}$	$23_{b,c}$	$0_{a,b}$	$0_{a,b,c}$	$0_{a,b,c}$	*

Table 6.23: Cross-tabulation of what time of year respondents visit Kayas with ethnic group. For legend see Table 6.3

		Ethnic Group							Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	
When use during the year	Dec - April	$23_{c,d}$	26_d	$2_{b,c,d}$	15_a	$16_{a,b}$	$29_{b,c}$	$5_{b,c,d}$	*
	Apr - Aug	31_a	20_b	$1_{a,b}$	0_b	$1_{a,b}$	5_b	$2_{a,b}$	*
	Aug - Sept	8_a	17_a	1_a	0_a	0_a	5_a	0_a	NS
	Sept - Dec	4_a	5_a	0_a	0_a	0_a	2_a	0_a	NS
	Dec - Aug	2_a	0_a	0_a	0_a	0_a	3_a	0_a	NS
	Dec - April and Aug - Sept	0_b	19_a	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	0_b	$0_{a,b}$	*
	Multiple seasons (other)	$0_{b,c}$	0_c	1_a	$0_{a,b,c}$	$0_{a,b,c}$	$1_{a,b,c}$	$1_{a,b}$	*
	All year	0_b	13_a	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	8_a	2_a	*

Table 6.24 Cross-tabulation of what time of year respondents visit Kayas with religion
For legend see Table 6.3

		Religion				Sig
		Christian	Muslim	Pagan	None	
What time of the day use Kayas	Morning	64_a	35_a	4_a	10_a	NS
	Daytime/ Early Afternoon	72_a	20_b	$4_{a,b}$	$4_{a,b}$	*
	Late Afternoon / Early Evening	15_b	$9_{a,b}$	6_a	$1_{a,b}$	*
	Night-time	3_a	0_a	0_a	0_a	NS
	Multiple times of the day	5_b	27_a	4_a	$1_{a,b}$	*

Table 6.25: Cross-tabulation of what time of day respondents visit Kayas with Division
For legend see Table 6.3

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
What time of the day use Kayas	Morning	170_a	33_a	24_a	2_a	NS
	Daytime/ Early Afternoon	116_b	20_b	31_a	$4_{a,\,b}$	*
	Late Afternoon / Early Evening	$19_{b,\,c}$	19_a	1_c	$2_{a,\,b}$	*
	Night-time	4_b	$1_{a,\,b}$	$0_{a,\,b}$	1_a	*
	Multiple times of the day	76_a	3_b	1_b	$0_{a,\,b}$	*

Table 6.26: Cross-tabulation of what time of year respondents visit Kayas with Division
For legend see Table 6.3

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
When use during the year	Dec - April	75_b	22_b	17_a	2_b	*
	Apr - Aug	29_b	30_a	1_b	$0_{a,\,b}$	*
	Aug - Sept	20_b	$7_{a,\,b}$	$1_{a,\,b}$	3_a	*
	Sept - Dec	7_a	3_a	0_a	1_a	NS
	Dec - Aug	4_a	1_a	0_a	0_a	NS
	Dec - April and Aug - Sept	19_a	0_b	$0_{a,\,b}$	$0_{a,\,b}$	*
	Multiple seasons (other)	3_a	0_a	0_a	0_a	NS
	All year	23_b	0_a	$0_{a,\,b}$	$0_{a,\,b}$	*

Kayas at night-time than those in all other Divisions, whereas a greater proportion of those in Kaloleni use the Kayas at multiple times of the day compared to those in Chonyi or Ganze. When analysing the time of year that people visit the Kayas the results indicate that a significantly greater proportion of those in Ganze Division use the Kayas in December – April than those in any other Division (Table26), whereas a greater proportion of those in Chonyi Division visit the Kayas in April – August than those in Kaloleni or Ganze. A greater proportion of those in Kikambala stated that they visit the Kayas in August – September than those in Kaloleni Division whereas a greater proportion of those in Kaloleni use the Kayas in both December – April and August – September. In addition a significantly greater proportion of those in Chonyi Division stated that they visit the Kayas all year round than those in Kaloleni Division.

6.4.5 Use of other sacred sites

When investigating the use of sacred natural sites (SNS) other than the Kayas (such as sacred groves (SG) and rocky outcrops) it was found that a much greater proportion of respondents said that they did not use other sacred sites (Figure 6.5). The use of other SNS was analysed using Chi-square tests. Results show that there were significant differences in whether or not a respondent uses other SNS according to their gender, age, ethnicity, religion and Division, and if a respondent uses the Kayas (Table 6.27). Analysis via a post-hoc z-test showed that a significantly greater proportion of men stated that they use other SNS than women (Table 6.28). In addition, a significantly greater proportion of respondents in the 36 − 45, 46 − 55 and 56 + age groups than expected use the SNS compared to those in the 17 − 25 and 26 − 35 age groups (Table 6.29). The results also indicate that a greater proportion of Jibana respondents use other SNS than any of the other northern Mijikenda tribes (Table 30). Post-hoc z-tests also highlight that a greater proportion of Pagans and those with no religion use other SNS than Christians and Muslims (Table 6.31) and that a significantly fewer respondents from Kikambala Division than expected use other SNS than those in all other Divisions (Table 32). In addition, the results indicate that a significantly greater proportion of people who use the Kayas use other SNS also (Table 33).
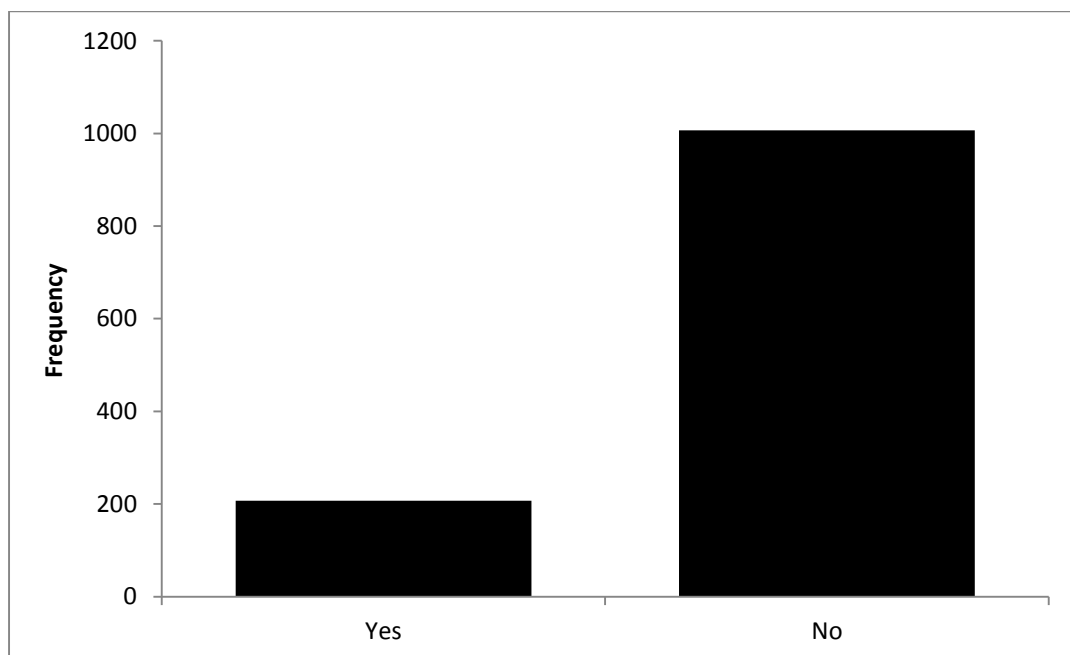
Figure 6.5: Do respondents use other sacred sites

Table 6.27: Chi-square results for analysis of use of other sacred sites
For legend see Table 6.3

Variable	χ^2	df	p	Cramer's V
Gender	9.29	1	0.002	0.088
Age	47.8	4	< 0.001	0.201
Ethnicity	113.7	8	< 0.001	0.306
Religion	58.8	3	< 0.001	0.281
Division	11.0	3	0.012	0.095
Use of Kayas	87.5	1	< 0.001	0.271

Table 6.28: Cross-tabulation whether respondents use other sacred sites with gender
For legend see Table 6.3

		Gender		Sig
		Male	Female	
Use any other SS	Yes	125_a	82_b	*
	No	488_b	513_a	*

Table 6.29: Cross-tabulation If respondents use other sacred sites with age group
For legend see Table 6.3

		Age in Groups					Sig
		17 - 25	26 - 35	36 - 45	46 - 55	56 +	
Use any other SS	Yes	20_b	25_b	53_a	39_a	65_a	*
	No	250_a	208_a	209_b	141_b	169_b	*

Table 6.30: Cross-tabulation If respondents use other sacred sites with ethnicity
For legend see Table 6.3

		Ethnic Group									Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
Use any other SS	Yes	$41_{b, c}$	59_b	36_a	$23_{b, c}$	$25_{b, c}$	13_d	$6_{c, d}$	$2_{a, b, c, d}$	$1_{a, b, c, d}$	*
	No	$198_{b, c}$	179_c	30_d	$113_{b, c}$	$119_{b, c}$	246_a	$108_{a, b}$	$8_{a, b, c, d}$	$4_{a, b, c, d}$	*

Table 6.31: Cross-tabulation of if respondents use other sacred sites with religion
For legend see Table 6.3

		Religion				Sig
		Christian	Muslim	Pagan	None	
Use any other SS	Yes	54$_b$	25$_b$	12$_a$	11$_a$	*
	No	446$_a$	170$_a$	6$_b$	20$_b$	*

Table 6.32: Cross-tabulation of if Respondents use other sacred sites with Division
For legend see Table 6.3

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
Use any other SS?	Yes	136$_a$	42$_a$	27$_a$	1$_b$	*
	No	653$_b$	161$_b$	137$_b$	54$_a$	*

Table 6.33: Cross-tabulation whether respondents use other sacred sites with if they use Kayas. For legend see Table 6.3

		Do use kayas?		Sig
		Yes	No	
Use any other SS	Yes	162$_a$	43$_b$	*
	No	427$_b$	563$_a$	*

6.4.6 How often use other sacred sites

The frequency at which respondents use other SNS varied (Figure 6.6). The most common frequency at which people use other SNS is a few times a year, or for particular rituals and ceremonies. Using Chi-square analysis, it was found that there was a significant difference in the frequency that respondents visit other SNS according to their gender, ethnicity and location, however there were no significant differences according to age and religion (Table 6.34).

A post-hoc z-tests shows (Table 6.35) that a greater proportion of men use the other SNS every day compared to women, whereas a significantly greater proportion of women stated that they use other SNS only a few times a year. Results also show that a significantly greater proportion of Jibana respondents stated that they use the other sacred sites every day than expected compared to the Chonyi, Giriama, Kambe, Kauma, and Rabai (Table 6.36). A
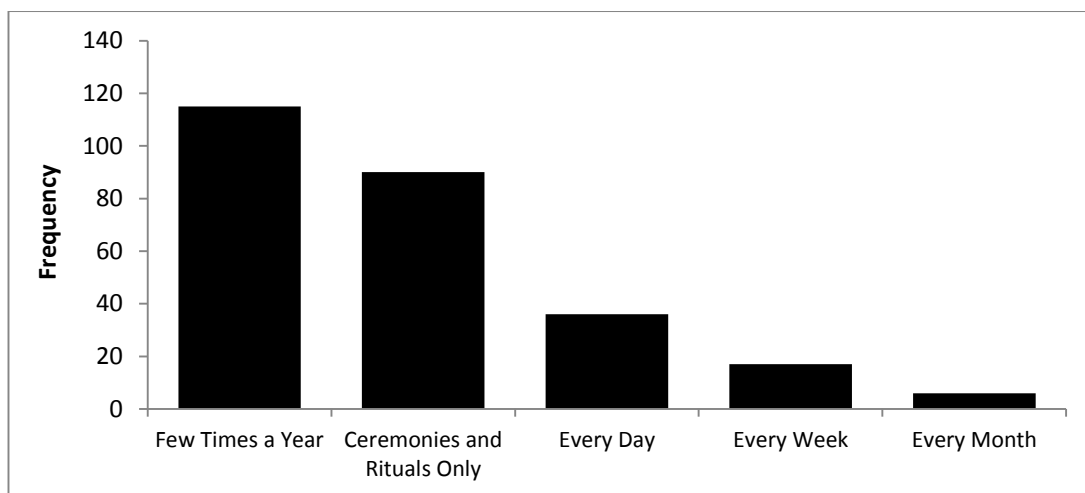
Figure 6.6: Frequency of use of other sacred sites (SS)

Table 6.34: Chi-square results for analysis of frequency of use of SS
For legend see Table 6.2
(A) 66.7 % of cells have expected counts are less than 5, minimum expected count 0.02
(B) 78.6 % of cells have expected counts are less than 5, minimum expected count 0.09

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	13.8	4	**0.008**			0.229		
Age	11.1	16	0.802					
Ethnicity[1] (A)	132.4	32	**< 0.001**	< 0.001	< 0.001	0.355	0.303	0.458
Religion	18.3	12	0.133					
Location[1] (B)	198.2	52	**< 0.001**	< 0.001	< 0.001	0.434	0.387	0.570

significantly greater proportion of Kambe respondents stated that they use the sites only a few times a year compared to the Jibana, whereas a significantly greater proportion of Rabai and Ribe respondents stated that they use the sites for rituals and ceremonies compared to the Jibana and Kambe. A post-hoc z-test investigating differences between the locations highlights that a significantly greater proportion of those in Jibana location stated that they use the SNS every day compared to those in Chasimba, Jaribuni, Kambe, Kauma, Kaya-Fungo, Mwarakaya, Rabai and Tsangatsini Locations, whereas a significantly greater proportion of those in Junju Location stated that they use the SNS every week compared to those in Mwarakaya (Table A3.19, Appendix 3). A significantly greater proportion of respondents in Chasimba location than expected use the sacred sites a few times a year, compared to those in Bedida, Jibana, Kaya Fungo, Mwarakaya, and Ribe locations. In addition, a significantly

Table 6.35: Cross-tabulation of how often respondents use other SS with gender
For legend see Table 6.3

		Gender		Sig
		Male	Female	
How often use SS	Every Day	28_a	7_b	*
	Every Week	13_a	4_a	NS
	Every Month	2_a	4_a	NS
	Few Times a Year	58_b	57_a	*
	Ceremonies and Rituals	55_a	35_a	NS

Table 6.36: Cross-tabulation of how often respondents use other SS with ethnicity.
For legend see Table 6.3

		Ethnic Group									Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
How often use SS	Every Day	4_b	7_b	23_a	0_b	1_b	0_b	$1_{a, b}$	$0_{a, b}$	$0_{a, b}$	*
	Every Week	2_a	5_a	2_a	3_a	4_a	1_a	0_a	0_a	0_a	NS
	Every Month	1_a	2_a	0_a	1_a	2_a	0_a	0_a	0_a	0_a	NS
	Few Times a Year	$33_{a, b, c}$	$36_{a, b, c}$	8_c	21_a	$7_{b, c}$	$6_{a, b, c}$	$1_{a, b, c}$	$1_{a, b, c}$	$1_{a, b, c}$	*
	Ceremonies and Rituals	$22_{a, b}$	$30_{a, b}$	2_c	$3_{b, c}$	$14_{a, b}$	13_a	5_a	$1_{a, b, c}$	$0_{a, b, c}$	*

greater proportion of those in Bedida stated they use the SNS only for rituals and ceremonies compared to those in Chasimba and Jibana locations.

6.4.7 When use other sacred sites

Results show that respondents use the other SNS at different times of the day and year (Figure 6.7). Most people stated that they use the sites in the morning and between December – April and April – August. Chi-square tests show that there was no significant difference in what time of day respondents use the SNS across the genders and age; however, there were significant differences according to ethnicity, religion, location and Division (Table 6.37). Results show that for the time of year that people use SNS there were no significant differences across the genders, age groups and religions. However, there were significant differences between the ethnicities, locations and Divisions (Table 6.38).
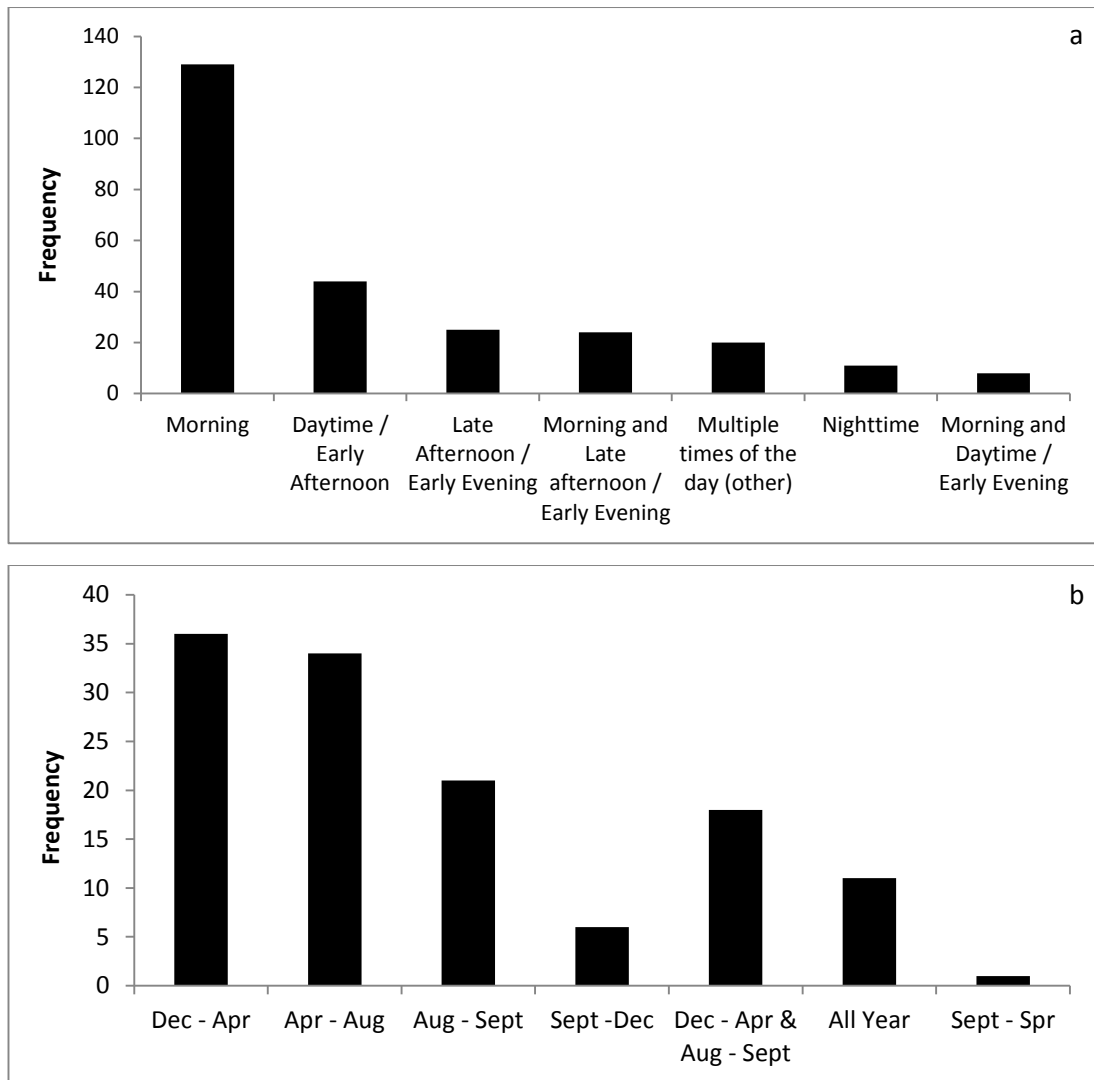
Figure 6.7: When other SS are used. a) Time of day, b) Time of year

The results also show that a significantly higher proportion of Kambe individuals stated that they use the SNS in the morning compared to the Giriama, Jibana, Kauma, or 'other Mijikenda' group (Table A3.20, Appendix 3). However, a significantly greater proportion of Giriama respondents stated that they use the Kayas in both the morning and late afternoon compared to the Chonyi. The results also show that a significantly greater proportion of Ribe use the SNS at multiples times of the day than the Chonyi, Kambe or Kauma.

Results from a post-hoc z-test show that a significantly greater proportion of Kambe and Kauma respondents use the SNS from December to April compared to the Chonyi and Giriama (Table A3.21, Appendix 3). A significantly greater proportion of Giriama stated they use the SNS both from December – April and August – September whereas a significantly greater proportion of Ribe use the SNS from September – April compared to the Giriama.

Table 6.37: Chi-square results for analysis of when use SS in the day
For legend see Table 6.2
[A] 77.8 % of cells have expected counts are less than 5, minimum expected count 0.03
[B] 89.3 % of cells have expected counts are less than 5, minimum expected count 0.10
[C] 86.7 % of cells have expected counts are less than 5, minimum expected count 0.12
[D] 53.6 % of cells have expected counts are less than 5, minimum expected count 0.25

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	6.07	6	0.415					
Age	36.0	24	0.055					
Ethnicity[1] [A]	136.3	48	**< 0.001**	< 0.001	< 0.001	0.296	0.266	0.387
Religion[1] [B]	40.2	18	**0.004**	0.003	0.006	0.321	0.237	0.515
Location[1] [C]	249.2	78	**< 0.001**	< 0.001	< 0.001	0.399	0.371	0.501
Division[1] [D]	48.8	18	**< 0.001**	< 0.001	< 0.001	0.250	0.200	0.359

Table 6.38: Chi-square results for analysis of when use SS in the year
For legend see Table 6.2
[A] 85.7 % of cells have expected counts are less than 5, minimum expected count 0.01
[B] 88.4 % of cells have expected counts are less than 5, minimum expected count 0.02
[C] 75.0 % of cells have expected counts are less than 5, minimum expected count 0.03

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	12.9	6	0.055			0.319		
Age	33.7	24	0.090					
Ethnicity[1] [A]	122.6	42	**< 0.001**	< 0.001	< 0.001	0.401	0.328	0.582
Religion	27.1	18	0.077					
Location[1] [B]	201.4	66	**< 0.001**	< 0.001	< 0.001	0.514	0.465	0.668
Division[1] [C]	68.4	18	**< 0.001**	< 0.001	< 0.001	0.424	0.324	0.575

Post hoc-z tests show that a significantly greater proportion of Muslim respondents stated that they use the SNS in both the morning and late afternoon than expected compared to Christians (Table 6.39). In addition, a significantly greater proportion of respondents in Kambe location than expected use the SNS in the morning compared to those in all other locations except Chasimba, whereas a significantly greater proportion of those in Bedida use the sites in the late afternoon compared to those in Chasimba, Jibana and Kambe (Table A3.22, Appendix 3). The results also show that a significantly lower proportion of respondents in Kaya Fungo location stated that they use the SNS from December to April than expected compared to those in Chivara, Jaribuni, Kambe, Kauma, Mwanamwinga, Rabai and Ribe locations (Table A3.23, Appendix 3). Post-hoc z tests also highlight that a significantly greater proportion of respondents in Chonyi Division use the SNS in the morning

than expected, compared to those in Kaloleni or Ganze (Table 6.40). Whereas, significantly fewer of those in Kaloleni division use the sites in the daytime/early afternoon compared to those in Ganze and Kikambala. In addition, results highlight that a significantly greater proportion of people in Ganze division use the SNS between December and April compared to those in all other Divisions (Table 6.41). A significantly greater proportion of those in Chonyi Division than expected stated that they use the sites from April to August than those in Kaloleni and Ganze. In addition, a significantly greater proportion of those in Kikambala Division than expected use the sites in August – September compared to those in Kaloleni and Ganze.

Table 6.39: Cross-tabulation of what time of day respondents use other SS with religion. For legend see Table 6.3

		Religion				Sig
		Christian	Muslim	Pagan	None	
When use in day	Morning	46_a	13_a	3_a	8_a	NS
	Daytime/ Early Afternoon	10_a	1_a	1_a	3_a	NS
	Late Afternoon / Early Evening	6_a	5_a	3_a	1_a	NS
	night-time	2_a	0_a	0_a	0_a	NS
	Morning and Daytime	3_a	1_a	2_a	0_a	NS
	Morning and Late Afternoon/Early evening	3_b	9_a	$0_{a, b}$	$0_{a, b}$	*
	Multiple times of day (other)	3_a	3_a	3_a	1_a	NS

Table 6.40: Cross-tabulation of what time of day respondents use other SS with Division. For legend see Table 6.3

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
When use in day	Morning	77_b	38_a	11_b	$3_{a, b}$	*
	Daytime/ Early Afternoon	19_b	$9_{a, b}$	12_a	4_a	*
	Late Afternoon / Early Evening	14_a	6_a	4_a	1_a	NS
	Night-time	9_a	0_a	2_a	0_a	NS
	Morning and Daytime	5_a	3_a	0_a	0_a	NS
	Morning and Late Afternoon/Early evening	23_a	0_b	$1_{a, b}$	$0_{a, b}$	*
	Multiple times of day (other)	19_a	1_a	0_a	0_a	NS

Table 6.41: Cross-tabulation of what time of year respondents use other SS with Division. For legend see Table 6.3

			Division				Sig
			Kaloleni	Chonyi	Ganze	Kikambala	
When use in year?	Dec - April	Count	17_b	4_b	14_a	1_b	*
	Apr - Aug	Count	18_b	15_a	1_b	$0_{a, b}$	*
	Aug - Sept	Count	11_b	$7_{a, b}$	0_b	3_a	*
	Sept - Dec	Count	4_a	2_a	0_a	0_a	NS
	Dec - April and Aug - Sept	Count	18_a	0_b	$0_{a, b}$	$0_{a, b}$	*
	Sept - April	Count	1_a	0_a	0_a	0_a	NS
	All year	Count	11_a	0_a	0_a	0_a	NS

6.5 Discussion

6.5.1 Use of Kayas and other sacred sites (SS)

Use of the Kayas and other SNS can be both positive and negative for site conservation. If sites are used people are likely to value them and support measures to conserve them (Kellert, 1996; Chawala, 1998; Jepson and Canney, 2003). However, use can lead to disturbance and degradation of sites and threaten their protection (Brandon et al., 1998; Woodroffe & Ginsberg, 1998; Matiku, 2003). For example, the excessive use of Mount Fiji (a sacred mountain) led to such a significant degree of degradation that despite its iconic status and its religious significance, it was recommended that it should not be nominated as a World Heritage Site due to its poor condition (Bernbaum, 2010). Therefore understanding who uses the Kayas and other SNS is an important part of creating an effective management plan. The results show a departure from the traditional customs with the majority of people stating that they do not use the Kayas (Figure 6.1) or other SNS (Figure 6.5), and it was found that a much lower proportion of respondents use the other SNS compared to the Kayas.

Traditionally all members of the Mijikenda communities would use the Kayas (Spear, 1978), so these results show a loss of adherence to traditional customs. Both attitudes and demographic factors influence whether or not individuals use the Kayas and SNS (Tables 6.1 – 6.5, 6.24 – 6.29). In line with what has been found in previous chapters with regards to adherence to traditional practices (Chapters Four and Five), older individuals and men are more likely to use the Kayas. Use of the Kayas may be due to an engagement with cultural practices, or it may be due to personal circumstances. For example, older people are more likely to have more dependents and a greater demand for resources and therefore they may

use the kayas more in order to obtain them directly (such as food and firewood), or to generate income (logging and/or charcoal production). Examples of different members of the community being more or less likely to use sacred sites is noted in other areas, for example, in Japan the *Yama no kami* sites are used more by older generations than younger generations (Fukamachi and Rackham, 2012). The reduction of use by younger individuals is linked to a loss of adherence to traditional customs, which has also led to uses which are detrimental to the sites (Fukamachi and Rackham, 2012). This example highlights the importance of understanding which people do and do not use the sites, and by doing so it may help to identify target groups for conservation engagement (especially those who use the sites less, or do not follow the local traditions). The analysis shows that respondents who belong to a Kaya, and express the importance of their cultural identity, are more likely to use the Kayas. These results reflect traditional practices in that some individuals use the Kayas for traditional cultural and spiritual reasons. The Kayas are an important part of the traditional culture expressed through practices such as ceremonies, rituals and/or worshipping. Therefore those who feel that their culture is important to them may engage in behaviours at the Kayas more than those who do not. This finding may also be due to the fact that those who belong to a Kaya are more aware of the potentially exploitable resources they contain.

Some respondents who have converted from the traditional faith to other religions believe that the Kayas and other SNS are places of bad spirits and witchcraft. For example one Christian respondent stated (Questionnaire 25/100) "tradition is now witchcraft", and one respondent (21/05) who identified as having no religion associates the Kayas with "daemons", "superstition" and "witchcraft". It is therefore possible that the reason some individuals do not associate with the Kayas (and do not belong to a Kaya) is because of negative perceptions. The reduction of the use of SNS can lead to their degradation. For example, church forests in both Uganda and Ethiopia, as well as sacred groves in Japan have all seen a reduction in the respect of local traditions, and a decrease in the use of sacred sites. The diminishing levels of cultural importance to the local communities of these sites are associated with them becoming increasingly degraded and at risk of being lost (Banana *et al.,* 2008; Berhane-Selassie, 2008; Fukamachi and Rackham, 2012). If the Mijikenda SNS lose their value as cultural spaces and cease to be used they too could be at greater risk of degradation.

The results also show that married respondents are more likely to use the Kayas than those who are not married. However, this correlation may be a spurious relationship, related to age, in that older people are more likely to be married. However, this was investigated by splitting respondents by age and marital status (Table 6.4) and differences were still found between single and married respondents for those in the 36 − 45 age group. As noted by Githitho (2003), Matiku (2003) and Metcalfe et al., (2010), many resources taken from the forests are fuel, food and medicinal plants; resources that individuals providing for families, including children and older dependents, are likely to require. In addition, the communities surrounding the sites are poor (Nyamweru, 1997; Matiku, 2003; SID, 2014), therefore it is possible that married individuals use the Kayas as a source of direct resources, or to generate income to provide for their families (e.g. using wood to make charcoal to sell, mining for rocks). Significant differences in the use of the Kayas and other SNS were found across the ethnic groups. This could be due to differences in cultural practices, but could also be due to differences in environmental conditions and subsequent resources availability; for example the Giriama Kayas, Fungo and Jorore, are in more arid locations so access to alternative resources may be limited resulting in greater levels of extraction from the SNS.

The use of sites and their importance for resource extraction could be both beneficial and detrimental to conservation. This is because if sites are deemed important, the local community is likely to support efforts to conserve them; however, extractive use can lead to the degradation of sites. These issues are discussed further in Chapter Seven.

6.5.2 Which Kayas are used

It was found that respondents use a range of Kayas (Figure 6.2), and that the sites people use varies according to sex, age, ethnic group, the Kaya they belong to, location and division (Tables 6.6, - 6.10). At Kaya Mudzimwiru a significantly greater proportion of women use the site, whereas at Kaya Fungo a greater proportion of men use the Kaya and a significantly greater proportion of younger respondents use Kaya Mudzimuvia. However, ethnicity, the Kaya respondents belong to, location, and Division are all much stronger predictors of the Kayas that respondents use. Most people use Kayas that are traditionally associated with their tribal group, the Kaya which they belong to, and ones that are in the area that they live. While there is some variation, the Kayas that people use are predominantly those they would traditionally be associated with due to ethnicity and location (as shown in chapter 4.4.1 are linked). Therefore when planning the management for each site it is important to include the

groups traditionally associated with them, as well as the people that live nearby as stakeholders so that they are included in designing interventions and management policies. By including all relevant stakeholders, and incorporating their values into planning approaches, it is likely that people will be more supportive of management actions and therefore conservation plans are likely to be more effective (Brown, 2003).

6.5.3 How frequently people visit Kayas and other SNS

The frequency of visits to the SNS was measured because it can help understand the potential impact of people on the forests. Most people reported visiting the Kayas and other SNS only a few times a year, or for particular rituals and ceremonies (Figure 6.3 and 6.6), highlighting their importance for cultural and spiritual use. The frequency of visits to the Kayas varied according to gender, ethnicity, Division, location and religion (Tables 6.12 – 6.16), whereas it varied according to gender, ethnicity and location for the other SNS (Tables 6.30 - 6.32).

While the results indicate that the frequency with which the Kayas and other SNS are visited varies, most people visit them infrequently, suggesting the level of disturbance from the local population would be limited. However, these results contradict observations as a number of sites exhibited moderate to high levels of disturbance and degradation (as shown in chapter 3.4). It is possible therefore that respondents may have either underestimated how frequently they use the sites, that they intentionally understated how often they use the sites, that when people visit the sites they perform detrimental environment activities, or a combination of these factors. A significant issue associated with the use of the sites is the extraction of resources. The use of plants and animals and the potential impact on the conservation of the sites are investigated further in Chapter Seven.

6.5.4 When Kayas and other SNS are used

The Kayas and other SNS are used at different times of the day and year (Figure 6.4 and 6.7). When Kayas are used varies according to gender, age, ethnicity, religion and Division (Table 6.17 – 6.23). For the other SNS it varies according to gender, ethnicity, religion, location and Division (Table 6.33 – 6.40). The results show that the most common time of day that the Kayas and other SNS were used is in the morning. In addition, people use the Kayas and other SNS most commonly in the December – April period, which is the hottest and longest dry season. The lowest level of use of the Kayas is between September - December period, which

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is just after the main crop season of maize (the predominant crop in the region) which is harvested in August/September. For the other SNS, it was found that women are more likely to use the SNS during the two dry seasons than men. Different ceremonies are associated with women than men (Spear, 1978 and Shepheard-Walwyn, pers. obs. 2012), so it is possible that women use the sites at different times for specific ceremonies. In addition, women are responsible for collecting different resources for the household than men (predominantly firewood and water) (Nyamweru, 1997), therefore, it is possible that they use the sites at different times to access different resources.

The use of the Kayas coincides with the activities and situations of the local communities. For example, following the harvest season in August/September of the dominant crop in the region (maize), there is a much lower use of the Kayas. This could be because resources are in abundance following the harvest, or that individuals are spending time re-planting crops and/or selling any excess harvest, and therefore have less time to go to the forests. The reduced use during this period may also indicate that there are fewer/no ceremonies held during this period. The use of the Kayas increases during the long, hot, dry-season. This could be for a combination of reasons; weather conditions are harsh and many rivers dry up in the area, perhaps encouraging people to use the Kayas to access water which is found all year round in some forests. It may also be because people are in need of resources more during the dry season, therefore they may look for such resources in the Kayas. In Uganda sacred groves are used during times of drought and famine for food (Banana et al., 2008) and the Kayas may be used in similar ways during the dry seasons. It is also possible that people use the SNS at this time for rituals and ceremonies, such as praying for rain (which was noted as a major reason that the Kayas are important in Chapter 5.4.2) before the start of the long-rains. The use of SNS at different times, or in different ways throughout the year is observed in many areas. For example, the Montecassino Abbey, Italy, is used around the spring equinox as part of the celebratory festival in honour of the death of St Benedict (Cinquepalmi and Pungetti, 2012). Among the Maloca people in north-western Amazon there is a two-day ritual to celebrate the beginning and end of different seasons throughout the year involving rituals, ceremonies and dances, and they have a number of other ceremonies which mark other important times of the year (Richel, 2012). For the Kogi society in Colombia there is an intricate ritual calendar which is in line with the local agricultural cycle (Rodrigues-Navarro, 2012), and in Tibet during the spring festival people gather at sacred mountains and sacred groves to pay respect to the deities that live there (Wang *et al.,* 2012).

Understanding when sites are most often used by different groups will aid with effective monitoring of resource extraction during periods of high activity, it will also help to ensure the information is able to be incorporated into management plans and used in designing interventions. It also enables a better understanding of how the local communities interact with and use the sites, and these practices can be taken into account, therefore helping to create more comprehensive and adaptive management approaches.

6.6 Conclusion

The findings indicate a shift away from traditional practices with the majority of people no longer using the SNS. However, they are still used for rituals and ceremonies which indicate that they are used to a degree in accordance with traditional customs, highlighting their importance for culture and spirituality. People use the sites that are closest to them and those that are traditionally associated with their tribal group, showing that the traditional foundations for the use of the Kayas and SNS are still followed. Identifying who uses the sites and when allows for the identification of stakeholders who should be involved in future management plans, and highlights periods when the sites are at the greatest risk of degradation. In addition, this information will contribute to targeted monitoring programmes to investigate the impact of the use of the sites at peak periods. While the sites are still used for cultural and spiritual purposes, there has been a significant decline in the traditional customs of using and visiting the SNS. This could benefit the sites through lower levels of disturbance, but it poses a risk if diminishing use leads to local communities no longer valuing the sites. The shift away from traditional practices undermines the legitimacy of current management plans for the area which are based solely on traditional customs and laws. Therefore the management of the sites needs to be redesigned to reflect these cultural changes, and ways need to be found to reengage the local communities, who must be included in any interventions. Furthermore, the use of sites varies across regions, meaning that management plans must be designed on a site-by-site basis.

Chapter 7: Resource Use in Kayas

7.1 Abstract

The use of the natural environment and the resources it provides can be important drivers for both environmental degradation and conservation. While unregulated use can result in the destruction and loss of habitats as well as extinction of species, the value that sites can have for both cultural and provisioning services may help to foster support for conservation initiatives. To date while over-exploitation of the resources in the Kaya forests has been acknowledged as a significant driver of their degradation, the use of plants and animals from the Kayas forests has not been comprehensively analysed. At present the current management plan assumes that the communities surrounding the sites adhere to the customary laws which prohibit extractive use of plants and animals (except by a select few members of society – such as medicine men); however, the level of adherence to traditional laws is limited (Chapter 5.4.5) and extractive use in violation of the traditional laws has been noted. Therefore the efficacies of the current management plans are again brought into question. Due to high levels of poverty in the area the local populations are thought to use the sites to access resources, both for personal use, as well as to generate additional income. This study aimed to investigate the use of the plants and animals within the forests. The results show that most people in the interviewed population use a range of plants and animals from the Kayas, and that the majority of these uses are extractive. These results indicate a further shift away from traditional customs, they show that there is a significant level of use of plants and animals from the sites by the local population which at present is not being monitored or managed, and again highlight the lack of adherence to traditional laws. As such these results demonstrate the inefficacy of the current conservation management practices. Management plans need to take into account the use of the resources which the forests contain and sustainable use, and alternative resource access initiatives need to be put into place.

7.2.1 Introduction

The use of sacred natural sites (SNS) can have both positive and negative effects on the habitats and biodiversity they contain. As discussed in Chapter Six, use of sites can result in degradation, and if resource extraction occurs this can accelerate damage and could result in the local extinction of over-harvested flora and fauna (Brandon et al., 1998; Woodroffe &

Ginsberg, 1998; Matiku, 2003; Wright, 2003; Pfeifer et al., 2012). However, if people gain benefits from sites they may support conservation programmes aimed at protecting them (Kellert, 1996; Chawala, 1998; Jepson and Canney, 2003; Turvey et al., 2010). Such use needs to be acknowledged, monitored and accounted for in conservation planning. To date, the literature suggests that the populations surrounding the Mijikenda SNS in Kilifi District are poor, and they use resources from the Kayas for personal subsistence, as well as to generate income (Nyamweru, 1997; Githitho, 2003; Matiku, 2003; Anderson et al., 2007a; Anderson et al., 2007b; Nyamweru et al., 2008; Metcalfe et al., 2010). However, the current management plan, based solely on the adherence to traditional laws, does not account for this use.

Cinner et al., (2004) state that "social and cultural institutions influence how societies organize themselves to extract resources, affecting the ways in which resources are used and ultimately managed"; however, as was found in Chapters Four and Five, people may not always follow these institutions. The deviation from customary practices and/or breaking laws and taboos, may not be solely due to departure from traditions. As was shown in chapter 5.4.5, many respondents admit to not adhering to the laws despite considering the local Mijikenda traditions important ('law' was defined in this research in accordance to the description provided in the questionnaire in Appendix 1). This contradictory behaviour may be because personal circumstances can overrule personal values and therefore people behave in ways that are not in line with their own beliefs (Kühl et al., 2009). The populations surrounding the sites are poor, have low levels of education and little access to resources (Nyamweru, 1997; Matiku, 2003; Nyamweru et al., 2008; SID, 2014). Many people in the region are farmers, but as the area suffers from droughts they often have poor harvests (Mbithi and Wisner, 1972; Nyamweru, 1997; Matiku, 2003; IRIN 2004; van 't Land and Wekesa, 2008). Therefore people in the region rely on forests for access to resources such as food, firewood and building materials. For example, meat from wild animals (bushmeat) is often a vital source of protein for poor people in sub-Saharan Africa (Asibey, 1974), and this is likely to be the case for the populations in the study area.

In addition, there is a high demand for forest products in external markets, offering a potential source of income by selling building materials, charcoal (made from wood in the forests) and non-timber forest products (NTFP) (Githitho, 2003; Matiku, 2003; personal observation, 2012). If there is no other option to gain alternative resources and income,

people are likely to break the rules which prevent use of sites to access resources in order to survive and prosper. To date the information on the use of resources from the Kayas of the north coast is limited. In a report compiled in 1997, Nyamweru (1997) investigated the use of firewood, and a limited range of other plant products. While the report gave valuable information on the perceptions and use of these resources, the study was limited to a small number of sites, interviewed a small population, looked at specific uses of plants (therefore not providing additional information on other uses, or the use of animals) and was conducted over 15 years ago. The limited information available to date does not enable a comprehensive understanding of which plants and animals are used, and how, it also does not facilitate effective monitoring or conservation.

As discussed in Chapters One and Five, the use of the natural environment can be classified according to the ecosystem services (ES) it provides (MEA, 2005). The benefits and limitations of grouping resource uses into these sets were discussed in the previous chapters; however, it was noted that such categorisation allows for a comparison of how different communities gain benefits from nature, and helps to link this information to international frameworks such as the Millennium Ecosystem Assessment (MEA). In Chapter Five, whilst there are limitations, it was found that using a modified version of the ES categorisations from the MEA was a useful tool for analysing how people view the Kayas. By using the modified categorisation list developed in Chapter Five, it is also possible to group the ways in which the local communities use plants and animals in a way which allows for effective analysis and comparison across groups of people and sites, as was done for the grouping perceptions of the Kayas. Use of an internationally recognised set of classifications will allow for more effective comparison to sites elsewhere in the world, and structures the information within an internationally recognised framework.

As discussed above, extraction of natural resources can lead to habitat loss and a reduction in biodiversity (Pfeifer et al., 2012). Therefore if resources are being used it needs to be monitored and managed to prevent such degradation. However, if use is not monitored or accounted for, this could diminish the efficacy of management plans, and such extraction could lead to the damage of sites. SNS around the world are often used for resource extraction for items such firewood, charcoal and timber as well as NTFPs including food and clothing. In Sierra Leone, sacred groves (SG) contain plants and animals which are used for a range of products including, charcoal, timber, utensils, poles, nuts, fruit, dyes, drums and

medicine (as well as many more) (Lebbie and Guries, 2008), and in Ethiopia, church forests are used to access fruit, fuel wood, timber and other products (Berhane-Selassie 2008). The over-exploitation of bushmeat, medicinal plants, timber, and firewood as well as a range of other resources has been noted as a threat to biodiversity (Asibey, 1974; Anderson and Fishwick, 1984; Bussmann, 1996; Wright, 2003; FitzGibbon et al., 1995, Wilkie et al., 2011), and this is likely to be the case for illegal and unregulated extraction from SNS.

Ostrom (1990) highlights that in many instances groups have come together to develop rules and strategies which regulate the use of common resources so as to avoid overexploitation. This has been observed for the Maloca people in the north-west Amazon and the Tandory people in Madagascar who use the resources from their SNS sustainably (Tengö and von Heland, 2011; Richel, 2012). The traditional laws and customs of the Mijikenda Kayas reflect the type of 'rules' outline by Ostrom (1990), but as communities shift away from traditional practices, the laws and regulations are likely to break down. Furthermore, as non-Mijikenda migrants move into the area, it is likely that the extraction of resources from the Kayas would increase. Without intervention this could result in the degradations of habitats and loss of biodiversity, if not the loss of the Kayas all together (Githitho, 2003; Anderson *et al*., 2007b; Metcalfe et al., 2010). Therefore, for effective conservation management of these sites, it is important to understand resource use, and incorporate this into plans and interventions.

As was found for these communities in Chapters Five and Six, people's attitudes and values, while important indicators, can be different from their actual behaviour (Kühl et al., 2009). Therefore, as outlined by St John et al. (2010) when seeking to understand behaviours associated with areas of interest for conservation, direct questions are important. In light of this, direct questions about types of resource use were asked to investigate people's use of the plants and animals. This information can be used to inform conservation management plans and enable more appropriate interventions. Understanding the type of resource use occurring and what level of pressure the local people are putting on the natural environment will allow for more informed approaches to conservation. In addition, acknowledging and adapting management to address local needs will enable more effective and sustainable conservation which is likely to have greater levels of support from the communities.

7.2.2 Research Question

Main Question: What is the use of plants and animals from the Kayas, does it differ across demographic groups, and how might it impact conservation of the SNS and the species they contain?

Null Hypothesis: There is no use of the plants and animals from the Kayas and there is no impact on the conservation of the SNS and the species they contain

Sub Questions

1. Do people use plants and animals from the Kayas?

Null hypothesis: People do not use plants and animals from the Kayas

2. Do people more commonly use plants or animals?

Null Hypothesis: There is no difference in the use of plants or animals

3. How do people use plants? – Is it different according to typs of plants?

Null Hypothesis: There is no difference in the way people use different types of plants

4. How do people use animals? – Is it different according to typs of animals?

Null Hypothesis: There is no difference in the way people use different types of animals

5. Is there any difference in the use of plants and animals across different demographic groups?

Null hypothesis: There is no difference in the use of plants and animals across demographic groups

6. Is the use of plants and animals from the Kayas likely to impact the conservation of the SNS and their species?

Null Hypothesis: The use of plants and animals from the Kayas is not likely to impact the conservation of the SNS and their species

7.3 Methods

The data in this chapter were collected using questionnaires (Appendix 1) in face-to-face interviews in accordance to the methodology outlined in chapter 2.5. As highlighted in chapter 2.5.1 the survey was a collected in a random stratified manner, seeking to obtain

equal proportions of male and female respondents from a range of age groups. Data were input into Access (2010, Microsoft) the database was then formatted in Excel (2010, Microsoft) before being analysed in SPSS (version 21, IBM) as outlined in chapter 2.7.1. The data were analysed individually and in relation to one-another using a range of descriptive statistics including histograms, percentages, chi-square and post hoc tests as outlined in chapter 2.7.1.1.

Variables

Do respondents use plants and animals – Based on whether or not respondents listed plants and animals that they used from the Kayas

Plants/animals do respondents use – Respondents gave a list pf plants and animals they used in an open question. Answers were translated (where possible), coded, and grouped

How plants/animals are used – Respondents listed how they use the different plants and animals in an open question. Answers were translated (where possible), coded, and grouped

The responses to the above independent variables were tested across the following dependent variables:

Gender

Age – Grouped into five categories (as outlined in Chapter 2.7.1 and 4.3)

Ethnicity – Grouped into seven northern Mijikenda tribes, other Mijikenda tribes (Digo and Duruma0, or 'other' (non-Mijikenda tribes)

Religion –Self identified and grouped accordingly (traditional faith noted as 'Pagan'in the analysis and discussion)

Spatial Variation – To investigate responses at different spatial scales Location (finest scale), Division (medium spatial scale), and sub-district (largest spatial scale) were used

7.4 Results

7.4.1 Use of plants and animals from the Kayas

The results show that a greater proportion of respondents (86.3%) who answered the question noted that they do use plants and animals from the Kayas (Figure 7.1) and there is a range of plants and animals used. The large number of people who do use plants and
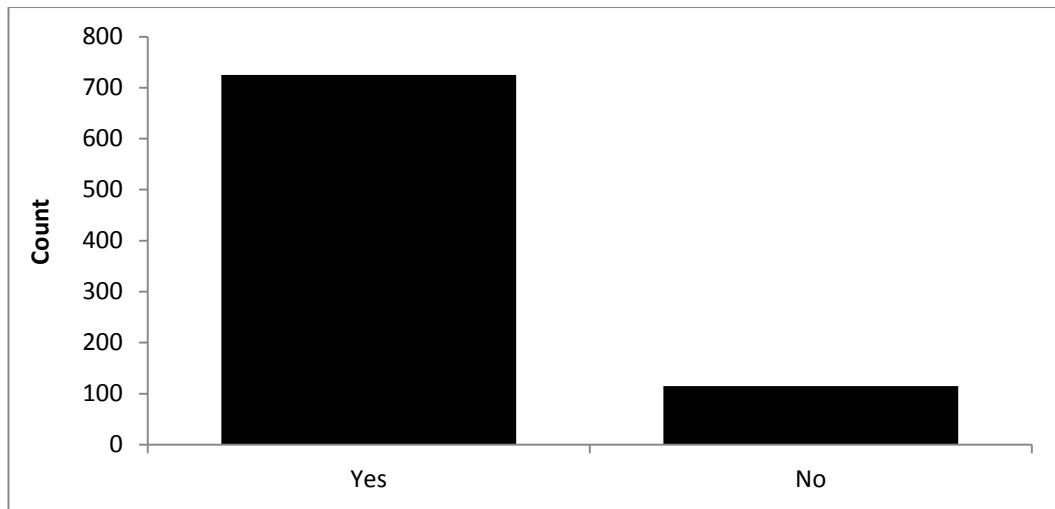
Figure 7.1: If respondents use plants and animals from the Kayas

animals brings into question the results described in chapter 6.4.1 on whether or not people use the Kayas, or highlights an issue with how respondents are defining the term 'use the Kayas'. Results show that 270 individuals who stated that they do not use the Kayas do use plants and animals from the Kayas. A split chi-square analysis was used to look at differences between groups who claimed not to use the Kayas, but do use plants and animals. Results show (Table 7.1) that there were no significant differences for the genders, age groups, religions, or sub-district; however, there was a significant difference across the ethnicities. A post-hoc z-test shows (Table 7.2) that a greater proportion of Kambe respondents than expected stated that they do not use the Kayas but do use plants and animals compared to Jibana respondents.

Question 85 (Appendix 1) asked respondents to list any plants and animals that they use from the Kayas. Whilst some stated that they did not use any plants and animals, a large number of respondents did not answer the question (n= 564). If non-response is assumed to mean that they do not use plants and animals then this would alter the findings to show that only a small majority of respondents use plants and animals (51.6%). However, this result still shows that the majority of respondents do use plants and animals from the Kayas. From the responses given it was also found that while the respondents identified a number of different plants and animals used there are also some which they were unable to name. Many respondents gave comments such as 'I do not know the name but I know what it looks like' or 'I am not aware of the name, but there are plants I collect for… (with a use specified)'. These plants were therefore grouped by use where appropriate.

Table 7.1: Chi square analysis results for whether or not someone uses plants and animals split according to those who do not use the Kayas

Legend: [1] = χ^2 Monte Carlo Exact Test and Bootstrapped Cramer's V analysis conducted to account for violations in assumptions of the model.

[A] Ethnicity: (21.4% cells have expected count less than 5)

Variable	χ^2	Degrees of freedom (df)	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	1.02	1	0.312					
Age	2.25	4	0.690					
Ethnicity[1] [A]	22.1	6	**0.001**	< 0.001	0.002	0.251	0.174	0.372
Religion	3.08	3	0.380					
Sub-District	7.35	5	0.196					

Table 7.2: Cross-tabulation of those who do not use Kayas, but do use plants and/or animals with ethnicity

Legend: Calculated with Bonferroni correction to account for multiple comparisons. Sig = Significance. * Denotes that there is a significant difference between proportions on that row to the p = ≤ 0.05 level. Different letters denote proportions (based on observed count compared to expected count) that are significantly from each other. Where: a = Greatest proportion; b = significantly less than 'a' and significantly greater than 'c' etc.

		Ethnic Group							Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	
Don't Use Kayas	Don't use plants and animals	$41_{a, b}$	$9_{a, b}$	7_a	1_b	$2_{a, b}$	$25_{a, b}$	$1_{a, b}$	*
	Do use plants and animals	$97_{a, b}$	$51_{a, b}$	8_b	28_a	$9_{a, b}$	$54_{a, b}$	$18_{a, b}$	*

7.4.2 Plant or Animal?

When investigating the plants and animals that are used from the Kayas, it was found that 55.0% of responses were in reference to plants and 45.0% animals. Chi-square analysis as to whether respondents use either plants or animals showed no significant difference between genders or age groups. However, there were significant differences between ethnicities, religions, locations, sub-districts, and Divisions (Table 7.3).

Post hoc Z-tests indicate that for the ethnicities a significantly greater proportion of Jibana and Rabai respondents use plants compared to Chonyi, Giriama, Kambe and Kauma respondents whereas a significantly greater proportion of Chonyi, Giriama and Kambe respondents use animals compared to Jibana, Rabai and Ribe respondents (Table 7.4). The results indicate that a significantly greater proportion of those with no religion use plants

Table 7.3: Chi square analysis for whether respondents use plants or animals

Variable	χ^2	p	Degrees of freedom (df)	Cramer's V
Gender	0.712	0.339	1	
Age	2.50	0.645	4	
Ethnicity	138.0	**< 0.001**	8	0.182
Religion	20.7	**< 0.001**	3	0.094
Location	276.4	**< 0.001**	13	0.258
Sub-District	53.6	**< 0.001**	5	0.114
Division	37.6	**< 0.001**	3	0.095

Table 7.4: Cross-tabulation of use of plants or animals with ethnicity
For legend see Table 7.2

	Ethnic Group									Sig
	Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
Plant	392_c	680_c	261_a	247_c	$181_{b,c}$	382_a	$128_{a,b}$	$17_{a,b,c}$	$7_{a,b,c}$	*
Animal	420_a	711_a	110_c	245_a	$139_{a,b}$	162_c	$68_{b,c}$	$10_{a,b,c}$	$2_{a,b,c}$	*

compared to those of all other religious groups. They also show that a significantly higher proportion of those in Bedida use plants compared to those in Chivara, Jaribuni, Jibana, Junju, Kambe, Kauma, Kaya Fungo, Mwanamwinga, Mwarakaya, Rabai, Ribe and Tsangatsini locations (Table A3.24, Appendix 3). A post-hoc z-test highlights that a significantly greater proportion of those in Rabai sub-district use plants compared to those in Kaloleni, Kilifi and Mariakani sub-districts (Table 7.5). In addition a significantly greater proportion of those in Kaloleni and Ganze Divisions than expected use plants compared to those in Chonyi and Kikambala Divisions (Table 7.6).

The results indicate that the plants and animals are used in a number of ways (Table 7.7), but most commonly for food and drink (plants 42.5%; animals 71.5%). The results also show that while animals are reported as being used for 'tourism' and/or 'to make money', this use was not found for the plants. Analysis using chi-square shows that there was a significant difference between plants and animals in how they are used ($\chi^2 = 800.9$, df = 9, p < 0.001; V=0.471). A post-hoc z-test (Table 7.7) indicates that a significantly greater proportion of animals are used for 'food/drink', 'hides', 'traditional clothing' and for 'tourists and money' compared to plants, whereas a significantly greater proportion of plants are used for 'medicine/treatments', 'building materials' and for 'firewood' compared to animals. In

Table 7.5: Cross-tabulation of use of plants or animals with sub-district
For legend see Table 7.2

	Sub-District						Sig
	Ganze	Junju	Kaloleni	Kilifi	Mariakani	Rabai	
Plant	$194_{a, b}$	$18_{a, b}$	967_b	647_b	1_b	457_a	*
Animal	$143_{a, b}$	$18_{a, b}$	850_a	623_a	7_a	232_b	*

Table 7.6: Cross-tabulation of use of plants or animals with Division
For legend see Table 7.2

	Division				Sig
	Kaloleni	Chonyi	Ganze	Kikambala	
Plant	1685_a	362_b	198_a	39_b	*
Animal	1256_b	404_a	149_b	64_a	*

Table 7.7: Cross-tabulation of plants and animals and their uses
For legend see Table 7.2

	Plant	Animal	Sig
Food/ Drink	893_b	1085_a	*
Medicine, treatment and promoting health	528_a	166_b	*
Culture, Rituals, Spirituality, Predictions	29_a	26_a	NS
Hides, Traditional clothing, bags & Mats	33_b	95_a	*
Safety/ Protect/ Guard	2_b	51_a	*
Building materials	217_a	6_b	*
Firewood	356_a	4_b	*
Improve environment/ conservation	9_a	8_a	NS
Tourists and money	0_b	47_a	*
Other	33_a	29_a	NS

addition results highlight (Table 7.8) that a significantly greater proportion of respondents stated plants were used for 'building and firewood' than expected compared to all other uses. For animals, a significantly greater proportion of people mentioned 'security/ guards of the Kayas' and 'tourism and money' than expected compared to all other uses. The results show that when uses are grouped according to ES, there was still a significant difference between plants and animals in how they are used (χ^2 = 133.0, df = 4, p < 0.001; V = 0.191). The results from a post-hoc z-test shows (Table 7.9) that while the most common use for

Table 7.8: Cross-tabulation of plants and animals and their uses
For legend see Table 7.2

	Food/ Drink	Medicine and treatment	Culture and Spirituality	Hides, Traditional clothing, bags & Mats	Safety/ Protect/ Guard	Building materials	Firewood	Improve environment/ conservation	Tourists and money	Other	Sig
						Use					
Plant	893_c	528_b	29_c	33_d	2_e	217_a	356_a	$9_{b, c, d}$	0_e	33_c	*
Animal	1085_c	166_d	26_c	95_b	51_a	6_e	4_e	$8_{c, d, e}$	47_a	29_c	*

Table 7.9: Cross-tabulation of plants and animals and their uses grouped by ecosystem service categories. For legend see Table 7.2

		Plant or Animal		Sig
		Plant	Animal	
Use Coded by Ecosystem Services	Provisioning	2056_a	1384_b	*
	Regulating/Supporting	9_a	8_a	NS
	Cultural	29_a	32_a	NS
	Social	2_b	95_a	*
	Provisioning and Cultural	10_a	4_a	NS

both plants and animals were in the provisioning services category significantly greater proportion of plants than expected are used for provisioning compared to animals, whereas a significantly greater proportion of animals are used for social services compared to plants.

7.4.3 How plants and animals are used

Chi square analysis shows that there was a significant difference in how different plants and animals are used (Table 7.10). As noted previously the ways in which plants and animals are used can be grouped into ES. When this was done for the different types of plants and animals identified as being used by respondents the chi-square analysis shows that there was a significant difference in how they are used (Table 7.10).

A post-hoc z-test shows (Table A3.25, Appendix 3) that there was a significant difference in how all the different types of plants and animals are used. Results from a post-hoc z-test

shows (Table 7.11) that when uses are grouped by ES, there were significant differences in the uses for plants in the classes *Rosidae* and *Liliopsida*, plants identified as fruit plants, medicinal plants, and plants identified with multiple uses. In addition there are significant differences in the uses of birds, small mammals, small cats, primates, and herptiles. The results show that for plants in the Rosidae family, social uses were listed significantly less than expected compared to all other uses. For small mammals, a significantly greater proportion than expected of uses were cultural compared to social, whereas for small cats a significantly greater proportion of uses were social compared to provisioning uses. When investigating animals in the group herptiles results highlight that a significantly greater proportion of uses were cultural or social compared to provisioning uses.

Table 7.10: Chi square analysis on uses of plants and animals. For legend see Table 7.1
[A] 50.0% of cells have expected count less than 5, minimum expected count = 0.19
[B] 54.7% of cells have expected count less than 5, minimum expected count = 0.16

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Use of plants and animals[1] [A]	2447.9	135	**<0.001**	< 0.001	< 0.001	0.276	0.268	0.298
Uses categorised by ecosystem services[1] [B]	490.7	60	**<0.001**	< 0.001	< 0.001	0.185	0.167	0.222

Table 7.11: Cross-tabulation of types of plants and animals and their uses grouped by ecosystem services. For legend see Table 7.2

	Use Coded by ecosystem services					Sig
	Provisioning	Regulating/ Supporting	Cultural	Social	Provisioning and Cultural	
Rosidae	607_a	3_a	9_a	0_b	5_a	*
Liliopsida	$227_{a, b}$	$1_{a, b}$	6_a	0_b	$0_{a, b}$	*
Fruit Plant	365_a	$2_{a, b}$	8_a	1_b	$0_{a, b}$	*
Medicinal Plant	512_a	2_a	$2_{a, b}$	0_b	$0_{a, b}$	*
Multiple Use Plant	187_b	$0_{a, b}$	$4_{a, b}$	1_b	4_a	*
Aves	99_b	$0_{a, b}$	7_a	$3_{a, b}$	$1_{a, b}$	*
Small Mammals	$231_{a, b}$	$1_{a, b}$	8_a	0_b	$0_{a, b}$	*
Small Cats	46_b	$0_{a, b}$	$1_{a, b}$	8_a	$0_{a, b}$	*
Primates	201_b	$3_{a, b}$	1_b	42_a	0_b	*
Herptiles	105_b	$2_{a, b}$	10_a	21_a	$0_{a, b}$	*

7.4.4 Plant Use

The results show that plants are used in various ways (Figure 7.2), with the top 5 uses being extractive. To analyse the way different groups use the different types of plants a split Chi-square analysis was used with types of plants and animals as the layer. Chi-square analysis showed that there were significant differences for some plants according to people's ethnicity, location and Division (Table 7.12). However there were no significant differences for the other types of plants (Table 7.13) and there were no significant differences in the ways the plants are used when people are split by their gender, age group, religion or sub-district (Table7.14). A post-hoc z-test shows (Table 7.15) that a significantly greater proportion of Kambe respondents than expected use plants identified as 'medicinal plants' for food/drink compared to Rabai respondents, whereas significantly greater proportions of Rabai and Ribe respondents than expected use plants identified as 'medicinal plants' for firewood compared to Giriama respondents. A post hoc z-test highlights where the differences occur across plants in the *Rosidae* family, fruit plants and medicinal plants across the locations (Table A3.26, Appendix 3).

A post-hoc z-test (Table 7.16) showed that significantly fewer of those in Chonyi Division than expected use plants in the Liliopsida class for medicine than those in Ganze or Kikambala. A
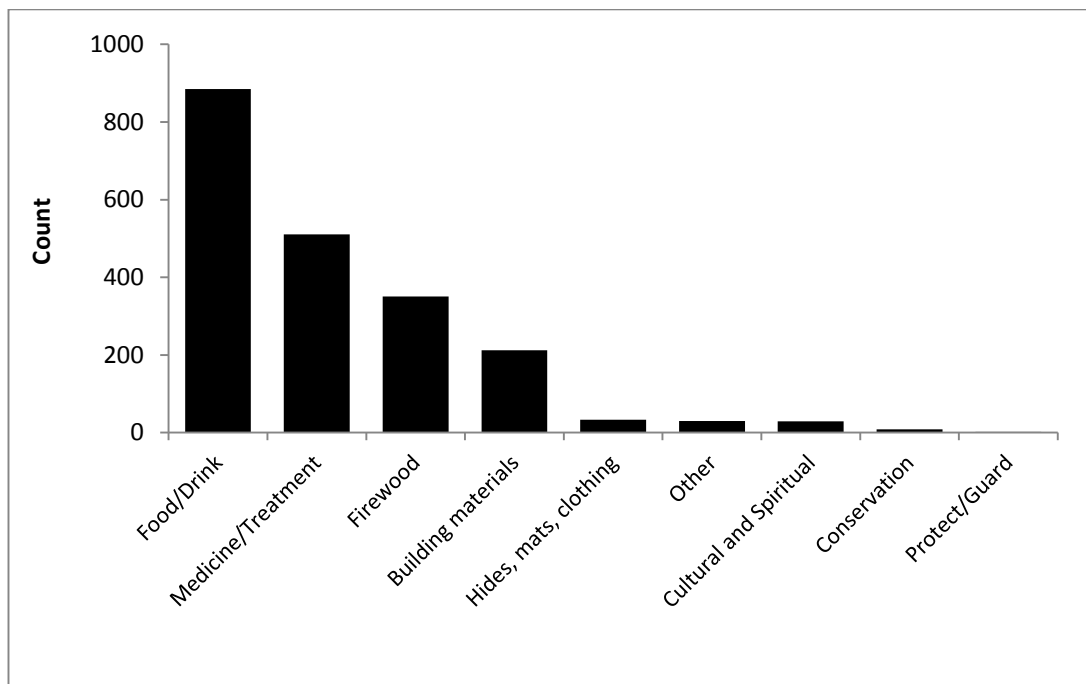
Figure 7.2: Ways plants from the Kayas are used

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Table 7.12: Chi square analysis with significant results for uses of plants
For legend see Table 7.1
(A) 55.4% of cells have an expected count of less than 5 and the minimum count is 0.08
(B) 70.5% of cells have an expected count of less than 5 and the minimum count is 0.03
(C) 53.1% of cells have an expected count of less than 5 and the minimum count is 0.10
(D) 89.7% of cells have an expected count of less than 5 and the minimum count is 0.00
(E) 80.6% of cells have an expected count of less than 5 and the minimum count is 0.02
(F) 69.6% of cells have an expected count of less than 5 and the minimum count is 0.03
(G) 71.4% of cells have an expected count of less than 5 and the minimum count is 0.02

		χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
					Upper bound	Lower bound		Upper bound	Lower bound
Medicinal plants	Ethnicity 1 (A)	64.2	42	**0.025**	0.021	0.029	0.145	0.137	0.218
	Location 1 (B)	138.2	91	**0.015**	0.012	0.018	0.197	0.197	0.310
	Division 1 (C)	39.9	21	**0.027**	0.023	0.031	0.161	0.106	0.292
Fruit plants	Location 1 (D)	202.0	104	**0.016**	0.012	0.019	0.261	0.218	0.435
	Division 1 (E)	108.2	24	**0.001**	<0.001	0.002	0.312	0.092	0.590
Rosidae	Location 1 (F)	130.5	91	**0.018**	0.014	0.021	0.173	0.171	0.268
Liliopsida	Division 1 (G)	81.4	18	**0.002**	0.001	0.003	0.345	0.136	0.621

Table 7.13: Chi square results for uses of different plants for ethnicity, location and Divisions. For legend see Table 7.1

	Ethnicity			Location			Division		
	χ^2	df	p	χ^2	df	p	χ^2	df	p
Rosidae	55	42	0.086	130.5	91	**0.018[1]**	31.1	21	0.097
Liliopsida	40.8	30	0.095	129.8	78	0.063	81.4	18	**0.002[1]**
Building /Firewood plants	27	24	0.312	47.0	48	0.406	5.06	12	0.950
Fruit plants	39.5	48	0.800	202.1	104	**0.016[1]**	108.2	24	**0.001[1]**
Vegetables	17.3	18	0.326	36.7	30	0.185	11.1	6	0.058
Medicinal plant	64.2	42	**0.025[1]**	138.2	91	**0.015[1]**	39.9	21	**0.027[1]**
Multiple use plant	35.4	42	0.713	95.6	91	0.352	36.9	21	0.088

significantly greater proportion of those in Kikambala than expected also use unidentified fruit plants for 'culture' and 'spiritual' purposes compared to those in Chonyi Division, as 'safeguards' or for 'protection' and for 'conservation/improve' compared to those in Kaloleni or Chonyi. The results also show that a significantly greater proportion than expected of those in Chonyi Division use unidentified medicinal plants for 'cultural and spiritual' purposes compared to those in Kaloleni.

Table 7.14: Non significant chi square results for uses of different plants for genders, age groups, religions and sub-districts.

	Gender			Age			Religion			Sub-District		
	χ^2	df	p	χ^2	df	p	χ^2	df	p	χ^2	df	p
Rosidae	10.4	7	0.167	26.5	28	0.545	12	21	0.94	27.6	35	0.617
Liliopsida	5.8	6	0.446	20.3	24	0.679	12.7	15	0.625	19.4	24	0.581
Building / Firewood plants	7.69	4	0.104	12.9	16	0.683	6.76	9	0.662	8.5	12	0.772
Fruit plants	5.76	8	0.675	43.6	32	0.083	11.3	24	0.987	22.9	32	0.708
Vegetables	3.74	3	0.291	12.6	12	0.396	3.05	2	0.218	14.7	9	0.055
Medicinal plant	6.25	7	0.511	24	28	0.684	20.1	18	0.330	58.9	35	0.059
Multiple use plant	7.66	7	0.364	23.7	28	0.698	24.8	21	0.257	34.5	28	0.189

Table 7.15: Cross-tabulation of medicinal plants and their uses with ethnicity
For legend see Table 7.2

		Ethnic Group							Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	
Medicinal plant (U)	Food/ Drink	12$_{a, b}$	32$_{a, b}$	5$_{a, b}$	18$_a$	7$_{a, b}$	6$_b$	2$_{a, b}$	*
	Firewood	19$_{a, b}$	34$_b$	7$_{a, b}$	13$_{a, b}$	8$_{a, b}$	33$_a$	10$_a$	*

Table 7.16: Cross-tabulation of types of plants and their uses with Division.
For legend see Table 7.2

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
Liliopsida	Medicine, treatment and promoting health	24$_{a, b}$	1$_b$	11$_a$	2$_a$	*
	Other	0$_b$	0$_b$	0$_b$	1$_a$	*
Fruit plants	Culture, Rituals, Spirituality, Predictions	5$_{a, b}$	0$_b$	0$_{a, b}$	1$_a$	*
	Safety/Protect/Guard	0$_b$	0$_b$	0$_{a, b}$	1$_a$	*
	Improve environment/ conservation	1$_b$	0$_b$	0$_{a, b}$	1$_a$	*
Medicinal plant	Culture, Rituals, Spirituality, Predictions	0$_b$	2$_a$	0$_{a, b}$	0$_{a, b}$	*
	Building materials	49$_b$	5$_b$	3$_{a, b}$	8$_a$	*

7.4.5 Plant Use grouped by ecosystem services

When uses of plants are grouped by ES (categoriation of uses by ES are outlined in Table A5.1 in Appendix 5), a large majority (97.2%) were categorised as provisioning services (Figure 7.3). Chi-square analysis shows there was a significant difference across the Divisions for how fruit plants were used (Table 7.17). However, there was no significant difference between
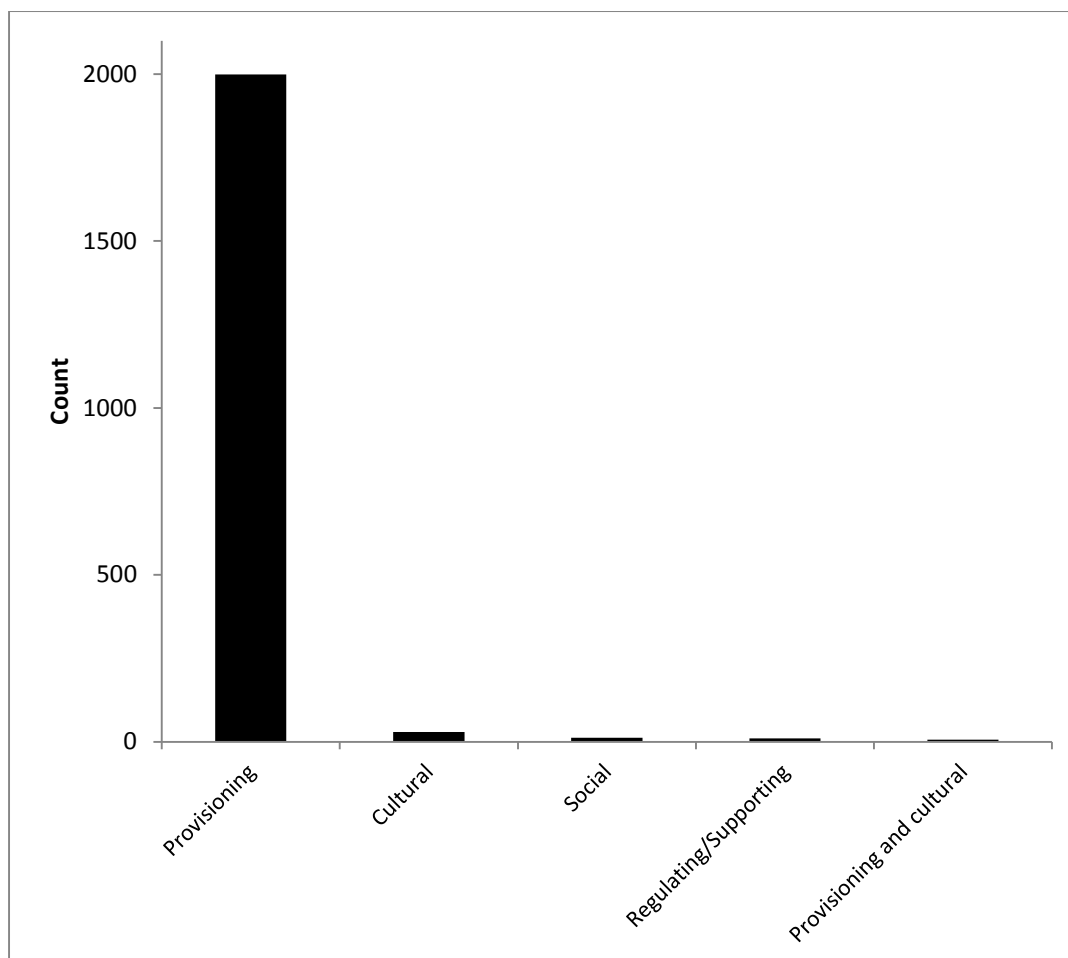
Figure 7.3: Use of plants grouped by ecosystem services

Table 7.17: Chi square analysis with significant results for uses of plants
For legend see Table 7.1
[A] 75.0% of cells have an expected count of less than 5 and the minimum count is 0.03

| | | χ^2 | df | p | Monte Carlo Exact 99% CI | | Cramer's V | Bootstrapped 99% CI | |
					Upper bound	Lower bound		Upper bound	Lower bound
Fruit Plants	Division [1 (A)]	54.9	9	**0.002**	0.001	0.003	0.224	0.045	0.502

how the plants and animals were used across genders, age groups, ethnicities, religions, sub-districts or locations and there were no significant differences for any of the other plants across the Divisions (Table 7.18). A post-hoc z-test shows (Table 7.19) that for fruit plants there were significant differences across all uses for the Divisions. Significantly fewer of those in Kikambala Division than expected use the fruit plants for provisioning services compared to those in all other Divisions, whereas a significantly greater proportion of those in Kikambala than expected use them for regulating/supporting services compared to those in

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Table 7.18: Chi square results for uses of different plats coded by ecosystem services for different groups of respondents.
For legend see Table 7.1

	Gender			Age			Ethnicity			Religion			Sub-District			Location			Division		
	χ^2	df	Sig.	χ^2	df	Sig	χ^2	df	Sig.	χ^2	df	Sig.	χ^2	df	Sig.	χ^2	df	Sig.	χ^2	df	Sig.
Rosidae	3.99	4	0.408	12.1	16	0.74	26.7	24	0.321	5.61	12	0.935	14.3	20	0.46	55	52	0.354	14.5	12	0.277
Liliopsida	0.874	2	0.646	7.68	8	0.466	8.97	12	0.705	2.65	3	0.449	5.7	8	0.518	16.9	26	0.631	7.01	6	0.296
Building/ Firewood	0.556	1	0.456	2.6	4	0.628	12.2	6	0.058				1.52	3	1.000	15.5	12	0.148	0.52	3	1.000
Fruit plant	2.55	3	0.466	11.7	12	0.471	18.9	18	0.397	2.81	9	0.971	8.66	12	0.493	70.9	39	0.063	54.9	9	**0.002[1]**
Vegetable	0.813	1	0.367	6.1	4	0.192	4.32	6	0.634				4.24	3	0.333	11.6	10	0.275	3.83	2	0.385
Medicinal	2.41	3	0.491	13.6	12	0.325	24.7	18	0.133	2.09	6	0.911	26	15	0.138	35.7	39	0.508	18.4	9	0.082
Multiple use	3.75	2	0.154	8.12	8	0.422	3.4	12	0.992	6.98	6	0.323	10.1	8	0.181	23.7	26	0.394	2.02	6	0.833

Table 7.19: Cross-tabulation of how people use unidentified fruit plants coded by ecosystem services with Division. For legend see Table 7.2

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
Fruit plants (U)	Provisioning	265_a	46_a	40_a	3_b	*
	Regulating/ Supporting	1_b	0_b	$0_{a, b}$	1_a	*
	Cultural	$5_{a, b}$	0_b	$0_{a, b}$	1_a	*
	Social	2_b	$1_{a, b}$	$0_{a, b}$	1_a	*

Kaloleni or Chonyi Divisions. In addition a significantly greater proportion of those in Kikambala Division use the fruit plants for cultural services compared to those in Chonyi, and for social services compared to those in Kaloleni Divisions.

7.4.6 Animals Use

Uses of animals vary and the most common three uses were extractive (Figure 7.4). Results showed that there were significant differences across ethnicities, religions, sub-districts, locations and Divisions for some types of animals (Table 7.20). However, there were no significant differences in how people use the animals based on their gender or age group (Table 7.21). While chi-square indicates a significant difference in how ethnicities use 'Big Game' animals, a post-hoc z-test (Table 7.22) shows that once a 'Bonferroni' correction was applied to account for multiple comparisons there was no significant difference. However, the analysis did show differences for how people use Artiodactyla, highlighting that a significantly greater proportion of Rabai respondents than expected use them for 'food/drink' compared to Giriama respondents. The results also showed that a significantly greater proportion of Jibana respondents use Herptiles for 'tourism and/or to make money' compared to the Giriama or Kambe. Results from a post-hoc z-test showed (Table7.23) that a significantly higher proportion of pagan respondents use big game for 'tourism and/or to make money' compared to any other religion.

A post-hoc z-test showed (Table 7.24) that a significantly greater proportion of those in Kilifi and Rabai sub-districts than expected use Artiodactyla for 'food/drink' compared to those in Kaloleni sub-district. A significantly greater proportion of those in Rabai sub-district use invertebrates as 'Guards of the Kayas' or for 'safety and protection' compared to those in Kaloleni or Kilifi sub-districts.
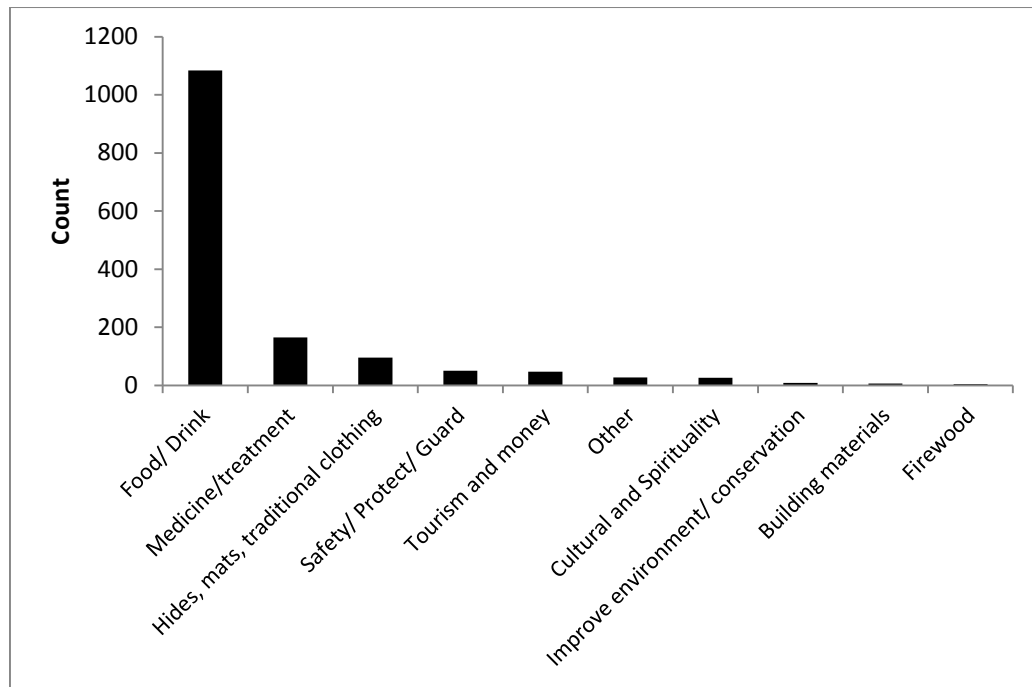
Figure 7.4: Ways animals from the Kayas are used

Table 7.20: Chi square analysis with significant results for uses of animals
For legend see Table 7.1

(A) 85.7% of cells have an expected count of less than 5 and the minimum count is 0.08; (B) 76.2% of cells have an expected count of less than 5 and the minimum count is 0.03; (C) 93.5% of cells have an expected count of less than 5 and the minimum count is 0.04; (D) 76.2% of cells have an expected count of less than 5 and the minimum count is 0.11; (E) 83.9% of cells have an expected count of less than 5 and the minimum count is 0.03; (F) 83.3% of cells have an expected count of less than 5 and the minimum count is 0.00; (G) 87.5% of cells have an expected count of less than 5 and the minimum count is 0.06; (H) 94.6% of cells have an expected count of less than 5 and the minimum count is 0.01; (I) 98.6% of cells have an expected count of less than 5 and the minimum count is 0.02; (J) 87.5% of cells have an expected count of less than 5 and the minimum count is 0.02; (K) 75.0% of cells have an expected count of less than 5 and the minimum count is 0.05

| | | χ^2 | df | p | Monte Carlo Exact 99% CI | | Cramer's V | Bootstrapped 99% CI | |
					Upper bound	Lower bound		Upper bound	Lower bound
Big Game	Ethnicity [1] (A)	50.5	36	**0.040**	0.035	0.045	0.298	0.262	0.485
	Religion [1] (B)	38.4	12	**0.027**	0.022	0.031	0.552	0.176	0.803
	Location [1] (C)	84.5	60	**0.025**	0.021	0.029	0.385	0.359	0.605
	Divisions [1] (D)	23.7	12	**0.039**	0.034	0.044	0.353	0.201	0.554
Artiodactyla	Ethnicity [1] (E)	70.7	42	**0.019**	0.015	0.022	0.219	0.175	0.283
	Sub-District [1] (F)	69.6	35	**0.047**	0.041	0.052	0.207	0.174	0.314
Herptiles	Ethnicity [1] (G)	78.3	42	**0.003**	0.001	0.004	0.311	0.267	0.453
	Location [1] (H)	151.5	91	**0.012**	0.009	0.014	0.397	0.364	0.547
Small cats	Location [1] (I)	141.4	55	**0.003**	0.002	0.005	0.717	0.394	0.861
	Division [1] (J)	70.5	15	**0.006**	0.004	0.008	0.654	0.137	0.783
Invertebrates	Sub-District [1] (K)	26.4	6	**0.006**	0.004	0.008	0.567	0.131	0.856

Table 7.21: Chi square results for uses of animals for different groups of respondents. For legend see Table 7.1

	Gender			Age			Ethnicity			Religion			Sub-District			Location			Division		
	χ^2	df	Sig	χ^2	df	Sig	χ^2	df	Sig	χ^2	df	Sig	χ^2	df	Sig	χ^2	df	Sig	χ^2	df	Sig
Aves	7.71	6	0.260	24.9	24	0.414	35.7	36	0.461	7.41	15	0.880	33.8	24	0.206	64	66	0.505	9.05	18	0.792
Small Mammals	11.6	6	0.072	19.7	24	0.713	29.3	36	0.737	14.7	15	0.414	9.6	24	0.970	89	78	0.283	5.68	18	0.953
Antelope	4.05	5	0.542	17	16	0.385	37.7	30	0.182	12.9	12	0.288	17.9	25	0.462	83.3	65	0.142	5.93	15	0.839
Big Game	6.08	6	0.415	23.8	24	0.471	50.5	36	**0.040[1]**	38.4	12	**0.027[1]**	26.7	18	0.080	84.5	60	0.025[1]	23.7	12	**0.039[1]**
Artiodactyla	4.1	7	0.768	36.1	28	0.141	70.7	42	**0.019[1]**	9.95	18	0.831	69.6	35	0.047	118.3	91	0.101	16.9	21	0.593
Invertebrates	4.39	2	0.111	4.77	8	0.782	13.7	10	0.171	4.35	4	0.492	26.4	6	**0.006[1]**	15.2	16	0.474	5.75	6	0.324
Small Cats	3.33	5	0.650	17.9	20	0.593	53	30	0.090	7.04	9	0.395	21.9	15	0.250	141.4	55	0.003[1]	70.5	15	**0.006[1]**
Primates	6.77	8	0.561	43	32	0.093	57.7	48	0.148	6.3	21	0.925	25.9	32	0.534	124.8	104	0.185	19.8	24	0.593
Herptiles	10.1	7	0.183	20.2	28	0.858	78.3	42	**0.003[1]**	25.1	21	0.280	36	35	0.373	151.5	91	0.012[1]	24.3	21	0.283

Table 7.22: Cross-tabulation of how people use animals with ethnicity
For legend see Table 7.2

		Ethnic Group							Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	
Big Game	Food/ Drink	5_a	13_a	4_a	6_a	11_a	5_a	5_a	NS
	Medicine, treatment and promoting health	0_a	9_a	2_a	4_a	1_a	2_a	4_a	NS
	Hides, Traditional clothing, bags & Mats	4_a	5_a	0_a	3_a	0_a	2_a	0_a	NS
	Safety/Protect/Guard	1_a	1_a	2_a	1_a	0_a	1_a	0_a	NS
	Improve environment/ conservation	0_a	0_a	0_a	0_a	0_a	0_a	2_a	NS
	Tourists and money	1_a	0_a	0_a	0_a	0_a	0_a	0_a	NS
	Other	0_a	1_a	0_a	0_a	0_a	0_a	0_a	NS
Artiodactyla	Food/ Drink	$45_{a, b}$	58_b	$27_{a, b}$	$35_{a, b}$	$22_{a, b}$	48_a	$8_{a, b}$	*
	Medicine, treatment and promoting health	5_a	9_a	1_a	5_a	1_a	2_a	0_a	NS
	Culture, Rituals, Spirituality, Predictions	0_a	6_a	3_a	0_a	0_a	0_a	0_a	NS
	Hides, Traditional clothing, bags & Mats	5_a	9_a	1_a	0_a	0_a	3_a	0_a	NS
	Safety/ Protect/ Guard	0_a	1_a	0_a	6_a	0_a	1_a	1_a	NS
	Building materials	0_a	1_a	0_a	1_a	0_a	1_a	0_a	NS
	Firewood	0_a	1_a	0_a	0_a	0_a	0_a	0_a	NS
	Other	0_a	8_a	0_a	3_a	1_a	0_a	0_a	NS
Herptiles	Food/ Drink	0_a	3_a	0_a	3_a	3_a	1_a	0_a	NS
	Medicine, treatment and promoting health	8_a	32_a	8_a	7_a	2_a	9_a	4_a	NS
	Culture, Rituals, Spirituality, Predictions	0_a	7_a	0_a	1_a	1_a	0_a	0_a	NS
	Hides, Traditional clothing, bags & Mats	1_a	8_a	0_a	4_a	0_a	3_a	0_a	NS
	Safety/ Protect/ Guard	1_a	4_a	3_a	2_a	3_a	0_a	0_a	NS
	Improve environment/ conservation	0_a	1_a	1_a	0_a	0_a	0_a	0_a	NS
	Tourists and money	$1_{a, b, c}$	2_c	8_a	$0_{b, c}$	$0_{a, b, c}$	$0_{a, b, c}$	$0_{a, b, c}$	*
	Other	0_a	2_a	0_a	2_a	0_a	0_a	0_a	NS

Table 7.23: Cross-tabulation of how people use animals with religion
For legend see Table 7.2

		Religion			Sig
		Christian	Muslim	Pagan	
Big Game	Food/ Drink	17_a	8_a	0_a	NS
	Medicine, treatment and promoting health	12_a	6_a	0_a	NS
	Hides, Traditional clothing, bags & Mats	7_a	4_a	1_a	NS
	Safety/Protect/Guard	4_a	0_a	0_a	NS
	Improve environment/conservation	2_a	0_a	0_a	NS
	Tourists and money	0_b	0_b	1_a	*
	Other	0_a	1_a	0_a	NS

Table 7.24: Cross-tabulation of how people use animals with Sub-District
For legend see Table 7.2

		Sub-District						Sig
		Ganze	Junju	Kaloleni	Kilifi	Mariakani	Rabai	
Artiodactyla	Food/ Drink	$24_{a,b}$	$1_{a,b}$	85_b	71_a	$0_{a,b}$	68_a	*
	Medicine, treatment and promoting health	$1_{a,b}$	1_a	$13_{a,b}$	$6_{a,b}$	$0_{a,b}$	2_b	*
	Culture, Rituals, Spirituality, Predictions	0_a	0_a	9_a	0_a	0_a	0_a	NS
	Hides, Traditional clothing, bags & Mats	0_b	$0_{a,b}$	8_b	6_b	1_a	3_b	*
	Safety/Protect/Guard	0_a	0_a	3_a	0_a	0_a	6_a	NS
	Building materials	0_a	0_a	2_a	0_a	0_a	1_a	NS
	Firewood	0_a	0_a	1_a	0_a	0_a	0_a	NS
	Other	1_a	0_a	10_a	1_a	0_a	0_a	NS
Invertebrates	Food/ Drink	1_a		11_a	16_a		0_a	NS
	Medicine, treatment and promoting health	0_a		9_a	2_a		0_a	NS
	Safety/Protect/Guard	$0_{a,b}$		1_b	0_b		1_a	*

As was noted for ethnicity, whilst the Chi-square results indicated a significant difference in how 'big game' animals are used across the locations, the post-hoc z-test showed that once a Bonferroni correction was applied to account for multiple comparisons there was no longer a significant difference observed (Table A3.27, Appendix 3). A significantly greater proportion of those in Junju location than expected use small cats for 'tourism/money' compared to those in Kaya Fungo location. Significantly fewer of those in Jibana location use herptiles for food/drink than expected compared to those in Chivara or Kauma locations. A significantly greater proportion of those in Junju use herptiles for 'tourism/money' compared to those in Kambe and Kaya Fungo locations. A post-hoc z-test showed (Table 7.25) that a significantly greater proportion of those in Ganze Division than expected use 'big game' animals for 'food/drink' compared to those in Kaloleni. A significantly greater proportion than expected of those in Ganze Division use small cats as 'guards of the Kayas' and/or for 'safety/protection' compared to those in Kaloleni or Chonyi Divisions.

Table 7.25: Cross-tabulation of how people use animals with Division
For legend see Table 7.2

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
Big Game	Food/ Drink	32_b	$5_{a,b}$	12_a		*
	Medicine, treatment and promoting health	21_a	0_a	1_a		NS
	Hides, Traditional clothing, bags & Mats	11_a	3_a	0_a		NS
	Safety/Protect/Guard	5_a	1_a	0_a		NS
	Improve environment/conservation	2_a	0_a	0_a		NS
	Tourists and money	0_b	1_a	$0_{a,b}$		*
	Other	1_a	0_a	0_a		NS
Small Cats	Food/ Drink	23_a	5_a	0_a	0_a	NS
	Medicine, treatment and promoting health	14_a	3_a	0_a	0_a	NS
	Culture, Rituals, Spirituality, Predictions	1_a	0_a	0_a	0_a	NS
	Safety/Protect/Guard	5_b	0_b	2_a	$0_{a,b}$	*
	Tourists and money	0_b	0_b	$0_{a,b}$	1_a	*
	Other	1_a	0_a	0_a	0_a	NS

7.4.7 Animal Use grouped by ecosystem services

The results showed that the most common ES that animals provide is provisioning services (figure 7.5). Chi-square analysis showed that for some uses of animals there were significant differences across genders, ethnicities and locations (Table 7.26). However, there were no significant differences across age groups, religions, sub-districts or divisions (Table 27). Results from a post-hoc z-test highlighted that a significantly greater proportion of men use small mammals for provisioning services compared to women. While Chi-square indicated a significant difference in how 'big game' animals are used across ethnicities, a post-hoc z-test with adjustments made to account for multiple comparisons (using the Bonferroni method) did not show any significant differences across the ethnicities (Table 7.28). There were also no significant differences observed across the different uses for Artiodactyla once this correction is applied. However there were significant differences seen for both primates and herptiles. A significantly greater proportion of Kambe respondents use primates for provisioning services than expected compared to Jibana respondents, however, a significantly greater proportion of Jibana respondents use them for social services than expected compared to Kambe respondents. A significantly greater proportion of Rabai respondents use herptiles for provisioning services than expected compared to Jibana respondents, whereas, a significantly greater proportion of Jibana respondents use them for
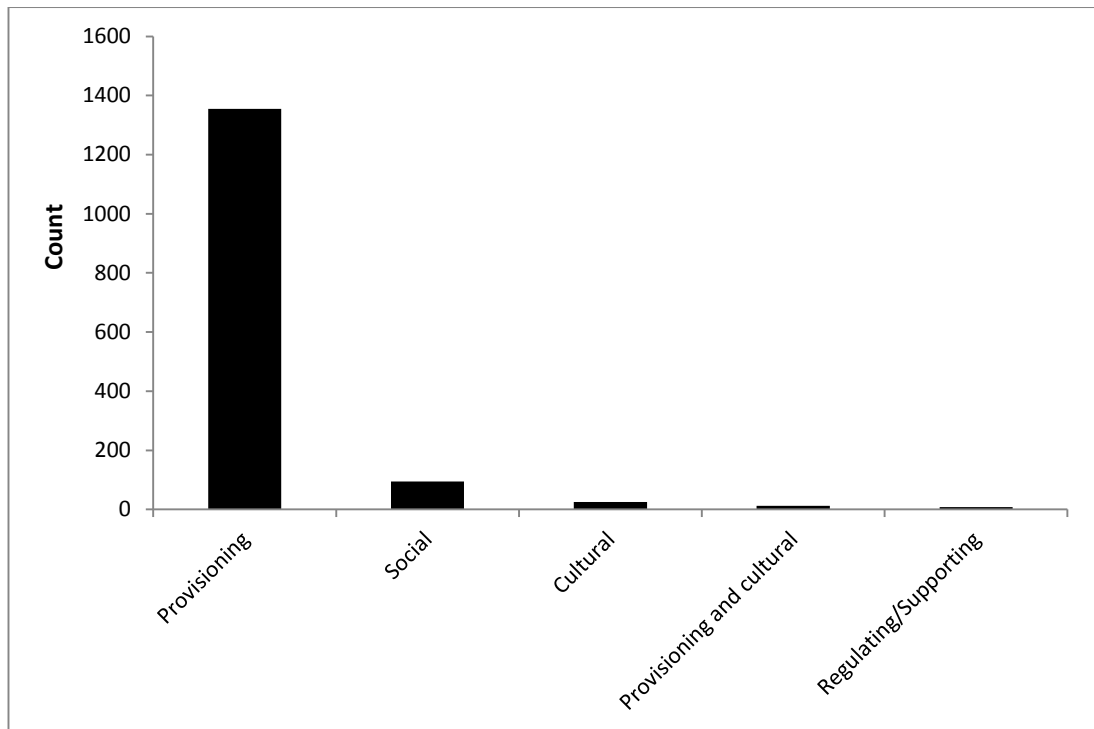
Figure 7.5: How animals from the Kayas are used grouped by ecosystem

Table 7.26: Chi square analysis with significant results for uses of animals
For legend see Table 7.1
[A] 75.0% of cells have an expected count of less than 5 and the minimum count is 0.42
[B] 66.7% of cells have an expected count of less than 5 and the minimum count is 0.17
[C] 75.8% of cells have an expected count of less than 5 and the minimum count is 0.09
[D] 75.0% of cells have an expected count of less than 5 and the minimum count is 0.11
[E] 64.3% of cells have an expected count of less than 5 and the minimum count is 0.08
[F] 75.0% of cells have an expected count of less than 5 and the minimum count is 0.06

		χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
					Upper bound	Lower bound		Upper bound	Lower bound
Small mammals	Gender [1] [A]	7.80	3	**0.020**	0.016	0.023	0.186	0.077	0.288
Big Game	Ethnicity [1] [B]	23.1	12	**0.028**	0.024	0.033	0.351	0.206	0.663
	Location [1] [C]	33.6	20	**0.029**	0.025	0.034	0.423	0.296	0.682
Artiodactyla	Ethnicity [1] [D]	42.0	18	**0.007**	0.005	0.010	0.211	0.155	0.340
Primates	Ethnicity [1] [E]	31.2	18	**0.024**	0.020	0.028	0.208	0.155	0.408
Herptiles	Ethnicity [1] [F]	33.5	18	**0.027**	0.023	0.028	0.292	0.207	0.493

Table 7.27: Chi square results for uses of animals grouped by 'ES' for different groups of respondents. For legend see Table 7.1

	Gender			Age			Ethnicity			Religion			Sub-District			Location			Division		
	χ^2	df	Sig.	χ^2	df	Sig.	χ^2	df	Sig.	χ^2	df	Sig.	χ^2	df	Sig.	χ^2	df	Sig.	χ^2	df	Sig.
Aves	4.91	3	0.176	7.22	8	0.513	23.7	12	0.073	4.9	6	0.557	9.23	8	0.327	36.7	22	0.102	1.75	6	0.833
Small Mammals	7.8	3	**0.020[1]**	7.33	8	0.501	13.5	12	0.45	0.519	3	0.915	3.05	8	1.000	17.9	26	0.544	1.1	6	1.000
Antelope	2.62	2	0.225	10.2	8	0.254	14	12	0.263	1.22	6	0.976	3.13	10	0.875	25.6	26	0.358	1.798	6	0.902
Big Game	3.18	3	0.427	11.3	8	0.186	23.1	12	**0.028[1]**	7.52	4	0.111	4.99	6	0.555	33.6	20	0.029	4.00	4	0.395
Artiodactyla	3.6	4	0.504	16.2	12	0.181	42	18	**0.007[1]**	3.95	6	0.683	25.2	15	0.134	58.5	39	0.070	7.37	9	0.501
Invertebrates	2.21	1	0.137	2.15	4	0.709	5.8	5	0.246	0.414	2	0.813	20.5	3	0.099	5.8	8	0.477	0.771	3	1.000
Small Cats	2.01	3	1.000	8.12	8	0.422	15	12	0.213	0.568	3	0.904	13.7	6	0.108	29.7	20	0.110	19.2	6	0.059
Primates	1.57	4	0.958	16.9	12	0.154	31.2	18	**0.024[1]**	2.68	6	0.847	11.8	12	0.351	50.8	39	0.180	10.5	9	0.321
Herptiles	8.53	4	0.055	13	12	0.372	33.5	18	**0.027[1]**	10.7	9	0.298	8.61	15	0.711	60.4	39	0.077	5.14	9	0.634

Table 7.28: Cross-tabulation of how people use animals (grouped by ecosystem services) with ethnicity. For legend see Table 7.2

		Ethnic Group							Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	
Big Game	Provisioning	9_a	27_a	6_a	13_a	12_a	9_a	9_a	NS
	Regulating/Supporting	0_a	0_a	0_a	0_a	0_a	0_a	2_a	NS
	Social	2_a	1_a	2_a	1_a	0_a	1_a	0_a	NS
Artiodactyla	Provisioning	54_a	84_a	28_a	44_a	23_a	52_a	8_a	NS
	Cultural	0_a	6_a	3_a	0_a	0_a	0_a	0_a	NS
	Social	0_a	1_a	0_a	6_a	0_a	1_a	1_a	NS
	Provisioning and Cultural	1_a	0_a	1_a	0_a	0_a	2_a	0_a	NS
Primates	Provisioning	$28_{a, b}$	$63_{a, b}$	20_b	25_a	$20_{a, b}$	$21_{a, b}$	$17_{a, b}$	*
	Regulating/Supporting	0_a	1_a	0_a	0_a	0_a	0_a	2_a	NS
	Cultural	0_a	1_a	0_a	0_a	0_a	0_a	0_a	NS
	Social	$11_{a, b}$	$15_{a, b}$	9_a	0_b	$2_{a, b}$	$4_{a, b}$	$1_{a, b}$	*
Herptiles	Provisioning	$10_{a, b}$	$45_{a, b}$	9_b	$14_{a, b}$	$5_{a, b}$	13_a	$4_{a, b}$	*
	Regulating/Supporting	0_a	1_a	1_a	0_a	0_a	0_a	0_a	NS
	Cultural	0_a	6_a	0_a	1_a	1_a	0_a	0_a	NS
	Social	$1_{a, b, c}$	5_c	10_a	$2_{a, b, c}$	$3_{a, b, c}$	$0_{b, c}$	$0_{a, b, c}$	*

social services compared to the Rabai or Giriama. Results from a post-hoc z-test found that once adjustments are made to account for multiple comparisons (using Bonferroni method) there was no significant difference across the locations for how they use 'big game' animals.

7.5 Discussion

7.5.1 Use of plants and animals from the Kayas

Over-exploitation of plants and animals is a key concern of conservation, and is also an issue for the Kaya forests (Wright, 2003). While the Kayas and other SNS were found to be important to local culture and spirituality (see Chapters Four, Five and 6.4.3 and 6.4.6), as well as for conservation locally and globally (Chapter Three, Burgess et al., 2000; Githitho, 2003; Matiku, 2003; Azeria et al., 2007; UNESCO, 2008; Metcalfe et al., 2010), it has also been noted that they are important resource sites for local populations (Chapter Five; Nyamweru, 1997; Githitho, 2003; Matiku, 2003). The use of resources from SNS is observed around the world. For example, SG in Sierra Leone provide local communities with a range of plant

products from firewood to dyes, fruit to building materials (Lebbie and Guries, 2008). In addition, in SG in Sichuan, China, it has been observed that there has been an increase in the exploitation of NTFP, (Wang et al., 2012) and in Madagascar the main forest products which are obtained from the Analavelona SG are building materials, fuel wood and food (Horning, 2008). To date the research into resource use in the north coast Kayas has been limited. As discussed previously, Nyamweru (1997) conducted a survey which included questions on the use of water, firewood and wild plant use (such as fruit and medicinal plants) resources from the Kayas. This research was conducted on a small scale, looking at only a few sites and it focused only on a limited range of uses of plants.

This study therefore sought to identify the full range of uses of plants and animals from the Kayas, and provide detailed information on the types of plants and animals used, as well as the potential impact of these uses on conservation. Respondents were asked which plants and animals they use, and how they use them. The majority of people said that they do use plants and animals from the Kayas (Figure 5.8). The results showed that over 270 individuals who claim not to use the Kayas do use plants and animals from the Kayas. This shows that there is contradiction between how some respondents view 'using the Kayas' and resource access. In addition it highlights again contradictions between responses given and behaviour exhibited. Therefore the conservation management of these sites must be sympathetic to local cultures and values, while also responding to the current activities and interactions that exist between local communities and the sites that are being conserved.

The results show that a range of plants and animals from the Kayas are used in a variety of ways, the majority of which are extractive (Tables 7.7 – 7.9, Figures 7.2 – 7.5). There were some difficulties with identification of plant species in the survey. A number of respondents stated that while they were able to identify the plants by sight themselves and their associated uses, they did not know the plants' names (therefore many were identified by use). A number of people gave names to plants and animals that could not be translated and some people named plants according to their use. These results indicate that there is a substantial wealth of local knowledge about the plants and animals of the Kayas and their uses through personal experience. However, further research needs to be done to investigate this knowledge, and to create a comprehensive catalogue of what plants and animals the Kayas contain and how they are used. A few individuals stated in their interview that they would be able to show the plants to the interviewer, therefore this method could

be used in future research to catalogue the plants and animals used and list the names the local people have for them. This would provide a more comprehensive list of the plants and animals used by the local communities and in what capacity. Despite the lack of details about some plants, it was found that the most common uses for plants were for food, medicine, firewood and building materials (Figure 7.2 and Table 7.7).

The ways in which plants are used varies according to the type of plant (Table 7.15, 7.16 and 7.19) and these differences could impact upon their importance to the local communities, the levels of extraction, and the degree to which they are threatened by extraction. Uses of plants are predominantly for personal use; however, fruits from the Kayas are sometimes sold (Shepheard-Walwyn, personal observation, 2013), and charcoal production is a common source of income in the region (Githitho, 2003; Matiku, 2003). The extraction of wood for building materials, firewood and charcoal production is known to be a major threat to forests (Naughton-Treves *et al.,* 2006; Makonjio *et al.,* 2010), and the extraction of plant products for food and medicinal purposes could threaten both the integrity of the Kaya habitats as well as biodiversity. The results indicate that there is a difference across the ethnic groups and the areas in the level of plant use (Tables 7.2 – 7.5). The differences in how plants are used may indicate differences in the cultures across the ethnicities, and therefore different rules or traditions about how plants are used. Differences may also arise due to the types of plants that are found at the sites within different locations or their abundance. Plants that are more commonly found at a particular site may be used for more common purposes (such as food/firewood) than in sites where the species are relatively rare.

It was found that the uses given for the plants were easily grouped into the modified list of ES produced in Chapter Five. When uses are categorised by their ES the majority of responses are provisioning (Table 7.9, Figure 7.3). When looking at how different groups use the plants according to the ecosystem services, it was found that there was little difference found across the groups (Table 7.18). The only significant difference was found across the Divisions (Table 7.19). The differences in use across the Divisions may reflect a difference in the rules associated with the sites in the area, and therefore people may use plants in different ways in accordance to those rules, or it may be based on the availability of different types of plants within the different forests and how they can be used.

As well as using plants from the forests, local people also use animals. The main uses of animals are for food (Figure 7.4). Evidence of hunting from SNS and the hunting of sacred species has been recorded across Africa in places such as Madagascar (Andriamarovololona and Jones, 2012), Uganda (Banana et al., 2008) and Ghana (Ormsby, 2012). Studies have also shown that bushmeat is hunted in Kilifi District and that harvesting rates reduced the abundance of a number of species (Fitzgibbon et al., 1995). Bushmeat extraction, which is one of the main uses for animals, can provide vital sources of protein to rural communities, however unsustainable harvesting levels are a major threat to biodiversity both in Africa and globally (FitzGibbon et al., 1995; Wilkie et al., 2011), and Wilkie et al., (2011: 121) note it as "presenting the most serious threat to mammals and birds after habitat loss". To date there has been little research into the ways in which animals from the Kayas are used.

At present, due to the lack of information on the rate of extraction from the sites, it is not possible to know whether the current levels of extraction are sustainable. However, based on the level of degradation within the sites (seen in Chapter Three) it is probable that they are not. There is a significant difference in how various types of animals are used (Table A3.25, Appendix 3). For example, birds and small mammals are predominantly used for food, but they are also used for cultural purposes. This indicates that both birds and small mammals are still important to local cultural practices. If these values and traditions can be strengthened, it is possible that cultural values could help to protect relevant species. The protection of species through cultural values and social taboos has been noted in a number of places such as Madagascar (Jones et al., 2008) and Brazil (Pezzuti et al., 2010), and such institutions could be important for the conservation of species in the Kayas. The results show that along with being important for food, antelopes are used for hides and/or traditional clothing. The prevalence of uses that are in accordance with cultural and traditional activities indicates that while there are departures found from traditional laws and practices, they have not been completely lost.

Of the small mammals noted, shrews were often mentioned. As mentioned in Chapter Three, the golden-rumped elephant-shrew is an endangered endemic species (FitzGibbon, 1994; FitzGibbon, 1995), and it is possible that the shrew may be found in a number of the sites. Whilst there are other more common species of shrew in the region, such as the Four-toed Elephant-Shrew, (*Petrodromus tetradactylus*) (FitzGibbon, 1995), it is possible that some of the observations of shrews within the Kayas are of Golden-rumped Elephant-Shrew. If in

some instances, it is the Golden-rumped Elephant-Shrew, understanding the type of use (extractive or non-extractive) could be important for the preservation of the species. This is because hunting of the Elephant-Shrew is already known to threaten its survival within other sites, and due to its rarity, it is a threat to the survival of the species in general (FitzGibbon et al., 1995). Therefore, further work needs to be done to identify which shrews are being used and in what way, so as to assess the potential impact on the protection of this endangered and endemic species.

Invertebrates were also found to be used for food. While the majority of the 'food' listed from invertebrates is honey (57.7%), a number were listed as just food, or 'relish'. The use of invertebrates as a source of food has been common amongst societies for millennia (FAO 2013). The consumption of insects is known as entomophagy, and whilst it is considered taboo in most western countires, it is common in many other areas of the world, with insects providing protein in at least 2 billion people's diets (FAO, 2013). The American Indians ate invertebrates in time of famine (Skinner, 1910), and invertebrates are recorded as an important part of the diet of indigenous Amazonian populations, as well as many communities in Africa, Asia and Austrailia (Dufour, 1987; Paoletti et al., 2000;Oniang et al., 2003; FAO, 2010; FAO 2013). The use of insects as a food resource is noted as being beneficial both to people and the environment, they are high in protein (and in some cases fat), there is a wide availability of a range of species, and their harvesting is more likely to be sustainable (Ramos – Elorduy, 1997; Paoletti et al., 2000; FAO, 2010; FAO, 2013). Promotion of insects as a food source in the areas surrounding the Kayas could therefore be beneficial both to the local populations (through improved nutrition) as well as the natural environment. In contrast, to most of the animals noted, the primary use for herptiles is for medicine. The herptiles listed included snakes (such as pythons), lizards and tortoises. The use of such species for medicine is extractive, and could pose a threat to the survival of the species within the region.

Differences in how people use the animals were noted for ethnicities, religions and area (Table 7.20 – 7.25). Differences in uses could demonstrate differences in cultural norms, preferences, and abundance of animals within the region. As was noted for the plants, uses of animals can be categorised according to ES. There was variation in the ES that people thought that animals provided (Figure 7.5), with significant differences across ethnicities (Tables 7.28). The main ES noted was provisioning. As has already been noted, the

differences in the uses of animals for provisioning, social and cultural services could reflect differing levels of need in different locations, as well as different social norms and taboos or abundance/availability of animals in different areas. Further research into the drivers for the different uses of animals across sites and between groups is needed to gain a better understanding of how such uses may impact conservation.

While extractive uses of plants and animals could be a threat to habitats and biodiversity within the sites, they also give them value. It has been observed that if natural environments have value then local communities are likely to support their protection (Kellert, 1996; Chawala, 1998; Githitho, 1998; Jepson and Canney, 2003; Turvey et al., 2010). Therefore due to their importance for these resources it is probable that the local communities will support conservation which will help to ensure their continued provision, or interventions that seek to provide them in other ways. For example, if it is compatible with the local culture, this could include plant nurseries to grow medicinal plants outside of the Kayas so that they do not need to be collected from the wild, as is recommended in the "Guidelines on the Conservation of Medicinal Plants" (WHO, IUCN, & WWF, 1993). Domestic plant farming has been trialed in the region before (Githitho, 2003), which suggests that such interventions are possible within this area, the findings from this research suggest that such initiatives should therefore be looked into further.

The results show a departure from traditional laws, which prevent extractions of plants and animals (Spear, 1978), and supports the findings in Chapter Five where a large number of interviewees reported not adhering to the customary laws associated with the sites. The extraction of resources against customary laws, and the breaking of taboos have been noted at other SNS and for species elsewhere in the world too. For example in the Magezigoomu SG, Uganda, people extract wood for timber, and to produce charcoal against the customary laws (Banana et al., 2008) and it has been noted that in Madagascar people may break taboos associated with finding or eating species which are traditionally taboo (Andriamarovololona and Jones, 2012). While Andriamarovololona and Jones (2012) stress that taboos and customary laws are still important to local people and can help the conservation of species, this study highlights that the shift away from some traditional practices may be happening on a global scale, and such changes need to be taken into account in the conservation of SNS and species.

However, as noted in Chapter Five, breaking of taboos and laws may not only be due to a departure from traditional customs. Personal circumstances can result in people behaving in ways which are contradictory to their own personal values (Kühl et al., 2009). As the majority of the populations surrounding the sites are poor (Nyamweru, 1997; Matiku, 2003; SID, 2014), it is possible that their need for resources, overrules their personal belief and values systems. However, while the motives behind the behaviours are different, and could change with changes in resource access, the end outcome of overexploitation is currently the same. Such extraction could be detrimental to the biodiversity and habitats within the SNS. As there is no monitoring of the scale of extraction, and it is not accounted for within the management plans, this poses a threat to the survival of the sites. The behaviours observed, and lack of monitoring of extraction, bring the legitimacy of the current management plan, which assumes local population follow the laws associated with the sites, into question and could help to explain its inefficacy in preventing the destruction of the sites (NMK, 2008, Bresnehan, 2010).

7.5.2 Impact of Use on conservation

The use of plants and animals could have both a positive and negative impact on the preservation of the sites. While resources give sites value and may help to generate support for conservation, overexploitation can be highly detrimental to the preservation of sites and their biodiversity. Knowing which plants and animals are used in which areas by different people can enable monitoring of sites or focal species and help to better understand the relevant pressures on the ecosystems, as well as facilitating more tailored and effective interventions and conservation management plans. Therefore further research needs to be done to comprehensively analyse the impact that the use of plants and animals from the Kayas may have on the conservation of the sites and their biodiversity.

The level of extractive use of plants and animals by a wide range of the local community, and the limited size of the majority of the sites (Chapter Three) which are not being effectively monitored or managed, support the findings of Githitho (2003), that over-exploitation of the biodiversity within the sites is likely to be contributing to their degradtion. However, such use highlights the importance of the sites to the local communities beyond their sanctity. As a large number of the local population no longer believe the sites to be sacred (Chapter 5.4.4), the importance of resources could be used to find new ways of engaging additional members of the community in the conservation of the sites. In addition, although the level

of response was low, a few people did note plants and animals as being used for conservation. This demonstrates that the issue of conservation, and the importance of the sites and the biodiversity they contain, is already understood by some of the community. If this understanding and knowledge can be used and further communicated to other members of the local community it is likely that such changes in attitudes would help to gain further support for conservation management plans from the local communities.

7.5.3 Traditional Knowledge

The responses given indicate a wealth of traditional knowledge of the plants and animals as well as their uses. While in some circumstances there appears to be a limited level of technical knowledge (i.e. the names of plants and animals), there is a wide range of applied knowledge, and most people listed a variety of uses from different plants and animals. Although people were not able to name some of the plants and animals, it is evident that they can find them within the forests, and have knowledge of their different uses. This local knowledge is highly specialised, and further investigations, which include going with local people into the forests to identify the plants and animals that they use, could be valuable both to conservation, and for investigating possible additional uses not yet known at a wider level. As noted in Chapter 1.1, the indigenous knowledge from around the world has led to a range of products such as dyes, medicines and building materials (Hoekstra, 2010), and it is possible that information obtained from further research into the use of plants and animals from the Kayas could lead to similar findings. With regards to conservation, the local indigenous knowledge could help to identify previously unknown populations, and potentially unknown species. It could also help to identify ways to promote the benefit of wildlife and its conservation both locally and on a global scale.

7.6 Conclusions

The results show a departure from traditional customs and a prevalence of behaviours that are in violation of the laws associated with the sites, with the majority of people using plants and animals from the Kayas in an extractive manner which is in direct contradiction of the traditional laws associated with the sites (Spear, 1978). These results show that the assumption that the majority of the local population respect and follow the laws, as is stated in the management plans (NMK, 2008), is incorrect. As the management plan is based on these customary laws, the results suggest that current plans are not effective in conserving the local biodiversity and are not likely to be in the future.

While the extractive use of plants and animals is against the laws associated with the SNS, and may currently be leading to the degradation of the sites and their ecosystems, it does highlight their importance to the local community. The local populations surrounding the sites are poor (Nyamweru, 1997; Matiku, 2003; Nyamweru et al., 2008; SID, 2014), and as is shown in Chapter Three the SNS in the area make up almost all the forested areas in the region. Therefore the use of the SNS is often the only way that these communities can access vital resources. The conservation of the sites must reflect the current situation in the region, and working with the local populations is the only way to fully understand this. If sustainable resource use is not possible from the Kayas (as has been suggested by Nyamweru (1997) and Githitho (2003)), alternatives need to be provided. As the sites have value to the local populations both for cultural and spiritual purposes, as well as resource use, conservation interventions and management is likely to be supported by them. The type of management would be more efficient if it were responsive to the needs and values of the local communities. As these vary in different areas, it is important that management is conducted on a site-by-site basis working with each specific local community.

In situations where sustainable resource use is possible, conservation management will need to allow for the use of the sites and their resources while still retaining their sanctity. In situations where sustainable use is not feasible, interventions must provide alternative resources, which will be crucial for continuing preservation of the SNS. Management plans must be developed with the local communities, and reflect the range of values and uses associated with the sites in order to provide sustainable and effective conservation. Approaches to this are discussed further in Chapter Nine.

Chapter 8: Transmission of knowledge and future conservation

8.1 Abstract

There is a strong link between culture and the environment, and the conservation of culture can help to preserve the natural environment and biodiversity. The preservation of local indigenous heritage is important to the preservation of biodiversity at sacred natural sites (SNS). To date research on the extent of local cultural knowledge and its transmission amongst the Mijikenda community has been lacking. This information is key to understanding the need for interventions to help promote cultural preservation. Studies into the perceptions of the local populations surrounding the Mijikenda SNS of the north coast towards conservation have also been lacking. This project sought to understand the level of existing cultural knowledge, how it has been taught in the past, and perceptions of how it should be passed on in the future, as well as to investigate attitudes towards the need for conservation and who should be responsible for it. The results show that while most people remember being taught about their culture, a large proportion of respondents do not. In addition, the ways in which people think cultural knowledge should be passed on to children is different from how it has been done in the past reflecting a change in attitudes towards knowledge transmission. The majority of the local communities are concerned about the degradation of both the local Mijikenda cultures as well as the natural environment, and while some people noted an interest in governmental control, the majority felt that the local Mijikenda communities should be in charge. However, while local people want the autonomy to conserve their culture and environments, the results indicate that they currently lack the knowledge, skills, resources and funding to do so without assistance. Based on the decrease in knowledge transmission, new approaches to education as well as support and information sharing will be needed across the communities to achieve the conservation of local cultures. The results suggest that interventions which seek to combine the preservation of cultural heritage and biodiversity would be most effective, and local communities would engage with these projects. However, due to the diversity of attitudes and perceptions future management plans need to be designed on a site-by site basis.

8.2 Introduction

8.2.1 Culture and biodiversity

As discussed in chapter 1.1.2 there is an interaction between culture and the natural environment and it has been argued that "biological, cultural and linguistic diversity are co-evolved, interdependent and mutually reinforced" (Djoghlaf, 2012: xvii). The ways in which people interact with nature and the views they have of it arise from and reflect cultural traditions, and in turn the natural environment in which people live shapes their cultures (Vecsey, 1980; Rist et al., 2003; Selin, 2003). Research has shown that in a number of places around the world there is an association between cultural, linguistic and biological diversity (Sutherland, 1993; Maffi, 2005; Djoghlaf, 2012). In addition, threats which affect biodiversity can also act as a threat to cultural diversity and the loss of one can be linked to the loss of the other (Sutherland, 1993; Maiero & Shen, 2004; Turvey *et al.,* 2010). A loss of culture can lead to a loss in biodiversity, through a reduction of knowledge and practices which help to preserve natural environments and species (Selin, 2003; Berkes and Davidson-Hunt, 2006; Turvey et al., 2010; Verschuuren, 2012). This link has been noted particularly for sacred natural sites (SNS), where the loss of knowledge and adherence to traditional belief systems and practices has led to the degradation and in some cases loss of sites all together (Khalil et al., 1992; Berhane-Selassie, 2008; Verschuuren, 2012). As highlighted in chapter 1.2.3, the loss of SNS due to declines in adherence to traditional practices has already been observed for Mijikenda Kayas on the south coast of Kenya (Khalil et al., 1992), and Githitho (2003) argues that, along with other factors, the Mijikenda SNS are under threat due to a loss of cultural knowledge, values and respect (chapter 1.2.2 and 1.2.3). Therefore the preservation of culture and cultural knowledge is vital to biodiversity conservation, particularly at SNS.

However, it has been observed that the way in which many indigenous communities view the natural world, and their cultures, varies from the interpretations made in the academic literature (Foley, 2003). For example, some American Indians believe that the environment is made up of beings with souls (Vercsey, 1980). Thus, it has been argued that jointly protecting culture and nature requires the integration of traditional viewpoints into management (Foley, 2003; Adams, 2004; Fischer et al., 2013). As noted in Chapter 1.1.2, links between cultural and environmental conservation have been found, such as the preservation cultures in Madagascar where taboos have helped to protect certain threatened species including the lemur *Propithecus edwardsi* and the carnivore *Cryptoprocta ferox* (Jones *et al.* 2008). Following on from these observations it can be argued that understanding how the perceptions of the Mijikenda may align or differ from those presented in the literature is

important for creating more effective conservation management plans. To date, no research has been done to specifically investigate if the local Mijikenda populations around the SNS think that there is a connection between preserving their local culture and protecting the natural environment. In addition there is a lack of information on the way in which cultural knowledge is currently being passed on among the Mijikenda populations, as well as their attitudes towards the loss of culture. All these factors must be investigated to understand if, and how, joint conservation of cultural heritage and biodiversity can be achieved in the region.

8.2.2 Approaches to cultural and biodiversity management

As noted in chapter 1.1.1, some approaches to the conservation can result in conflicts between local populations and government and/or NGOs, especially when local people are not adequately involved in conservation planning. Such disputes include those pertaining to the alteration or prevention of cultural practices associated with certain sites, as well as the misuse of SNS (such as through tourism), which are of particular concern when seeking to protect SNS (Infield, 2001; Adams, 2004; O'Leary et al., 2004; Berkes, 2007; Wild and McLeod, 2008). Therefore when developing plans for the preservation of cultural heritage and SNS (as well as the biodiversity they contain), it is important that the views and attitudes of the local populations are taken into account, and where appropriate autonomy should be given to local communities to protect their culture and associated natural sites (Infield, 2001; 2004; Berkes, 2007; Wild and McLeod, 2008). As noted in chapter 1.2.7 and chapter 4.1.1, currently the conservation management of the Mijikenda SNS is in line with suggestions in the literature, as it is based on traditional rules and punishments, that the local Kaya Elders are left to enforce and manage (NMK, 2008). However, as argued by Bresnahan (2010), this management approach does not reflect the diversity of the current population, changes within the society, or their reduced ability to effectively manage the sites due to lack of adherence and knowledge/understanding of the traditional culture and laws, as well as the availability of funds and resources. In addition, as the current population is so diverse (as highlighted in Chapter Four), and there have been shifts in behaviours, values and viewpoints across the communities (Chapters Four to Six), the current management approach is no longer in keeping with the attitudes and values of the local populations surrounding the sites today. Therefore understanding whom the local people think should be in charge of the conservation of culture and the environment now is of vital importance to its efficacy.

In order to better understand local attitudes towards the conservation of their culture and the local environment, this project sought to investigate how knowledge about their culture should be passed on to future generations, and who they felt should be in charge of the preservation of culture and the environment. However, as noted by Kühl et al., (2009), attitudes alone do not determine behaviour. Knowledge, means and ability to put actions into effect are required. Therefore, whilst this research will help to highlight how and by whom local people think education and conservation of culture and the environment, should be done, it does not reflect the ability of those groups to do so. Transmission of knowledge and conservation require action and (for the case of conservation management) enforcement, therefore funds, skills and resources are all required. So while the results may highlight local values and perceptions towards transmission of cultural knowledge and conservation approaches, they do not reflect upon their feasibility.

8.2.3 Research Question

Main Question: What is the perceived correlation between culture and conservation amongst the Mijikenda, and how might the relationship between cultural knowledge and conservation, as well as attitudes towards conservation approaches affect the management and protection of the Mijikenda SNS?

Null Hypothesis: Local people do not perceive there to be a connection between culture and conservation, and the relationship between the two, as well as attitudes towards conservation approaches will have no impact on the management and protection of the Mijikenda SNS.

Sub Questions

1. Do local people think there is a connection between the protection of traditional culture and the local environment?

Null Hypothesis: Local people do not think there is a connection between the protection of traditional culture and the local environment

2. Do respondents remember being taught about their culture?

Null Hypothesis: Respondents do not remember being taught about their culture

3. Is there a difference across demographic groups as to whether or not respondetns remember being taught about their culture?

Null Hypothesis: There is no difference across demographic groups as to whether or not respondetns remember being taught about their culture

4. Do respondents think it is important that children are taught about their culture?

Null Hypothesis: Respondents do not think it is important that children are taught about their culture

5. Is there a difference across demographic groups as to whether respondents think it is important that children are taught about their culture?

Null Hypothesis: There is no difference across demographic groups as to whether respondents think it is important that children are taught about their culture

6. Were respondents taught about their culture by different people and in different ways?

Null Hypothesis: Respondents were not taught about their culture by different people and in different ways

7. Do respondents think that children should be taught about their culture by different people or in different ways compared to how they were taught?

Null Hypothesis: Respondents do not think that children should be taught about their culture by different people or in different ways compared to how they were taught

8. Are respondents concerned about the loss of the traditional Mijikenda culture?

Null Hypothesis: Respondents are not concerned about the loss of the traditional Mijikenda culture

9. Do different demographic groups think that different people should be responsible for the protection of the local culture?

Null Hypothesis: Different demographic groups do not think that different people should be responsible for the protection of the local culture

10. Do respondents think that the local environment is being damaged? – If so, what are the perceptions of local people towards different reasons for the damage?

Null Hypothesis: Respondents do not think that the local environment is being damaged

11. Do different demographic groups think that different people should be responsible for the protection of the local environment?

Null Hypothesis: Different demographic groups do not think that different people should be responsible for the protection of the local environment

8.3 Methodology

The data in this chapter were collected using questionnaires (Appendix 1) in face-to-face interviews in accordance to the methodology outlined in chapter 2.5. As highlighted in chapter 2.5.1 the survey was a collected in a random stratified manner, seeking to obtain equal proportions of male and female respondents from a range of age groups. Data were input into Access (2010, Microsoft) the database was then formatted in Excel (2010, Microsoft) before being analysed in SPSS (version 21, IBM) as outlined in chapter 2.7.1. The data were analysed individually and in relation to one-another using a range of descriptive statistics including histograms, percentages, chi-square and post hoc tests as outlined in chapter 2.7.1.1. In addition binary logistic regression and multinomial regressions were used to investigate relationships further as described in Chapter 2.7.1.2.

Variables

Peception of the connection between cultural and environmental protection – If respondents think that cultural and environmental protection are linked

Remembering being taught about culture – If respondents stated they remember being taught about their culture (culture is defined according to the definitions given at the start of the questionnaire – Appendix 1)

Who taught respondents about their culture – Respondents listed and ranked which individuals they remember being taught by

How were respondents taught about their culture – Respondents listed and ranked which ways they were taught about their culture

If it is importat to teach children about their culture – If respondents stated that they felt it was important for children to be taught about their culture

Who should teach children about their culture – Respondents listed and ranked who they thought should teach children about their culture

How children should be taught about their culture – Respondents listed and ranked how they thought children should be taught about their culture

Concern over the loss of culture – Respondents ranked how concerned they are about the loss of the traditional Mijikenda Culture

Responsibilities for the protection of Mijikenda culture - Which groups respondents think should be in charge of the protection of the Mijikenda culture

Damage to the environment – Respondents ranked how concerned they are about the damamge to the local environment. Plus they ranked how much they agreed with different statements associated with the damage to the local environment

Responsibilities for the protection of the local environment – Which groups respondents think should be in charge of the protection of the local environment

The responses to the above independent variables were tested across the following dependent variables:

Gender

Age – Grouped into five categories (as outlined in Chapter 2.7.1 and 4.3)

Ethnicity – Grouped into seven northern Mijikenda tribes, other Mijikenda tribes (Digo and Duruma0, or 'other' (non-Mijikenda tribes)

Religion –Self identified and grouped accordingly (traditional faith noted as 'Pagan'in the analysis and discussion)

Spatial Variation – To investigate responses at different spatial scales Location (finest scale), Division (medium spatial scale), and sub-district (largest spatial scale) were used.

Importance of cultural identity – Comparrisons made according to how important repondents felt their cultural identity was

Belief in traditional belief system – Comparrisons made according to whether or not respondents believe in the traditional belief system

8.4 Results

8.4.1 Perceptions of the connection between cultural and environmental protection

The majority of people (69.4%) stated that they think that protecting the local culture will help to protect the local environment (Figure 8.1). Chi-square analysis was used to investigate the responses further. Results showed that there was no significant difference between genders or religions; however, there were significant differences across the age groups, ethnicities, locations and sub-districts (Table 8.1). A post-hoc z-test showed (Table 8.2) that a significantly greater proportion of those in the 56+ age group think that protecting culture would help to protect the environment compared to those in the 17 – 25, 26 – 35 or
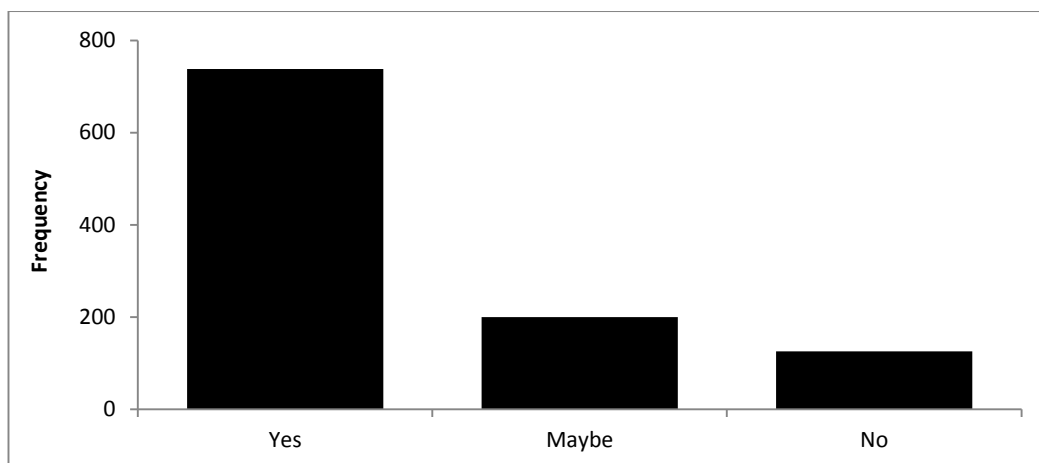
Figure 8.1: Protecting local culture will help to protect the environment

Table 8.1: Chi-square results for analysis of if people think protecting the local culture will help to protect the local environment. Legend: [1] = χ^2 Monte Carlo Exact Test and Bootstrapped Cramer's V analysis conducted to account for violations in assumptions of the model. [A] 27.8 % cells have expected count less than 5, minimum expected count is 0.24

Variable	χ^2	Degrees of freedom (df)	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	0.547	2	0.761					
Age	50.1	8	**< 0.001**			0.156		
Ethnicity	116.0	16	**< 0.001**			0.234		
Religion	5.95	6	0.429					
Location	174.3	26	**< 0.001**			0.287		
Sub-District[1] [A]	61.7	10	**< 0.001**	< 0.001	< 0.001	0.171	0.122	0.222

36 – 45 age groups, whereas a significantly greater proportion of those in the 17 – 25 and 26 – 35 age groups thought only that it may do, compared to those in the 46 – 55 and 56+ age groups.

A post-hoc z-test highlighted that a significantly greater proportion of Kambe and Kauma respondents answered yes compared to the Giriama, Rabai or Ribe (Table 8.3). A significantly greater proportion of Rabai respondents do not think that it will help compared to the Kauma, and a significantly greater proportion of Ribe respondents noted that protecting culture may help protect the environment compared to the Chonyi, Jibana, Kambe, and Kauma.

Table 8.2: Cross-tabulation of if people think protecting the local Mijikenda culture will help protect the environment with age.

Legend: Calculated with Bonferroni correction to account for multiple comparisons. Sig = Significance. [*] Denotes that there is a significant difference between proportions on that row to the p = 0.05 level. Different letters denote proportions (based on observed count compared to expected count) that are significantly from each other. Where: a = Greatest proportion; b = significantly less than 'a' and significantly greater than 'c' etc.

		Age in Groups					Sig
		17 - 25	26 - 35	36 - 45	46 - 55	56 +	
Will protecting local cultural help protect the environment	Yes	150_c	126_c	$144_{b, c}$	$123_{a, b}$	172_a	*
	No	27_a	31_a	32_a	19_a	15_a	NS
	Maybe	62_a	52_a	$44_{a, b}$	$17_{b, c}$	15_c	*

Table 8.3: Cross-tabulation of if people think protecting the local Mijikenda culture will help protect the environment with ethnic group. For legend see Table 8.2

		Ethnic Group									Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
Will protecting local cultural help protect the environment	Yes	$163_{a, b}$	$144_{b, c}$	$49_{a, b}$	110_a	106_a	113_d	$34_{c, d}$	$14_{a, b}$	$2_{a, b, c, d}$	*
	No	$19_{a, b}$	$26_{a, b}$	$5_{a, b}$	$14_{a, b}$	5_b	44_a	$11_{a, b}$	$1_{a, b}$	$1_{a, b}$	*
	Maybe	$26_{c, d, e}$	$50_{a, b, c}$	$7_{b, c, d, e}$	5_e	$13_{c, d, e}$	$70_{a, b}$	27_a	$0_{a, b, c, d, e}$	$2_{a, b, c, d}$	*

A post-hoc z-test highlights that a significantly greater proportion of respondents in Chasimba location stated that they think that protecting the local culture will help to protect the environment compared to those in Bedida, Jibana, Kaya Fungo, Mwanamwinga, Mwarakaya, Rabai or Ribe locations (Table A3.28, Appendix 3). A significantly greater proportion of those in Bedida location do not think that it will help compared to those in Chasimba, or Jaribuni location, and significantly greater proportion of those in Bedida location also think that it may help compared to those in Chasimba, Chivara, Junju, Kambe and Kauma locations.

A post- hoc z-test indicates that a significantly greater proportion of respondents in Ganze sub-district think that protecting the culture will help to protect the environment compared to those in Kaloleni and Rabai sub-districts (Table 8.4). A significantly greater proportion of

Table 8.4: Cross-tabulation of if people think protecting the local Mijikenda culture will help protect the environment with sub-district. For legend see Table 8.2

		Sub-District						Sig
		Ganze	Junju	Kaloleni	Kilifi	Mariakani	Rabai	
Will protecting local	Yes	118$_a$	8$_{a, b, c}$	174$_{b, c}$	254$_{a, b}$	2$_{a, b, c}$	179$_c$	*
cultural help protect	No	5$_c$	0$_{a, b, c}$	42$_a$	24$_c$	0$_{a, b, c}$	55$_{a, b}$	*
the environment	Maybe	16$_b$	0$_{a, b}$	43$_{a, b}$	55$_b$	0$_{a, b}$	85$_a$	*

those in Kaloleni division do not think that protecting the culture will help protect the environment compared to those in Ganze, and Kilifi sub-district, whereas a significantly greater proportion of those in Rabai sub-district said that it may do compared to those in Ganze or Kilifi sub-districts. Location was found to be the strongest predictor of whether or not a respondent thinks that protecting the local culture will help protect the environment compared to all other factors tested (Cramer's V = 0.287, Table 8.1).

8.4.2 Remember being taught about culture

The results show that the majority of people (68.8%) stated that they remember being taught about their culture (definition for 'culture' given in questionnaire in Appendix 1); however, a large proportion (almost one third) do not (Figure 7.2). To investigate the responses, a binary logistic regression was conducted with Gender, 'belief in the traditional belief system', age, and 'importance of cultural history' as the predictor variables. The results (Table 8.5) showed that when all other variables are kept constant there was no significant difference between the genders. The results also highlighted that those who believe in the traditional belief system were 64.7% less likely not to remember being taught about their culture. When investigating age as a variable in the model, the results support those of the chi-square analysis, showing that with every unit increase in age respondents were 2.3% less likely to not remember being taught about their culture. Therefore older respondents are more likely to remember being taught about their culture. The results also show that for every unit increase in response to how important a person's cultural history is (as units increase, importance decreases) respondents were 1.67 times more likely to not remember being taught about their culture, therefore the less important a person feels their cultural history is, the less likely they were to remember having been taught about their culture.
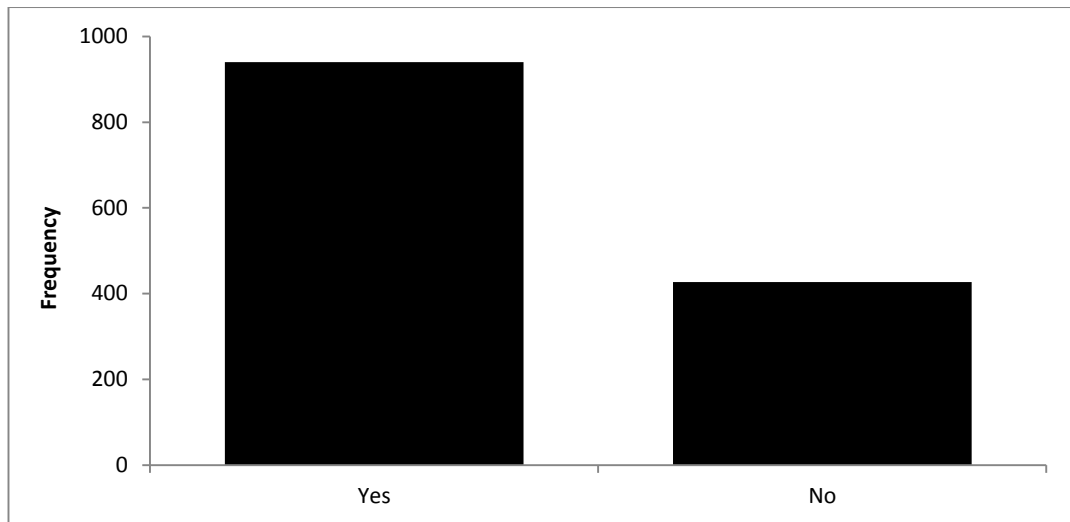
Figure 8.2: If respondents remember being taught about their culture

Table 8.5: Binary logistic regression output of if respondents remember being taught about their culture
Legend: Dependent variable: Remember being taught culture (Coding 0= Yes, 1 = No)
Independent Variables: Gender; 'Belief in traditional faith'; Age; 'Importance of cultural history'. Variable entered on step 1. Significance tested with Wald test statistic. Coding for predictor variables Gender: 0 = female, 1 = male; Believe in traditional belief system: 0 = No, 1 = Yes; Age input on a scale; Importance cultural history input on scale (1= very important, 5 = not important at all).

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Gender	-.072	.145	.245	1	.620	.931	.701	1.236
Believe in Traditional Belief System	-1.043	.165	40.065	1	**.000**	.353	.255	.487
Age	-.023	.005	21.809	1	**.000**	.977	.968	.987
Importance of cultural history	.511	.047	119.348	1	**.000**	1.668	1.521	1.828
Constant	-.858	.262	10.745	1	**.001**	.424		

The results show that if it was assumed that the response was yes for all respondents then there would be a 69.2% accuracy of prediction. However, a Wald test statistic (θ) shows there was a significant difference in whether or not people remember being taught about their culture and Nagelkerke R square test shows that the model had a moderate to strong level of prediction (θ = 173.7, p < 0.001, df = 1; Nagelkerke R^2 = 0.357). The classification Table shows that the model was a good fit for predicting the response for if someone remembers

being taught about their culture with a 77.0% success rate (which is a 7.8% increase in the prediction success). Chi-square analysis showed that there is a significant difference between the genders, age groups, ethnicities, sub-districts and Divisions; however, there was no significant difference between religions (Table 8.6). A post–hoc z-test shows that a significantly greater proportion of men remember being taught about their culture than expected compared to women (this difference between genders was not observed via the binary regression when all other factors were held constant). In addition, a significantly greater proportion of respondents in the age group 56+ remember being taught about their culture compared to those in the age groups 17 − 25, 26 − 35, and 36 − 45, whereas significantly fewer individuals in the age group 17 − 25 remember being taught about their culture than any other age group (Table 8.7).

A post-hoc z-test showed that a significantly greater proportion of individuals who are Chonyi and Kauma remember being taught about their culture compared to the Rabai and Ribe (Table 8.8). Results also showed that a significantly greater proportion of respondents in Kaloleni sub-district remember being taught about their culture than those in Junju, Kilifi or Rabai sub-districts, whereas a significantly lower proportion of those in Junju or Rabai sub-districts remember compared to those in Ganze, Kaloleni or Kilifi sub-districts (Table 8.9). In addition, results indicate that a significantly greater proportion of those in Chonyi and Ganze Divisions remember being taught about their culture than those in Kaloleni or Kikambala divisions, whereas significantly fewer respondents in Kikambala Division remember being taught about their culture than those in any other Division (Table 8.10).

Table 8.6: Chi-square results for analysis of if people remember being taught about their culture. Legend: See Table 1. [A] 25.0 % cells have expected count less than 5, minimum expected count is 0.63

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	4.93	1	**0.026**			0.060		
Age	92.8	4	**< 0.001**			0.265		
Ethnicity	38.1	8	**< 0.001**			0.167		
Religion	5.04	3	0.169					
Sub-District[1] [A]	111.1	5	**< 0.001**	< 0.001	< 0.001	0.280	0.224	0.341
Division	72.2	3	**< 0.001**			0.230		

Table 8.7: Cross-tabulation of if respondents remember being taught about their culture with age. For legend see Table 8.2

		Age in Groups					Sig
		17 - 25	26 - 35	36 - 45	46 - 55	56 +	
Remember being taught about culture	Yes	150_d	167_c	$205_{b, c}$	$160_{a, b}$	225_a	*
	No	149_a	100_b	$79_{b, c}$	$46_{c, d}$	41_d	*

Table 8.8: Cross-tabulation of if respondents remember being taught about their culture with ethnicity. For legend see Table 8.2

		Ethnic Group									Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
Remember being taught about culture	Yes	197_a	$179_{a, b}$	$59_{a, b}$	$120_{a, b}$	115_a	183_b	73_b	$9_{a, b}$	$2_{a, b}$	*
	No	63_b	$85_{a, b}$	$18_{a, b}$	$41_{a, b}$	36_b	117_a	53_a	$9_{a, b}$	$5_{a, b}$	*

Table 8.9: Cross-tabulation of if respondents remember being taught about their culture with sub-district. For legend see Table 8.2

		Sub-District						Sig
		Ganze	Junju	Kaloleni	Kilifi	Mariakani	Rabai	
Remember being taught about culture	Yes	$129_{a, b}$	2_c	305_a	273_b	$1_{a, b, c}$	227_c	*
	No	$40_{b,c}$	9_a	51_c	134_b	$1_{a, b, c}$	192_a	*

Table 8.10: Cross-tabulation of if respondents remember being taught about their culture with Division. For legend see Table 8.2

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
Remember being taught about culture	Yes	592_b	186_a	131_a	28_c	*
	No	307_b	32_c	40_c	48_a	*

8.4.3 Important to teach children about culture

The majority of respondents (76.5%) stated that they believe that it is important to teach children about their culture (Figure 8.3). Chi square analysis was used to investigate the responses further. The results show that there was a significant difference in whether or not people think that it is important to teach their kids about the local culture across the genders, age groups, ethnicities, sub-districts and Divisions (Table 8.11). There was no significant difference across the religions.
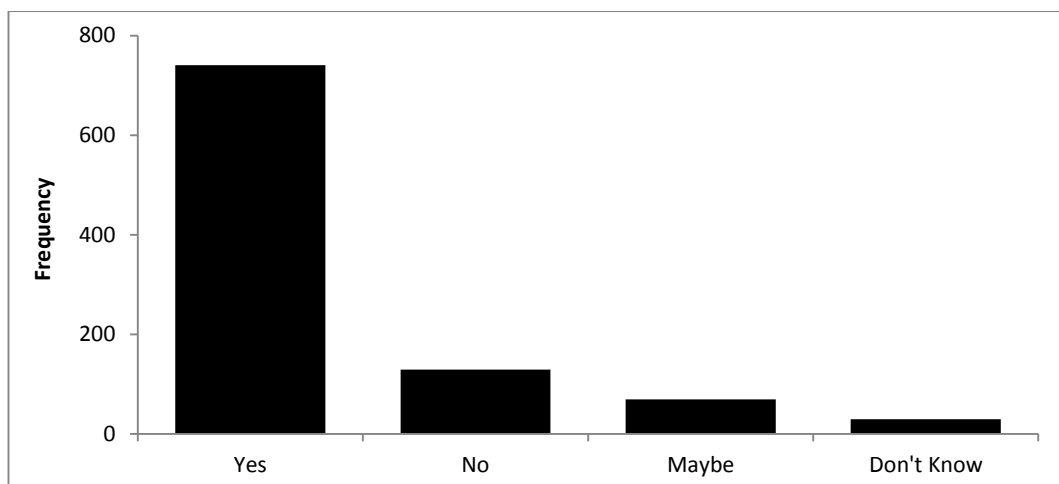
Figure 8.3: If respondents think it is important to teach children about culture

Table 8.11: Chi-square results for analysis of if think it is important to teach children about culture. For legend see Table 8.1
[A] 31.1 % cells have expected count less than 5, minimum expected count is 0.12
[B] 33.3 % cells have expected count less than 5, minimum expected count is 0.02

| Variable | χ^2 | df | p | Monte Carlo Exact 99% CI | | Cramer's V | Bootstrapped 99% CI | |
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	11.7	4	**0.019**			0.100		
Age	346.4	16	**< 0.001**			0.276		
Ethnicity[1] [A]	94.3	32	**< 0.001**	< 0.001	< 0.001	0.142	0.126	0.199
Religion	19.9	12	0.070					
Sub-District[1] [B]	103.1	20	**< 0.001**	< 0.001	< 0.001	0.148	0.123	0.193
Division	76.4	12	**< 0.001**			0.147		

To assess where the differences occur between the groups post-hoc z-tests were used. The results show that a significantly greater proportion of women believe that it is not important to teach children about their culture than expected compared to men (Table 8.12). Significantly fewer respondents in the age group 17-25 think that it is important to teach children about their culture compared to respondents in all other age groups, and a lower proportion of those in the age group 26 – 35 think so than those in the 36 – 45, 46 – 55 and 56+ age categories (Table 8.13). The results highlighted a significantly greater proportion of Kambe respondents are likely to think that it is important to teach children about their culture compared to the Rabai or Ribe (Table 8.14). A significantly greater proportion of Rabai respondents think that it is not important to teach children about their culture than is expected compared to the Giriama, Jibana and Kambe, whereas a significantly greater proportion of Jibana do not know if it is important to do so compared

Table 8.12: Cross-tabulation of whether or not respondents think it is important to teach children about their culture with gender. For legend see Table 8.2

| | | Gender | | Sig |
		Male	Female	
Important to teach children about culture	Yes	376_a	364_a	NS
	No	48_b	79_a	*
	Maybe	30_a	39_a	NS
	Don't know	11_a	18_a	NS

Table 8.13: Cross-tabulation of whether or not respondents think it is important to teach children about their culture with age. For legend see Table 8.2

| | | Age in Groups | | | | | Sig |
		17 - 25	26 - 35	36 - 45	46 - 55	56 +	
Important to teach children about culture	Yes	69_c	116_b	184_a	141_a	201_a	*
	No	19_a	33_a	41_a	14_a	21_a	NS
	Maybe	5_a	17_a	15_a	13_a	16_a	NS
	Don't know	1_a	8_a	9_a	7_a	3_a	NS

Table 8.14: Cross-tabulation of whether or not respondents think it is important to teach children about their culture with ethnicity. For legend see Table 8.2

| | | Ethnic Group | | | | | | | | | Sig |
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
Important to teach children about culture	Yes	$149_{a,b}$	$155_{a,b}$	$51_{a,b}$	93_a	$91_{a,b}$	139_b	48_b	$11_{a,b}$	$3_{a,b}$	*
	No	$18_{b,c,d,e}$	$13_{c,d}$	$3_{b,c,d,e}$	$4_{d,e}$	29_a	$39_{a,b}$	$19_{a,b}$	$2_{a,b,c,d,e}$	$1_{a,b,c,d,e}$	*
	Maybe	11_a	16_a	2_a	4_a	2_a	24_a	9_a	0_a	1_a	NS
	Don't know	$6_{a,b}$	$7_{a,b}$	6_a	$2_{a,b}$	$3_{a,b}$	1_b	$4_{a,b}$	$0_{a,b}$	$0_{a,b}$	*

to the Rabai. In addition the results show (Table 8.15) that a significantly greater proportion in Kaloleni sub-district think that it is important to teach children about their culture compared to those in Kilifi or Rabai sub-district, whereas a significantly fewer of those in Rabai sub-district think so compared to those in Ganze, Kaloleni, or Kilifi. The results also show (Table 8.16) that a significantly lower proportion of those in Kikambala Division believe

Table 8.15: Cross-tabulation of whether or not respondents think it is important to teach children about their culture with sub-district. For legend see Table 8.2

		Sub-District						Sig
		Ganze	Junju	Kaloleni	Kilifi	Mariakani	Rabai	
Important to teach children about culture	Yes	$106_{a,b}$	$6_{a,b,c}$	223_a	226_b	$0_{a,b,c}$	178_c	*
	No	32_a	$2_{a,b}$	4_c	30_b	1_a	59_a	*
	Maybe	2_b	$0_{a,b}$	$14_{a,b}$	$21_{a,b}$	$0_{a,b}$	32_a	*
	Don't know	3_a	0_a	6_a	13_a	0_a	7_a	NS

Table 8.16: Cross-tabulation of whether or not respondents think it is important to teach children about their culture with Division. For legend see Table 8.2

			Division				Sig
			Kaloleni	Chonyi	Ganze	Kikambala	
Important to teach children about culture	Yes	Count	472_a	137_a	107_a	23_b	*
	No	Count	73_b	5_c	32_a	18_a	*
	Maybe	Count	50_a	$10_{a,b}$	2_b	7_a	*
	Don't know	Count	20_a	5_a	3_a	1_a	NS

that it is important to teach children about their culture compared to those in any other Division. However, a significantly greater proportion of those in both Kikambala and Ganze divisions than expected think that it is not important to teach children about their culture compared to those in Chonyi and Kaloleni Divisions.

8.4.4 Transmission of knowledge of culture

When investigating who taught respondents about their culture and who they think should teach children about their culture various responses were found (Figure 8.4). For the question of who taught respondents, the most common response was the combination of Mother, Father and Grandparents. The top nine responses for who taught respondents about their culture include family members. The responses as to who should teach children about their culture are different from how respondents themselves were taught. The most common answer was a mix of family and non-family members, and teachers featured higher on the list of who should teach children about their culture compared to the people that respondents were taught by. The individuals who were most frequently ranked as the most
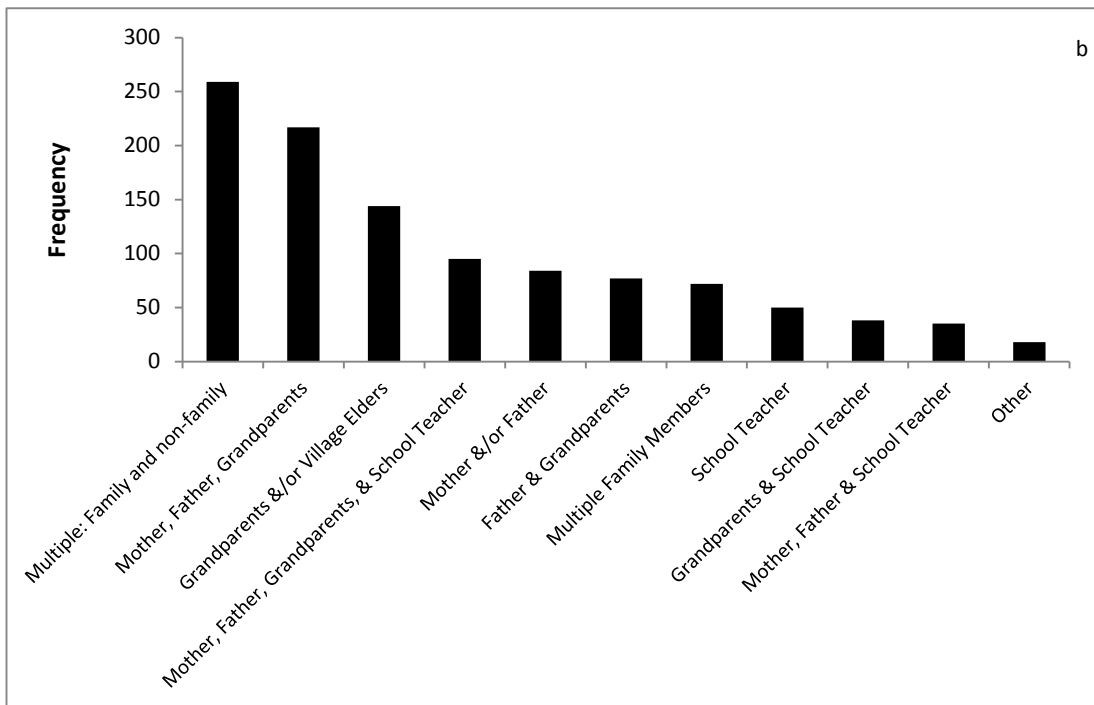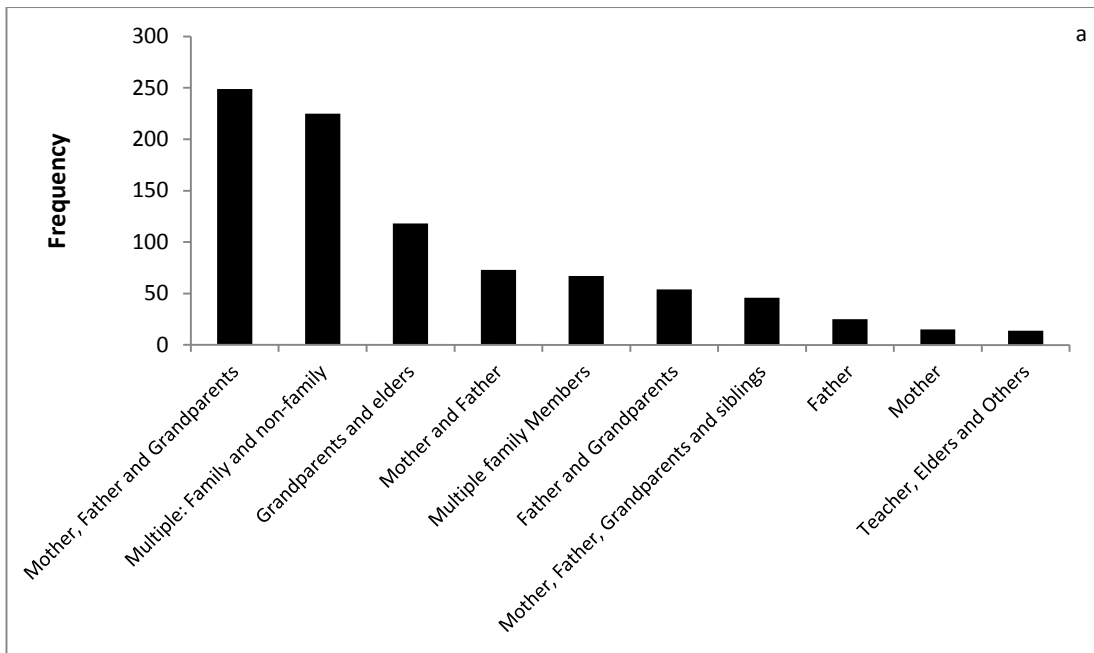
Figure 8.4: Who taught about culture, a) Who taught respondents, b) Who should teach children

important for teaching respondents about their culture were grandparents, followed by mothers and fathers (Figure 8.5a). There was a large difference between the frequency that these three were ranked as most important compared to the next most common answer. The results also show that the people most often noted as being the most important for teaching children about their culture are grandparents, followed by mothers and then teachers (Figure 8.5b). Teachers awere noted as being the most important for teaching
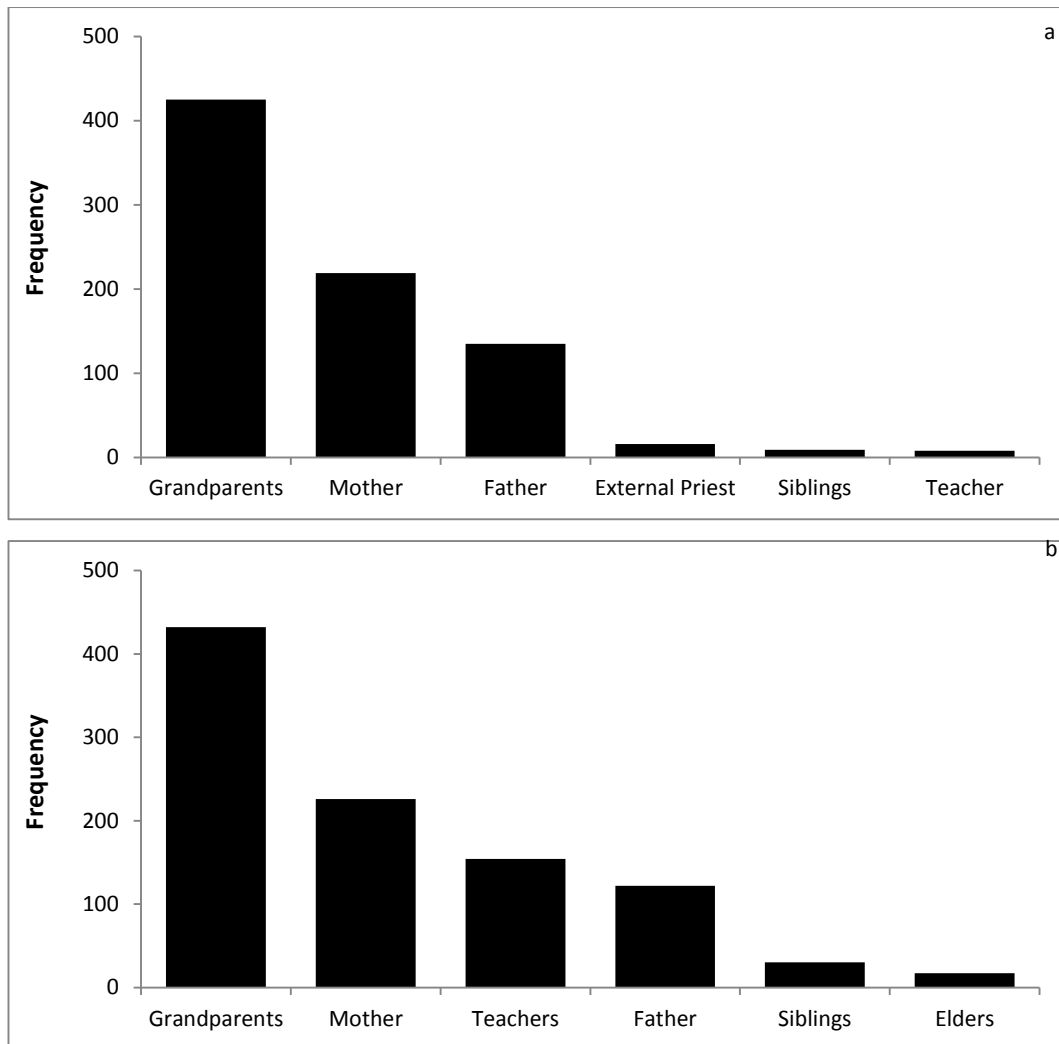
Figure 8.5: Most important person to teach about culture – frequency of times noted as most important. a) Who taught respondents, b) Who should teach children

children about their culture more often than fathers. The results therefore showed a difference between who taught the interviewed population about their culture and who they think should teach children about their culture. This implies a shift in who is expected to pass on cultural knowledge compared to who has done so to date. The ways in which people were taught about their culture also varies (Figure8.6a), a mix of songs and stories /myths is the most common combined answer, followed by songs and stories with performances. When looking at how respondents think that children should be taught, there was also considerable variation in the responses (Figure 8.6b). The responses were different from how respondents were taught with 'songs, stories dances/ performances and other methods' being the most common response. Another difference highlighted was in the frequency of how often lessons are noted. Lessons were mentioned more frequently as a way children should be taught compared to how respondents themselves were taught.
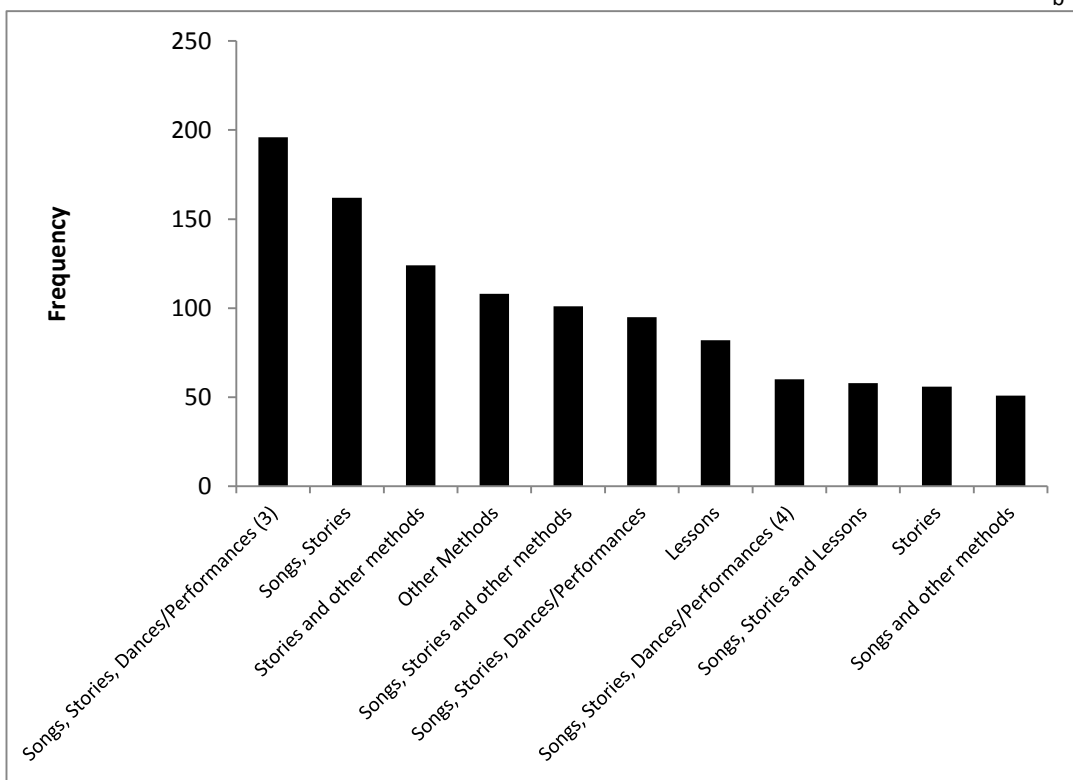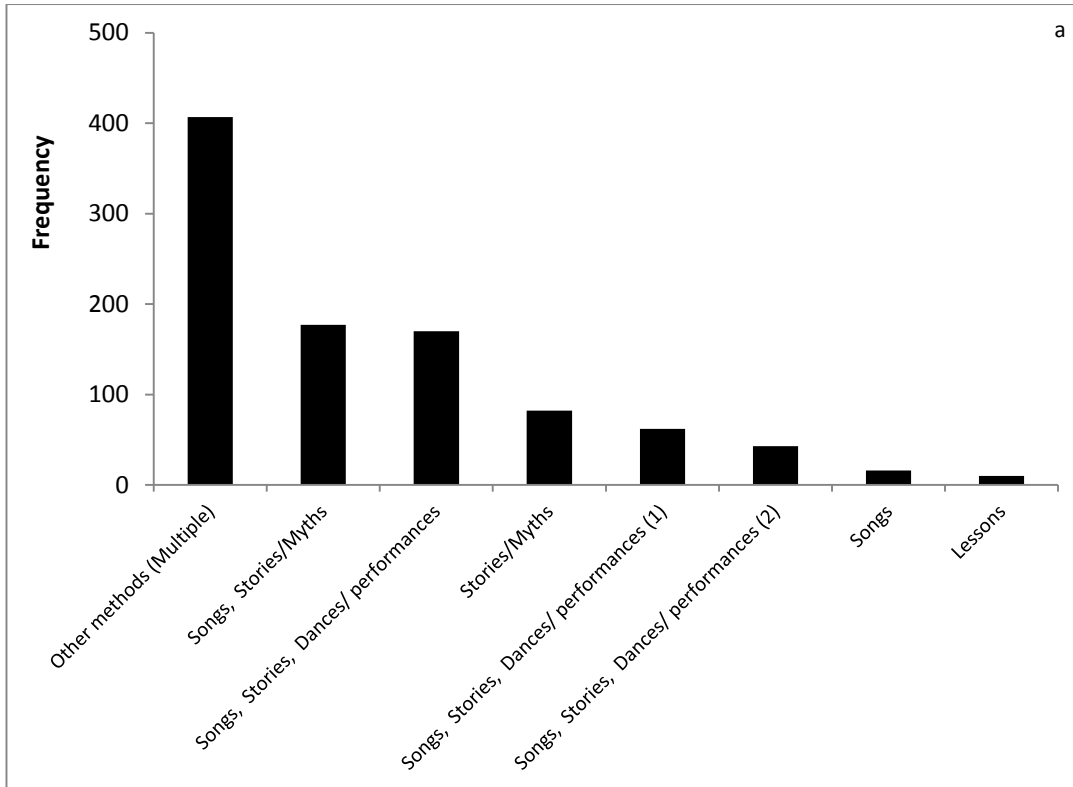
Figure 8.6 How culture is taught

Legend: a) How respondents were taught: (1) Songs, Stories/Myths, Dances/performances, Rules; (2) Songs, Stories/Myths, Dances/performances, Taken Places, Rituals/ceremonies, Rules, Lessons. b) How children should be taught: (3) Songs, Stories, Dances/Performances and other; (4) Songs, Stories, Dances/Performances, Taken Places, Rituals/ceremonies, Rules and Lessons

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Again this highlights a shift in the transmission of knowledge, showing that people think that the way in which cultural information should be taught has changed.

8.4.5 Concerned about loss of culture

The majority of people (52.2%) indicated that they are very concerned that the Mijikenda culture is under threat of being lost (Figure 8.7). To investigate these responses further, a multinomial regression was conducted with how concerned people are about the loss of Mijikenda culture as the dependant variable. For every unit increase in age there was a 2.2% increase in the likelihood that respondents will be very concerned about the loss of Mijikenda culture compared to being not concerned at all. The results show (Table 8.17) that there was no significant difference between the sexes in their response to concern about the loss of culture for any of the categories. This was also seen under Chi-square analysis (χ^2 = 7.0, df = 3, p = 0.072). When looking at ethnicity, the results indicate that if a respondent is Chonyi (rather than Rabai), they were over 3 times more likely to be very concerned than not concerned at all and if they are Kambe they were over two times more likely to be very concerned. However, if respondents are Jibana (rather than Ribe), they were over 71% less likely to be very concerned compared to not being concerned at all, and Rabai respondents were over 57% less likely to be very concerned. Respondents who feel that their cultural identity is very important (compared to those who think it is not important at all) were nearly 15 times more likely to be very concerned about the loss of the Mijikenda culture than to not be concerned at all and nearly 17 times more likely to be slightly concerned. Those who believe that their cultural identity is quite important were nearly four times more likely to be very concerned and almost 11 times more likely to be slightly concerned about the threat of the loss of the Mijikenda culture.

The Likelihood Ratio tests showed that there was a significant relationship between the dependent and independent variables and Nagelkerke R squared results indicate that the model was a moderately strong fit for the data (χ^2 = 480.6, p < 0.001, df = 36; Nagelkerke R^2 = 0.389). The independent variables in the model were age, gender, ethnicity and 'importance of cultural identity'. All predictors (except for gender) were significant to the model in explaining the difference in respondents being how concerned respondents are about the loss of the Mijikenda culture (Age: χ^2 = 18.0, p < 0.001, df = 3; Gender: χ^2 = 6.85, p = 0.077, df = 3; Ethnicity: χ^2 = 161.9, p < 0.001, df = 18; Importance of cultural identity: χ^2 =
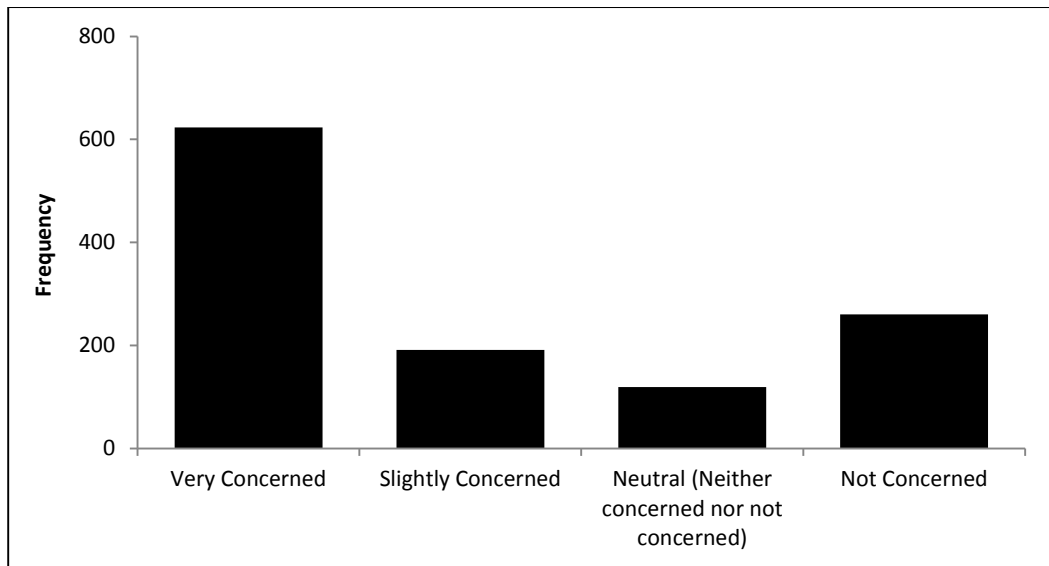
Figure 8.7: How concerned are respondents about the threat of loss to the Mijikenda culture

209.4, p < 0.001, df = 12). The classification accuracy produced by the model was 59.9% which is greater than the proportional by chance accuracy criteria (0.361, or 36.1% - calculated using the square of proportions of each category). The maximum by chance criterion was 66.25% (based on the high rate of responses which fall into the 'Very Concerned' – 53.0% calculated by a 25% increase over the proportion 0.530). This was higher than the overall fit for the model, showing that the usefulness of the relationship between the demographic variables and how concerned they are about the loss of culture may be questionable. However, the model was still found to be a good fit for the data. The multinomial regression uses a reference variable to calculate the B-coefficients, Wald test statistics and the odds ratios. The reference category for the response variable is "Not concerned at all". The reference category for Gender is 'Female', for Ethnicity is 'Ribe' and for if people think their cultural identity is important is 'not at all'.

To further investigate the results, Chi-square analysis was also conducted. The results show that there was a significant difference across the age groups, ethnicities, religions, sub-districts and Divisions (Table 8.18). A post-hoc z-test highlights (Table 8.19) that a significantly greater proportion of respondents in the age group 56+ were very concerned about the threat to Mijikenda culture than expected compared to those in the 17 – 25, 25 – 36 and 36+age groups, whereas significantly fewer of those in the 15 – 25 age group stated that they are very concerned compared to those in the 36 – 45, 46 – 55 and 56+ age groups.

Table 8.17: Multinomial logistic regression output of respondents level of concern about the loss of Mijikenda culture

Legend: Dependent variable: How concerned respondents are about the threat of the loss of Mijikenda culture, Reference category = Not Concerned at all. Independent Variables: age, gender, ethnicity, and 'importance of cultural identity'. Reference categories for Independent variables: Gender: 'Female'; Ethnicity: 'Ribe; Importance of cultural identity: 'Not important at all'. 'b' This parameter is set to zero because it is redundant.

Concerned Mijikenda culture under threat of loss		B	Std. Error	Wald	df	Sig.	Exp(B)	95% CI for Exp(B) Lower	Upper
Very	Intercept	-1.424	.346	16.913	1	.000			
	Age	.022	.006	13.446	1	**.000**	1.022	1.010	1.034
	Male	.092	.180	.260	1	.610	1.096	.770	1.561
	Female	0^b	.	.	0	.	.	.	.
	Chonyi	1.138	.357	10.158	1	**.001**	3.121	1.550	6.283
	Giriama	.112	.333	.114	1	.736	1.119	.583	2.148
	Jibana	-1.264	.466	7.353	1	**.007**	.283	.113	.704
	Kambe	.850	.394	4.664	1	**.031**	2.339	1.082	5.059
	Kauma	-.401	.357	1.258	1	.262	.670	.333	1.349
	Rabai	-.853	.320	7.092	1	**.008**	.426	.228	.798
	Ribe	0^b	.	.	0	.	.	.	.
	Importance of cultural identity — Very	2.690	.261	105.951	1	**.000**	14.735	8.828	24.593
	Quite	1.337	.289	21.363	1	**.000**	3.808	2.160	6.712
	Neutral	1.314	.358	13.474	1	**.000**	3.722	1.845	7.508
	Little	1.258	.277	20.560	1	**.000**	3.519	2.043	6.062
	None	0^b	.	.	0	.	.	.	.
Slightly	Intercept	-2.240	.463	23.429	1	**.000**			
	Age	.013	.007	3.302	1	.069	1.013	.999	1.027
	Male	-.189	.220	.743	1	.389	.828	.538	1.273
	Female	0^b	.	.	0	.	.	.	.
	Chonyi	.597	.462	1.674	1	.196	1.817	.735	4.491
	Giriama	.223	.421	.281	1	.596	1.250	.548	2.855
	Jibana	-.148	.524	.080	1	.777	.862	.309	2.407
	Kambe	-.660	.568	1.351	1	.245	.517	.170	1.573
	Kauma	-1.057	.492	4.617	1	**.032**	.348	.133	.911
	Rabai	-.261	.401	.425	1	.514	.770	.351	1.689
	Ribe	0^b	.	.	0	.	.	.	.
	Importance of cultural identity — Very	2.817	.361	60.856	1	**.000**	16.732	8.244	33.959
	Quite	2.364	.373	40.166	1	**.000**	10.634	5.119	22.090
	Neutral	.742	.558	1.767	1	.184	2.099	.703	6.265
	Little	1.099	.414	7.056	1	**.008**	3.000	1.334	6.749
	None	0^b	.	.	0	.	.	.	.
Neutral (neither concerned nor unconcerned)	Intercept	-1.555	.483	10.357	1	**.001**			
	Age	-.001	.009	.010	1	.921	.999	.982	1.016
	Male	.465	.244	3.636	1	.057	1.593	.987	2.569
	Female	0^b	.	.	0	.	.	.	.
	Chonyi	.384	.530	.526	1	.468	1.469	.520	4.151
	Giriama	1.080	.439	6.060	1	**.014**	2.946	1.246	6.962
	Jibana	.026	.653	.002	1	.968	1.027	.285	3.693
	Kambe	-1.546	1.097	1.986	1	.159	.213	.025	1.830
	Kauma	-20.772	.000	.	1	.	9.525E-010	9.525E-010	9.525E-010
	Rabai	.372	.429	.749	1	.387	1.450	.625	3.365
	Ribe	0^b	.	.	0	.	.	.	.
	Importance of cultural identity — Very	-.134	.432	.097	1	.756	.874	.375	2.038
	Quite	.851	.343	6.151	1	**.013**	2.341	1.195	4.587
	Neutral	.927	.400	5.377	1	**.020**	2.527	1.154	5.533
	Little	.095	.388	.060	1	.806	1.100	.514	2.353
	None	0^b	.	.	0	.	.	.	.

Table 8.18: Chi-square results for analysis of if respondents are concerned about loss of Mijikenda culture. For Legend: See Table 8.1

[A] 31.3 % cells have expected count less than 5
[B] 33.3 % cells have expected count less than 5, minimum expected count is 0.20

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	7.00	3	0.720					
Age	86.4	12	**0.001**			0.158		
Ethnicity	191.3	24	**< 0.001**			0.232		
Religion[1] [A]	23.0	9	**0.006**	0.004	0.008	0.102	0.067	0.172
Sub-District[1] [B]	100.8	15	**< 0.001**	< 0.001	< 0.001	0.168	0.139	0.218
Division	88.2	9	**< 0.001**			0.157		

Table 8.19: Cross-tabulation of how concerned a respondent is that the Mijikenda culture is under threat of being lost with age. For legend see Table 8.2

		Age in Groups					Sig
		17 - 25	26 - 35	36 - 45	46 - 55	56 +	
Concerned Mijikenda Culture is under threat of loss	Very Concerned	101_c	$111_{b, c}$	129_b	$104_{a, b}$	160_a	*
	Slightly Concerned	37_a	38_a	40_a	30_a	36_a	NS
	Neutral (neither concerned nor unconcerned)	49_a	$23_{a, b}$	19_b	15_b	10_b	*
	Not Concerned	78_a	64_a	$63_{a, b}$	$26_{b, c}$	22_c	*

A significantly greater proportion of individuals in the 17 – 25 age group are likely to not be concerned about the threat of loss to the Mijikenda culture compared to those in the 46 – 55 and 56+ age groups. These results indicate that older people are more concerned than younger respondents, which corresponds with the results from the Multinomial regressions.

The analysis also showed that (Table 8.20) that a significantly greater proportion of Chonyi and Kambe respondents than expected are very concerned compared to the Giriama, Jibana, Rabai or Ribe, whereas a significantly greater proportion of Rabai respondents stated they are not concerned compared to the Chonyi, Giriama and Kambe. In addition the post- hoc z-test highlights that a significantly greater proportion of Pagan respondents are slightly concerned about the threat of loss to Mijikenda culture than expected compared individuals who identify as Christian or as having no religion (Table 8.21).

Results from post-hoc z-tests show (Table 8.22) that a significantly higher proportion of

Table 8.20: Cross-tabulation of how concerned a respondent is that the Mijikenda culture is under threat of being lost with ethnic group. For legend see Table 8.1

		Ethnic Group									Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mij	Other	
Concerned Mijikenda Culture is under threat of loss	Very Concerned	149_a	$115_{b,c}$	$22_{c,d}$	109_a	$84_{a,b}$	80_d	$50_{b,c,d}$	$8_{a,b,c,d}$	$2_{a,b,c,d}$	*
	Slightly Concerned	$27_{b,c,d}$	$43_{a,b}$	21_a	8_d	$13_{b,c,d}$	$60_{a,b,c}$	$15_{a,b,c,d}$	$2_{a,b,c,d}$	$0_{a,b,c,d}$	*
	Neutral (neither concerned nor unconcerned)	14_b	39_a	$5_{a,b}$	1_b	1_b	49_a	$10_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	Not Concerned	28_c	$40_{b,c}$	$18_{a,b,c}$	17_c	$33_{a,b,c}$	83_a	$35_{a,b}$	$3_{a,b,c}$	$3_{a,b,c}$	*

Table 8.21: Cross-tabulation of how concerned a respondent is that the Mijikenda culture is under threat of being lost with religion. For legend see Table 8.1

		Religion				Sig
		Christian	Muslim	Pagan	None	
Concerned Mijikenda Culture is under threat of loss	Very Concerned	255_a	80_a	11_a	18_a	NS
	Slightly Concerned	65_b	$34_{a,b}$	7_a	2_b	*
	Neutral (neither concerned nor unconcerned)	57_a	19_a	0_a	5_a	NS
	Not Concerned	119_a	60_a	1_a	6_a	NS

Table 8.22: Cross-tabulation of how concerned a respondent is that the Mijikenda culture is under threat of being lost with sub-district. For legend see Table 8.1

		Sub-District						Sig
		Ganze	Junju	Kaloleni	Kilifi	Mariakani	Rabai	
Concerned Mijikenda Culture is under threat of loss	Very Concerned	92_a	$7_{a,b}$	181_a	190_a	$1_{a,b}$	148_b	*
	Slightly Concerned	16_b	$0_{a,b}$	$43_{a,b}$	79_a	$1_{a,b}$	50_b	*
	Neutral (neither concerned nor unconcerned)	1_c	$1_{a,b,c}$	24_b	30_b	$0_{a,b,c}$	63_a	*
	Not Concerned	$39_{a,b}$	$0_{a,b,c}$	$59_{b,c}$	45_c	$0_{a,b,c}$	116_a	*

respondents in Ganze, Kaloleni and Kilifi sub-districts than those in Kikambala sub-district, and a significantly greater proportion of those in Kikambala sub-district said they are not concerned about the threat of loss to the Mijikenda culture than those in Kaloleni and Kilifi sub-districts. In addition, significantly greater proportion of individuals from Chonyi Division are very concerned compared to those in Kaloleni or Kikambala Divisions, whereas a significantly greater proportion of those in Kaloleni or Ganze Divisions are not concerned compared to those in Chonyi Division (Table 8.23).

Table 8.23: Cross-tabulation of how concerned a respondent is that the Mijikenda culture is under threat of being lost with Division. For legend see Table 8.1

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
Concerned Mijikenda Culture is under threat of loss	Very Concerned	361$_c$	143$_a$	93$_{a, b}$	22$_{b, c}$	*
	Slightly Concerned	145$_a$	24$_a$	16$_a$	4$_a$	NS
	Neutral (neither concerned nor unconcerned)	104$_a$	5$_b$	1$_b$	9$_a$	NS
	Not Concerned	193$_a$	19$_b$	39$_a$	8$_{a, b}$	*

8.4.6 Responsibilities for protecting local culture

When investigating who should be in charge for the conservation of the local Mijikenda people, the majority of people (56.5%) said that the local Mijikenda population should be (Figure 8.8). A large number of people (23.2%) also mentioned that the government should be in charge for the preservation of the local culture. To investigate this further Chi-square analysis was conducted to look at the differences between different groups in the interviewed population.

Chi-square analysis showed that there was a significant difference in who people think should be responsible for protecting the local culture according to their ethnicity, religion, sub-district and Division; however, there was no significant difference between the genders or age groups (Table 8.24). Analysis using a post-hoc z-test showed (Table 8.25) that a significantly greater proportion of Kauma respondents think that the Government should be in charge of the preservation of culture compared to all other northern Mijikenda tribes, whereas a significantly greater proportion of Kambe people think that it should be the local
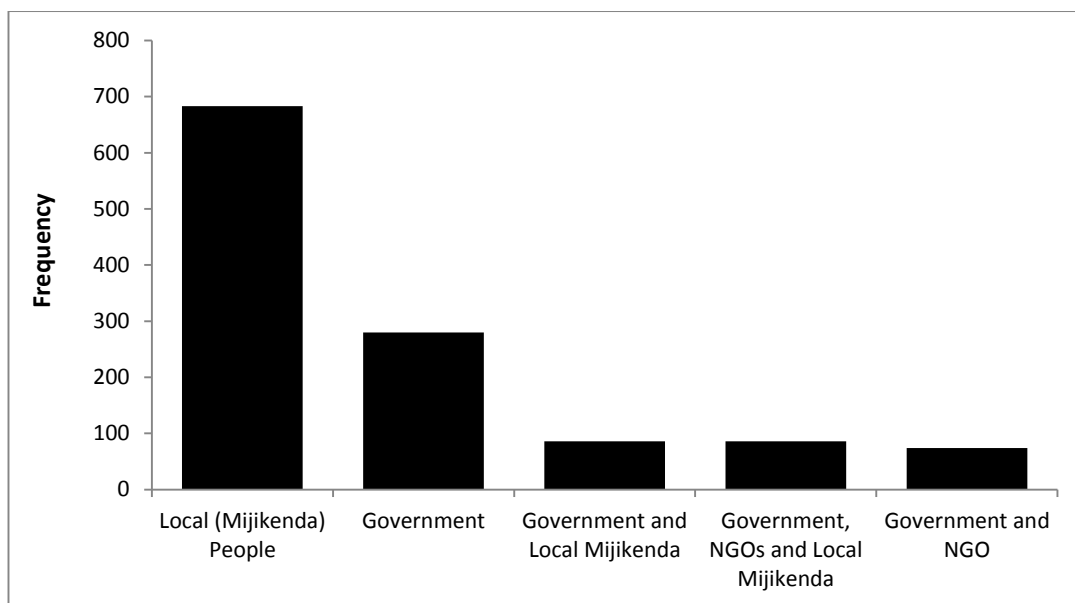
Figure 8.8: Who should be in charge of protecting local Mijikenda culture

Table 8.24: Chi-square results for analysis of who should be in charge of local Mijikenda culture. Legend: $^1 = \chi^2$ Monte Carlo Exact Test and Bootstrapped Cramer's V analysis conducted to account for violations in assumptions of the model
(A) 26.7 % cells have expected count less than 5, minimum expected count is 0.31
(B) 35.0 % cells have expected count less than 5
(C) 30.0 % cells have expected count less than 5, minimum expected count is 0.12

| Variable | χ^2 | df | p | Monte Carlo Exact 99% CI | | Cramer's V | Bootstrapped 99% CI | |
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	6.62	4	0.157					
Age	23.4	16	0.103					
Ethnicity[1] (A)	425.3	32	**< 0.001**	< 0.001	< 0.001	0.297	0.267	0.347
Religion[1] (B)	50.0	12	**< 0.001**	< 0.001	< 0.001	0.150	0.115	0.227
Sub-District[1] (C)	361.4	20	**< 0.001**	< 0.001	< 0.001	0.274	0.241	0.313
Division	452.6	12	**< 0.001**			0.354		

Mijikenda population compared to the Chonyi, Kauma and Ribe. A significantly greater proportion of Giriama respondents think it should be both the Government and NGOs than expected compared to the Kambe. A significantly greater proportion of Jibana than expected think both the Government and local Mijikenda population should be in charge compared to the Giriama, Kambe or Kauma, and a significantly greater proportion of Chonyi respondents think it should be jointly done by the Government, the local Mijikenda population and NGO compared to all other northern Mijikenda tribes.

Table 8.25: Cross-tabulation of Who should be in charge of protecting local Mijikenda culture with ethnic group. For legend see Table 8.1

| | | Ethnic Group | | | | | | | | | Sig |
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
Who Should be in charge of Protecting Local Culture	Government	$42_{b,c}$	$38_{b,c}$	3_c	33_b	81_a	$44_{b,c}$	31_b	$4_{a,b,c}$	$2_{a,b,c}$	*
	Local (Mijikenda) People	$97_{c,d}$	$157_{a,b}$	$47_{a,b}$	102_a	38_d	$164_{a,b}$	$63_{b,c}$	$9_{a,b,c,d}$	$3_{a,b,c,d}$	*
	Government and NGO	$14_{a,b,c}$	29_a	$0_{a,b,c}$	1_c	$13_{a,b}$	$13_{a,b,c}$	$4_{a,b,c}$	$0_{a,b,c}$	$0_{a,b,c}$	*
	Government and Local Mijikenda	$13_{a,b,c,d,e,f,g,h,i}$	$11_{c,d,e,f}$	10_a	$0_{e,f,g,h}$	$0_{d,f,h,i}$	$35_{a,b}$	$15_{a,b,c}$	$2_{a,b,c}$	$0_{a,b,c,d,e,f,g,h,i}$	*
	Government, NGOs and Local Mijikenda	67_a	7_b	0_b	0_b	2_b	9_b	0_b	$0_{a,b}$	$0_{a,b}$	*

A post-hoc z-test highlighted that a significantly greater proportion of Muslims think that the local Mijikenda population should be in charge of its protection compared to Christian respondents (Table 8.26). Whereas a significantly greater proportion of pagans think that it should be both the government and NGOs compared to Muslims, and a significantly greater proportion of Christians think that the government, NGOs and the local Mijikenda population should all be in charge compared to Muslims. In addition, results indicate that a significantly greater proportion of those in Ganze sub-district think that the government should be in charge, compared to those in Junju, Kaloleni, Kilifi or Rabai sub-districts (Table 8.27). A significantly greater proportion of those in Kaloleni think that it should be the local Mijikenda population compared to those in Ganze, Kilifi, or Rabai; whereas a significant greater proportion of those in Kaloleni think it should be both the government and the local Mijikenda population compared to those in Ganze or Kilifi. A significantly greater proportion of those in Kilifi sub-district think it should be the government, the local Mijikenda population and NGOs all together. Results also show that significantly fewer individuals in Ganze think the government should be in charge of the preservation of local Mijikenda culture than those in all other Divisions (Table 8.28). A significantly greater proportion of those in both Kaloleni and Kikambala think it should be the local Mijikenda population compared to those in Chonyi or Ganze, whereas a significantly greater proportion of those in both Chonyi and Kikambala think that it should be the government, the local Mijikenda population and NGOs.

Table 8.26: Cross-tabulation of who should be in charge of protecting local Mijikenda culture with religion. For legend see Table 8.1

		Religion				Sig
		Christian	Muslim	Pagan	None	
Who Should be in charge of Protecting Local Culture	Government	123_a	33_a	4_a	10_a	NS
	Local (Mijikenda) People	243_b	134_a	$6_{a,b}$	$20_{a,b}$	*
	Government and NGO	$35_{a,b}$	5_b	4_a	$2_{a,b}$	*
	Government and Local Mijikenda	28_a	22_a	2_a	2_a	NS
	Government, NGOs and Local Mijikenda	62_a	7_b	$1_{a,b}$	$0_{a,b}$	*

Table 8.27: Cross-tabulation of who should be in charge of protecting local Mijikenda culture with sub-district. For legend see Table 8.1

		Sub-District						Sig
		Ganze	Junju	Kaloleni	Kilifi	Mariakani	Rabai	
Who Should be in charge of Protecting Local Culture	Government	96_a	$0_{b,c}$	38_c	49_c	$0_{a,b,c}$	95_b	*
	Local (Mijikenda) People	43_c	$9_{a,b}$	224_a	191_b	$2_{a,b,c}$	210_b	*
	Government and NGO	13_a	0_a	13_a	30_a	0_a	18_a	NS
	Government and Local Mijikenda	0_c	$0_{a,b,c}$	35_a	14_c	$0_{a,b,c}$	$36_{a,b}$	*
	Government, NGOs and Local Mijikenda	0_b	$0_{a,b}$	0_b	77_a	$0_{a,b}$	9_b	*

Table 8.28: Cross-tabulation of who should be in charge of protecting local Mijikenda culture with Division. For legend see Table 8.1

		Division				Sig
		Kaloleni	Chonyi	Ganze	Kikambala	
Who Should be in charge of Protecting Local Culture	Government	139_a	37_a	97_b	5_a	NS
	Local (Mijikenda) People	532_a	74_b	43_b	30_a	*
	Government and NGO	47_a	13_a	13_a	1_a	NS
	Government and Local Mijikenda	71_a	$8_{a,b}$	0_b	6_a	*
	Government, NGOs and Local Mijikenda	10_b	68_a	0_b	8_a	*

8.4.7 Perceptions of the damage to the local environment

The majority of people stated that they think the local environment is being destroyed (85.6%, Figure 7.9a) and the destruction of the forests is because of migrants into the area (57.8%, Figure 7.9b), but they disagreed that tourism damages the local environment (59.7%, Figure 7.9c). Most respondents said they think the preservation of the Kayas is important (71.2%, Figure 7.9d), and that they would be sad if the Kayas were lost (58.3%, Figure 7.8e), yet, even though they think the environment is being destroyed they also believe that they are better able to protect the environment now compared to when they were younger (64.1%, Figure 7.8f).
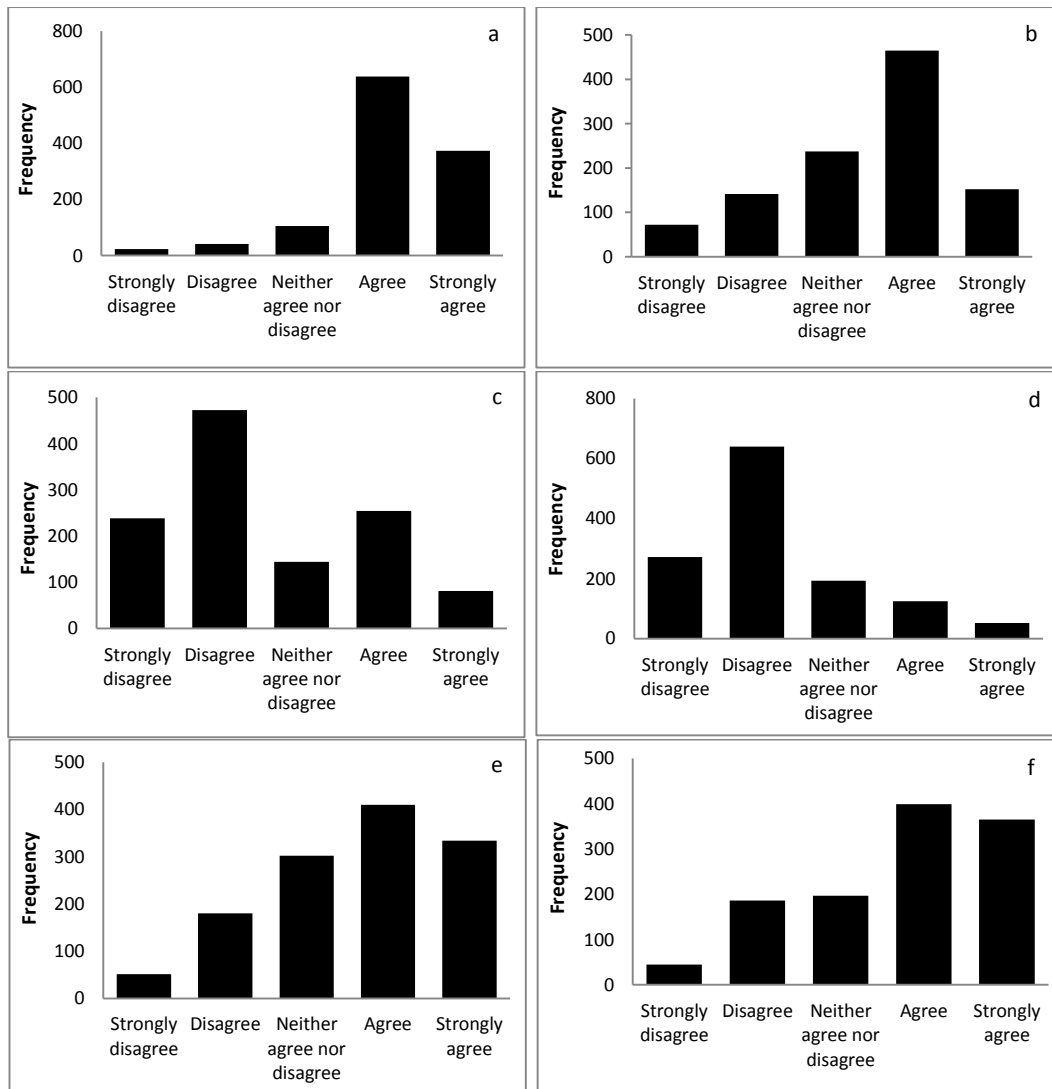
Fig 8.9: Perceptions of damage to local environment

a) Local environment is being destroyed; b) Damage to the environment is because
of migrants; c) Tourism damages the local environment; d) Preservation of Kayas not
important; e) Sad if the Kayas were lost; f) Better able to protect the environment
now compared to when were younger

8.4.8 Responsibilities for protecting the local environment

The majority of people interviewed (52.2%) think that the local Mijikenda population should
be responsible for the protection of the local environment, whereas a large number (26.3%)
believe that the government should (Figure 7.10). Chi-square was used to further investigate
the responses and the results showed that there were no significant differences in who
people felt was responsible based on respondent's gender or age. However there was a
significant difference across the ethnicities, religion, locations and sub-districts (Table 8.29).
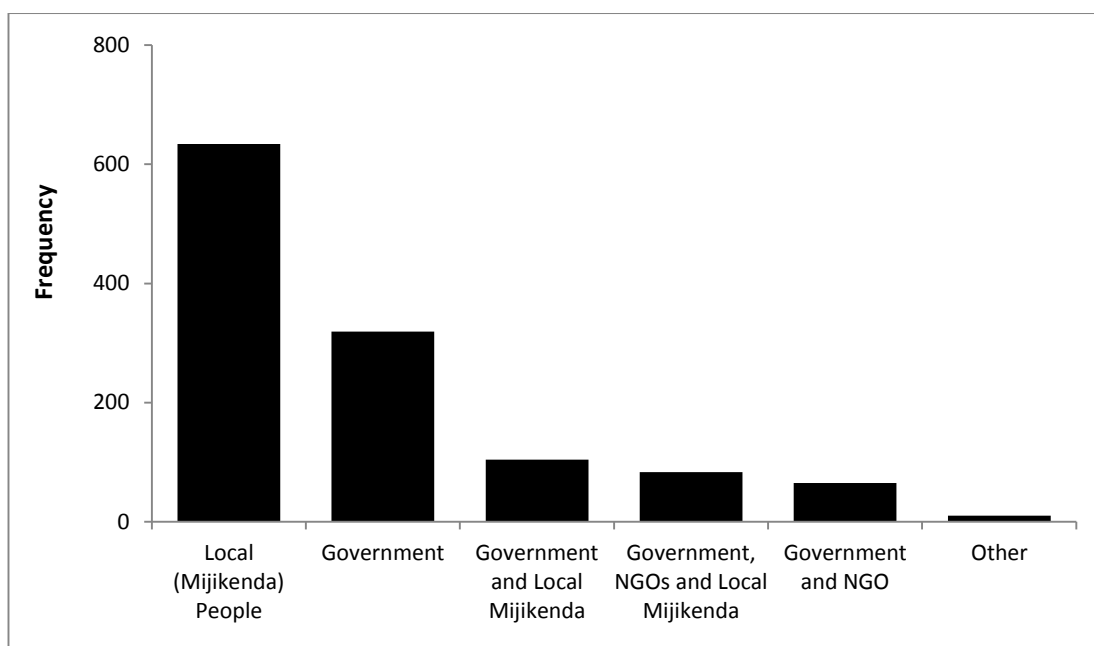
Figure 8.10: Who should be in charge of protecting the local environment

Table 8.29: Chi-square results for analysis of who should be responsible for protecting the local environment. For legend see Table 8.1
[A] 24.4 % cells have expected count less than 5, minimum expected count is 0.27
[B] 35.0 % cells have expected count less than 5, minimum expected count is 0.85
[C] 32.9 % cells have expected count less than 5, minimum expected count is 0.71
[D] 33.3 % cells have expected count less than 5, minimum expected count is 0.11

Variable	χ^2	df	p	Monte Carlo Exact 99% CI		Cramer's V	Bootstrapped 99% CI	
				Upper bound	Lower bound		Upper bound	Lower bound
Gender	6.07	4	0.194					
Age	19.3	16	0.253					
Ethnicity[1] [A]	484.0	32	**< 0.001**	< 0.001	< 0.001	0.318	0.281	0.368
Religion[1] [B]	60.3	12	**< 0.001**	< 0.001	< 0.001	0.165	0.135	0.237
Location[1] [C]	897.2	52	**< 0.001**	< 0.001	< 0.001	0.433	0.397	0.483
Sub-District[1] [D]	345.7	20	**< 0.001**	< 0.001	< 0.001	0.269	0.238	0.309

A post-hoc z-test analysis shows that a significantly greater proportion of Kauma respondents think that the government should be responsible for protecting the local culture compared to those in all other northern Mijikenda tribes, whereas the Jibana are least likely to think so (Table 8.30). Whereas a significantly greater proportion of Kambe respondents stated that they think that the local Mijikenda population should be in charge compared to the Chonyi, Jibana, Kauma, and Rabai. A significantly greater proportion of Jibana respondents think that both the government and local Mijikenda population should be in charge compared to all

Table 8.30: Cross-tabulation of who should be in charge of protecting local environment with ethnic group. For legend see Table 8.2

		Ethnic Group									
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	Sig
Who should be in charge of protecting the local environment	Government	61_b	$57_{b,c}$	4_c	$31_{b,c}$	81_a	$50_{b,c}$	$29_{b,c}$	$3_{a,b,c}$	$1_{a,b,c}$	*
	Local (Mijikenda) People	82_d	$149_{a,b,c}$	$28_{c,d}$	103_a	37_d	$154_{b,c}$	$65_{a,b,c}$	$10_{a,b,c,d}$	$3_{a,b,c,d}$	*
	Government and NGO	8_a	18_a	1_a	2_a	14_a	16_a	6_a	0_a	0_a	NS
	Government and Local Mijikenda	$12_{c,d}$	$11_{c,d}$	27_a	0_d	0_d	38_b	$13_{b,c}$	$2_{a,b,c}$	$1_{a,b,c}$	*
	Government, NGO and Local Mijikenda	67_a	7_b	0_b	0_b	2_b	6_b	0_b	$0_{a,b}$	$0_{a,b}$	*

other northern Mijikenda tribes. However, a significantly greater proportion of Chonyi respondents think that the government, NGOs and the local Mijikenda population should all be in charge together compared to all other northern Mijikenda groups.

The results also show that a significantly greater proportion of Pagan respondents said they think that the government should be in charge compared to Muslim respondents (Table 8.31). A significantly greater proportion of Christians, Muslims and respondents with no religion think that the local Mijikenda population should be in charge compared to Pagans. In addition, a significantly greater proportion of Pagans also think that both the government and the local Mijikenda population should be in charge compared to all other religions and those with no religion. A post-hoc z-test shows that a significantly greater proportion of those in Ganze sub-district think it should be the government compared to those in Junju, Kaloleni, Kilifi or Rabai sub-districts (Table 7.32). However, significantly greater proportion of those in Kaloleni sub-district think it should be the local Mijikenda population compared to those in Ganze, Kilifi or Rabai sub-districts.

Table 8.31: Cross-tabulation of who should be in charge of protecting local environment with religion. For legend see Table 8.2

		Religion				Sig
		Christian	Muslim	Pagan	None	
Who should be in charge of protecting the local environment	Government	$126_{a,b}$	40_b	8_a	$7_{a,b}$	*
	Local (Mijikenda) People	248_a	123_a	0_b	22_a	*
	Government and NGO	27_a	8_a	2_a	2_a	NS
	Government and Local Mijikenda	30_b	23_b	6_a	2_b	*
	Government, NGO and Local Mijikenda	57_a	6_b	$0_{a,b}$	$0_{a,b}$	*

Table 8.32: Cross-tabulation of who should be in charge of protecting local environment with sub-district. For legend see Table 8.2

		Sub-District						Sig
		Ganze	Junju	Kaloleni	Kilifi	Mariakani	Rabai	
Who should be in charge of protecting the Local Environment	Government	96_a	$0_{b,c}$	37_c	86_b	$0_{a,b,c}$	97_b	*
	Local (Mijikenda) People	42_d	$9_{a,b}$	206_a	169_c	$2_{a,b,c,d}$	$203_{b,c}$	*
	Government and NGO	14_a	0_a	15_a	14_a	0_a	22_a	NS
	Government and Local Mijikenda	0_c	$0_{a,b,c}$	50_a	14_c	$0_{a,b,c}$	$39_{a,b}$	*
	Government, NGO and Local Mijikenda	0_b	$0_{a,b}$	1_b	76_a	$0_{a,b}$	6_b	*

The analysis indicates (Table A3.29, Appendix 3) that a significantly greater proportion of those in Jaribuni location think that the government should be in charge compared to those in all other locations (except Kauma). A significantly greater proportion of those in Kambe stated that they think it should be the local Mijikenda population in charge compared to those in Chasimba, Jaribuni, Jibana, Kauma, Mwarakaya, Rabai and Ribe locations. In addition, a significantly greater proportion of those in Jibana location said they think that it should be both the government and the local Mijikenda population in charge of the protection of the local environment compared to those in all other locations except for those in Tsangatsini. The results showed that location was found to be the strongest predictor for who people think should be in charge of protecting the environment across those tested (Table 8.29).

8.5 Discussion

8.5.1 Perception of the connection between culture and the environment

In the literature, the link between cultural and biodiversity is clearly made, especially with regards to SNS (Vecsey, 1980; Sutherland, 1993; Infield, 2001; Rist et al., 2003; Selin, 2003;

Adams, 2004; Maffi, 2005; Berkes, 2007; Wild and McLeod, 2008; Djoghlaf 2012). It has been argued that the ways in which local traditional people perceive their culture and the environment is often different from how many academics (especially those from developed countries) do so (Infield, 2001; Foley, 2003; Adams, 2004; Fischer et al., 2013). Therefore this project investigated whether or not local people thought that conserving their culture would help to conserve the environment in the region as is stated in the literature. The results show that the majority of people think that preserving the local culture will help to preserve the environment, therefore showing that the local populations also think that there is a link between the two (Figure 8.1). This perception supports the existing concept of combining cultural and biodiversity preservation; however, as has been demonstrated in Chapters Three to Six, the existing management approach has been ineffective and needs to be redesigned. Whether or not people think protecting the culture will help to protect the environment varies according to age, ethnicity, and in different regions (Table 8.1 – 8.4). Older people are more likely to think that it will help than younger people, as do the Kambe and Kauma and those in Chasimba location. Whereas the Rabi are less likely to think there is a connection. As discussed in Chapter 4.5.2, the Rabai live in a more developped area, with greater migration in and out of the area, and there is greater access to major cities. This increased level of development in the region, and greater experience of urban areas and interactions with migrants, may influence the perceptions of the Rabai people, and result in them thinking there is less of a connection betweent their culture and environmental conservation. In addition, as has been seen in previous chapters (Chapters Four, Five and Six), the Rabai have undergone a greater shift away from traditional practices and values than other Mijikenda ethnic groups. In contrast the Kauma live in a more remote area (Figure 1.3 and 2.1) compared to the Rabai, there is less development, and previous chapters (Chapters Four, Five and Six), show that the Kauma are more likely to follow traditional values and practices. Which may affect why they think that there is a connection between their culture and environmental conservation.

Both Kaya Kauma and Kaya Kambe have, or have had in the past mines, next to the Kayas. In a number of cases the Mijikenda have fought to protect the Kayas from mining practices (Younge *et al.*, 2002; Matiku, 2003). The Kauma were successful in ensuring that the mining next to Kaya Kauma was ceased (Pers. obs. Shepheard-Walwyn, 2012). As the importance of the Kayas to the local culture is the driving force behind the objections to the mining, and in turn this has protected the Kayas, this may lead the Kauma and Kambe (communities who

have fought and/or are fighting to protect their sites from mining) to feel that their culture is helping to protect the Kayas. While the connection between culture and conservation is evident in this area, and a combined approach is likely to be the most successful, due to the differences amongst the communities, interventions will need to be on a site-by-site basis with projects being adapted to incorporate the views of the people within the communities where they are being put in place.

Based on the link between culture and biodiversity preservation, in order to achieve effective conservation of the biodiversity of the SNS, the protection of the local cultural heritage needs to be addressed, and incorporated into management plans. The results indicate that local people would engage with and support management which aims at jointly addressing the preservation of both cultural heritage and biodiversity.

8.5.2 Transmission of cultural knowledge

8.5.2.1 Cultural Knowledge of the interviewed population

A key component of preserving culture and safeguarding its longevity is to ensure that it is passed onto future generations. Whilst the majority of individuals do remember being taught about their culture a large proportion (31.2%) do not (Figure 8.2). Whilst it is possible that people were taught about their culture, but have since forgotten, a number of those who do not remember being taught about their culture are younger individuals (Table 8.5 and 8.7). It is less likely that younger respondents will have forgotten about being taught their culture, so therefore it is possible they may not have been taught about it at all. This indicates a reduction in the transmission of cultural knowledge, especially to younger generations, and suggests that a large proportion of the population are not aware of the local Mijikenda culture. As well as the variation across different age groups, whether or not someone remembers being taught about their culture differs across ethnicities, sub-districts and Divisions (Table 8.8 – 8.10). This (along with results from Chapters Five and Six), indicates that the existing cultural knowledge varies across different groups and different areas within the region.

The Chonyi and the Kauma are more likely to remember being taught about their culture than other ethnic groups. The Kauma have been found in previous chapters to adhere traditional practices and values (Chapters Four, Five and Six). They live in a more remote

area, with less development than other groups (such as the Rabai). The rules associated with the site (such as no photography in the sie) are stricter than other sites (pers. obs. Shepheard-Walwyn, 2012). The community in this region may be more traditional than other Mijikenda ethnic groups, and therefore more people may have been taught about the traditional culture. The Chonyi live around Kaya Chonyi and Kaya Tsolokero. The community living around Kaya Tsolokero are in the process of developing a tourist centre at the site, to inform tourists about the Mijikenda and the Kayas. The community in this area have been learning about their culture from the elders so that they are able to give tours (pers. Obs. Shepheard-Walwyn, 2012). It is therefore possible that the greater rate of Chonyi people remembering being taught about their culture is in connection to the development of the tourist centre.

The reduction in local traditional knowledge has been linked to a decrease in knowledge of local biodiversity and has been argued to be a threat to the conservation of culturally important sites and species, as well as overall biodiversity (Githitho, 2003). This has also been observed in other places around the world. For example, Fukamachi and Rackham (2012) note that in Japan the loss of traditional knowledge in younger generations and a reduction in the connectivity between the community and the traditional practices is a threat to the survival of 'Yama No Kami' SG, and in in both Ethiopia and Uganda ancient 'Church forests' are being degraded due to a loss of respect for and adherence to traditions and customs associated with the sites (Banana et al., 2008; Berhane-Selassie, 2008). In addition, Turvey et al., (2010) found that in China, the knowledge of the Baiji (*Lipotes vexillifer*), which was once a sacred species, was lost when the species started to die out, showing the link between environmental and cultural knowledge can be damaged in both directions.

Since the conservation of the local SNS is intertwined with the local culture, the changes in traditional cultural knowledge may have serious impacts on their conservation. In order to conserve SNS, the preservation of cultural history is required, and therefore, since the results of this project indicate that local traditional knowledge is decreasing, projects which address this are likely to be needed in the region to achieve more effective conservation of the SNS. As the level of cultural knowledge was found to vary across the Kayas, the importance of finding new ways to preserve and pass on cultural knowledge is needed among the different ethnicities and areas. Therefore both large scale projects working across all areas, as well as projects tailored to specific groups and regions are likely to be useful.

To date a number of projects that have focused on sharing knowledge and approaches to the conservation of community sites have been undertaken, both on small scales amongst communities, and larger scales which have involved members of communities from sites across the world. For example 'The Gaia Foundation' has been involved with learning exchanges between African community leaders (from Kenya, Africa, Ethiopia, Ghana, Botswana and South Africa) and communities in the Columbian Amazon. They also work on smaller scale projects within countries and communities (Wilton, 2013). In addition, networks such as the "Custodians of Sacred Sites, Africa", initiatives including "Interfaith Environmental Initiative of Alabama" and meetings such as "Many Heavens, One Earth, Our Continent" and "Protecting the Sacred: Recognition of Sacred Sites of Indigenous Peoples for Sustaining Nature and Culture in Northern and Arctic Regions" all seek to provide information and support to aid conservation of culture and SNS across and between communities (ARC, 2009; Interfaith Environmental, 2014; ABN, 2012; Heinämäki and Hermann, 2014). Such projects help to foster support between groups, and provide new approaches and techniques which communities can use. A similar approach could be used amongst the Mijikenda communities so as to foster support across different groups, as well as to share knowledge amongst communities and to help those who have had less success at passing on local cultural knowledge find new ways of doing so.

The results also indicate that those who think that their cultural history is important and those that believe in the traditional belief system are more likely to remember being taught about the local culture (Table 8.5). Those who believe in the traditional belief system are likely to remember being taught about their culture as the local culture is important to the traditional belief system which links the local people to their ancestors (Spear, 1978). In addition, many of the local cultural traditions, especially those associated with the SNS are routed in the traditional belief system. Those who think that their cultural history is important may have been more inclined to learn about the local culture, or by learning about their local culture may have decided that their cultural history is important to them. If the latter is true, then by engaging more people in learning about the local traditional culture, they may also begin to feel that their cultural history is important, and may be more engaged in the preservation of the local cultural heritage, including cultural and sacred sites associated with their culture.

8.5.2.2 Transmission of knowledge to future generations

A large majority of the interviewed population think that it is important to teach children about their culture (Figure 8.3). Older members of the community and men are more likely to think that it is important to teach children about their culture (Table 8.11 – 8.13). As younger individuals are less likely to think that it is important to teach children about their culture, this suggests that when they have children they will be less interested in their children learning about their culture which may result in a decay of transmission of knowledge to future generations. There is variation in how important different ethnic groups feel it is to teach children about cultural knowledge, therefore some ethnic groups are more likely to teach their children about culture than others. For example, the Kauma, Ribe and Rabai are less likely to teach children about their culture than the Kambe. This may result in the loss of local cultural knowledge which is unique to the different tribal groups being lost in some areas. In order to preserve this knowledge, it will be important to work with those who currently have the traditional cultural knowledge to find ways of preserving it, whether through documenting it, or finding new ways to re-engage people in traditional practices of passing on cultural information to children orally. It will be important to find ways of emphasising the importance of retaining cultural knowledge and passing it on to future generations in those communities that believe it is less important to do so. Again this could be achieved through intercommunity workshops and support groups. There is also a difference in how important people think it is to teach children across different ethnicities and areas (Table 8.11 and 8.14 – 8.16). Therefore it will be important to tailor approaches to the different regions and communities that educational programmes are being conducted in.

Most people were taught their culture by family members, especially mothers, fathers and grandparents (Figure 8.4). This shows that cultural knowledge was obtained primarily from family members, especially direct family. When considering who should teach children now, non-family members are also often mentioned, in particular teachers. This highlights a change in how people think knowledge should be transferred compared to how people were taught in the past. When investigating who were the most important people for teaching respondents about their culture the most common responses were grandparents, mothers and fathers, whereas for children people think the most important people are grandparents, mothers and teachers (Figure 8.5). However there is a difference between who people think should teach children today and people's knowledge levels, ability and interest to do so. As

highlighted previously, young women are less likely to remember being taught about their culture, and are less likely to think it is important to teach children about culture. However, mothers are considered highly important in passing on this knowledge. Therefore it is possible that if people expect new mothers to teach their children about their culture, yet the mothers do not know about culture or think it is important to teach children about it, that children will not be taught. This will result in a further lack of local cultural knowledge which may be lost when older generations pass on.

Teachers are also noted as being important for teaching children about their culture (more often than fathers; Figure 8.5). As younger generations are less likely to remember being taught about their culture, if many of the teachers in the region are young, it is possible that they themselves will not know about the local culture. In addition, Kenya currently has a national curriculum (Otanga and Nyandusi, 2010, Government of Kenya, 2013). Whilst there are sections within the curriculum which focus on educating pupils to accept and embrace diversity in their communities, a national education system has less autonomy for local regions, and set information that students are expected to learn which will be the same across the whole country. Therefore the scope for teaching local traditional culture within standard school lessons is likely to be very limited, if it is possible at all (Otanga and Nyandusi, 2010). The reduction of specific cultural knowledge is noted as one of the possible problems of a national curriculum by Otanga and Nyandusi (2010); however, the benefits which are gained from a national standard of education through a national curriculum is thought to outweigh these issues (Otanga and Nyandusi, 2010, Government of Kenya, 2013). Therefore if teachers are also being expected to teach children about their culture, but are unable to do so due lack of knowledge or constraints of the national curriculum, again this may lead to children not being taught about their culture at all.

One of the most common ways that people were taught about their culture, and how they thought children should be taught is through songs and stories as well as dances/performances (Figure 8.6). In line with teachers being more important to teach children about their culture (as discussed above), lessons as a means of teaching was a more common answer when investigating how children should be taught compared to how respondents themselves were taught. These results indicate that the traditional ways of passing on traditional knowledge (through songs, stories and performances) are still considered to be important ways of teaching children, yet, there is evidence that the

communities also think that the way information is passed on could be changed to include more contemporary methods such as in school lessons.

While there are issues with being able to teach children in schools, since respondents think that a mix of traditional and new methods would be effective ways of passing on cultural knowledge, new approaches could be developed and incorporated into programmes aimed at passing on traditional knowledge along with more historical approaches, which may help to re-engage other members of the community (who may otherwise be less interested). This could provide opportunities for elders and other people to work together to jointly pass on knowledge via different approaches, and may help to find ways to encourage more people to engage in the recording, teaching and preservation of local cultural knowledge. Alternative ways of passing on traditional cultural knowledge to other members of the community as well as younger generations and children could include youth workshops, after-school clubs, and community events, so those that currently have local knowledge within communities, and want to pass it on, are able to do so. In Panama the Kuna people have adopted new approaches to passing on their cultural knowledge. Elders now run classes which children attend and the knowledge which was once passed on orally through generations is being written down and taught more formally. In addition, in their local communities they have adopted "a new "intercultural" model of education" to pass on not only cultural history but indigenous knowledge (Guidi, 2014). UNESCO (2010) highlights how traditional approaches to education can help to enhance more formal education systems and indicate that a combined approach to education using both traditional methods and more formal and contemporary teaching methods combined could provide better all-round education.

Similar programmes as those used by the Kuna people or suggested by UNESCO, where possible, could be used by the different Mijikenda communities, for example having elders teach classes on local culture in more formal settings, either as part of their formal education (if the national curriculum would allow), or in after-school clubs. However, as noted above, the type of programmes, and level of participation are likely to vary according to ethnicity and region where programmes are being run, and therefore they need to be tailored to suit the different communities.

8.5.3 Level of concern over the loss of the local Mijikenda culture

The reduction of cultural knowledge in the region is evidenced through the lack of awareness and participation in traditional practices and laws as well as lack of cultural education (Chapters Four to Eight). The loss of cultural knowledge is likely to be due to a range of reasons; however, in the literature, conversion to mainstream faith systems and modern schooling/educational approaches have both been attributed to the reduction of the transmission, and loss of traditional knowledge (Sheridan, 2008; Otanga and Nyandusi, 2010; Andriamarovololona and Jones, 2012); both of which have occurred for the Mijikenda communities (as noted in Chapter Four and Five, and in sections 8.4.2 and 8.4.3). In light of this the level of concern over the threat of the Mijikenda culture being lost was investigated. The results show that the majority of people are concerned about the loss of the Mijikenda culture (Figure 8.7); however, the level of concern varies according to age, ethnicity, how important a person's cultural identity is, their religion and where they live (Table 8.17 – 8.23).

Older people are more concerned about the loss of culture than younger respondents, this may be due to older people having more knowledge about the local culture so are more aware of the levels of loss (if people do not know something, they cannot be aware as to what degree it is not there), or it may be because older people are more inclined to be involved in traditional practices and think that culture is more important than younger individuals (as noted in Chapters Four to Six). If younger people are not aware and/or not concerned by the loss of culture, they may be less likely to engage with activities aimed at the preservation of culture. Therefore it is important to engage with the younger members of the communities, to help to emphasise the importance of local culture, both for cultural heritage and the role it plays in environmental and biodiversity conservation, and find ways to make it relevant to them. As is found for other interventions where engaging with local people is thought to be key to conservation success, initiatives are more likely to be successful by better engaging with what younger people value, and finding ways to relate their culture, and the preservation of their culture to what they believe is important (Infield, 2001; Adams, 2004; Berkes, 2007). The engagement of younger generations is important for the longevity of such projects, as they will eventually be the people involved in its management and preservation, and if the knowledge is not passed on to them, it will eventually be lost (UNEP, 2005; Turvey *et al.*, 2010; UNEP, 2012; CBD, 2013; Guidi, 2014). This therefore emphasises the importance of engaging the younger members of the

communities surrounding the Mijikenda SNS in the importance and preservation of both their culture and the biodiversity of the SNS.

The level of concern also varies amongst different ethnicities and in different areas. The Kambe and the Chonyi are most likely to be concerned about the loss of the Mijikenda culture. Kaya Kambe has undergone encroachment, and there is an active mine next to the Kaya. Kaya Chonyi has undergone major levels of encroachment (Chapter Three). The threats that these Kayas face may influence the concern of these communities about the loss of their culture. Alternatively, the variation may indicate greater levels of loss in different communities, it may highlight areas and groups which are more aware of the loss that is occurring, or it may show that some communities are more worried by the loss of culture than others. By identifying the different reasons for the concern it may help to highlight areas where loss of culture is greater, with more need for interventions, and it may also help to identify groups that are more inclined to undertake activities intended to help preserve local culture. Understanding the levels of concern among different communities and the reasons for this concern will help in the design of approaches that are more applicable and are therefore more likely to be engaging and useful to those communities.

8.5.4 Who should be in charge of protecting local culture

Most people believe that the local Mijikenda population should be in charge of the protection of the local culture (Figure 8.8). This shows that the communities still want autonomy over their culture and how it is preserved. However, having control, and being primarily responsible (which they are currently, under the existing management plan) are not the same. While most people think that the Mijikenda population should be in control, the previous literaturehighlight that the local communities are poor (Githitho, 2003; Nyamweru et al., 2008; Bresnahan, 2010), and the results from this research (Chapter Six) seem to support this. Therefore the local communities may not have the ability or resources to be in control of protecting the local culture without external support, including funding. In addition a large number of people interviewed stated that the government should be in charge, which indicates a departure from traditional attitudes.

The responses vary according to ethnicity, religion and region (Table 8.24 − 8.28). These variations show that the approach to conservation needs to be adaptable to the different communities and locations where management is being put in place. The results can help to

determine to what level the government and NGOs need to be responsible, and how management plans should be designed with varied levels of community autonomy. It is therefore important to work on a site by site basis, with greater governmental involvement when working with some groups like the Kauma, or in areas such as Ganze sub-district, and less when working with groups such as the Kambe and those in Kaloleni sub-district who are likely to want greater autonomy for the local population. The shift to the perception of government needing to be in charge by some communities may reflect an observation of local institutions (including the existing management by elders) no longer being as effective as it may have once been. It may also indicate a change in the level of respect for elders (as noted by Githitho, 2003). If groups no longer respect the elders and the traditional customs, they may feel that the government should now be in charge, whereas those who still trust the elders and follow the traditional customs more may want just the local community to be in charge. In addition, the interest in the government being responsible may be in order to avoid social conflict. Individuals may think that if the local community are in charge this could result in negative relationships with migrants in the area when they have to enforce the local laws. These reasons may explain the differences observed in different groups, such as the Kauma (who believe the government should be responsible), and the Kambe (who think local people should be in charge). However, the want for the government to be in charge may also reflect the level of confidence communities have in their ability to protect their culture. If a community do not believe that they have the ability to protect their culture, they may want the government to be in charge. This could be due to a range of factors, such as resources to be able to achieve management, or it may reflect changes within the community. For example, if there has been an influx of migrants into an area, as migrants are less likely to follow customary laws (Githitho, 2003; Coffin, 2007; Laurance *et al.*, 2009; Andriamarovololona and Jones, 2012) they may think that the government should be in charge.

Castro and Nielsen (2001) note that whilst power sharing has promise as a method for approaching conservation management in Canada and South Asia, issues and conflicts have arisen between local communities, government, and other stakeholders (such as NGOs), due to limited engagement of local people in decision making. Such conflicts have the potential to increase degradation due to retaliation or local people becoming disinterested in conservation efforts. Therefore by engaging with local communities, respecting their wishes and reflecting this within management plans, it will help to foster better working

relationships, more effective cooperative management and the government can focus on being more active in areas where communities want greater governmental involvement.

8.5.5 Perceptions of the degradation of the local environment

The results indicate that the majority of people believe that the local environment is being destroyed (Figure 8.9), so this indicates that they are aware of the ongoing degradation of the SNS within the region. The majority of people believe that this damage to the environment is because of migrants who have moved into the area (Figure 8.9); however, results from Chapter Seven indicate that a large number of the interviewed population (who are significantly more likely to be local Mijikenda people) are partaking in extractive use of Kaya resources which is likely to be contributing to the degradation of the sites. Therefore, the results from these two chapters show that the perception of migrants being responsible for degradation may be unjustified, as it is likely that the Mijieknda are also having damaging effects on their natural environment. The perception that the degradation is due to migrants in the area may be because local people are not aware that what they are taking from the forests is causing damage, or they may blame migrants so as not to blame themselves. However, there may be a basis for these perceptions. Migration into an area increases land demand, so areas of natural environment are more likely to be converted, therefore reducing available resources and rendering what were once sustainable activities unsustainable (Spellerberg, 1998; Trombulak and Frissell, 2000; Younge *et al.,* 2002; Githitho, 2003;). In addition, while many of the local population use the Kayas in ways which are in contradiction to the traditional laws (Chapters Six and Seven), the majority still think they are sacred (Chapter Five). However, migrants who move into an area are unlikely to revere local traditional cultural sites, and may violate traditional regulations associated with the sites (Andriamarovololona and Jones, 2012). It is therefore possible, that while local people use the sites, they do so to a lower level, and still try to respect the sites. It is likely that the mining (for iron ore, minerals and stones) found within some sites (Chapter Three) and larger scale logging are because of bigger companies, migrants and non-local people in the region (Githitho, 2003; Nyamweru, 2008), and therefore due to the extreme level of damage that such practices cause, they are perceived as the ones who are destroying the local environment.

Most people agreed with the statement "I would be sad if the Kayas were lost" (Figure 8.9), which indicates that the local communities are likely to engage with conservation initiatives;

however, as noted in Chapters Four - Seven, any such initiatives would need to reflect changes and perceptions as well as the needs of the local communities. Since the majority of those interviewed do not think that tourists are responsible for the damage to the local environment (Figure 8.9), it may be possible, as has been done on the south coast at Kaya Kinondo (Nyamweru and Kimaru, 2008), to expand the ecotourism which currently exists at a low level at some sites, and introduce new projects at other sites. However, there is a risk to using ecotourism as a method to achieve conservation, especially at SNS. Tourists may break local taboos, and/or cause further damage to sites. For example, Andriamarovololona and Jones (2012) note that in Madagascar when local people see outsiders such as tourists break taboos and not suffer any consequences, this may lead to reduction in local adherence to these practices, which could lead to further degradation in both the following of cultural traditions, and the associated biodiversity. Ormsby (2012) notes that opening up Sacred Grove to tourists could cause a shift in the cultural significance of a SNS and therefore degrade its sanctity which could lead to loss of biodiversity at those sites. In Japan, at the Yama No Kami Sacred Grove, tourists are unfamiliar with local customs associated with them, they do not have an interest in the preservation, so pose a significant threat to their survival (Cinquepalmi and Pungetti, 2012).Respondents may state that they do not think tourists are responsible for the damage as the benefits (predominantly money) that they get from the tourists outweigh the costs, including those to the biodiversity. At Kaya Ribe, there is a visitor centre aimed at attracting tourists to the sites, and the community surrounding Kaya Tsolokero are in the process of developing a visitor centre. These initiatives show that the local communities have a positive perception towards tourists. Therefore, they may ignore the damage that tourists do to the SNS, or they see the benefits as greater than the costs so overall do not think the tourists damage the sites. The answers given, may undermine the level of threat that tourists currently have on the sites. Therefore, with the potential issues for both the local culture and biodiversity, any approaches which seek to use tourism as a resource must be carefully managed so as to avoid issues of further degradation, or damage to the sanctity, of the sites.

While the local people are aware of the degradation of their local environment, they also note that they are better able to protect the environment now compared to when they were younger (Figure 8.9). This perception indicates that the local communities believe that the conservation of these sites is feasible, and all the results so far suggest that they would be

willing to engage in conservation of the local environment, if it was adapted to address the changes in culture, attitudes, values, and needs of the local people.

8.5.6 Who should be in charge of protecting the local environment

The majority of people think that the local Mijikenda population should be in charge of the conservation of the local environment (Figure 8.10). There are some respondents who think that the government should be in charge, and this may reflect the reduced ability of the local population to protect their environment as they have done in the past (as has been noted in Chapters Three, Five and Six). It may also be due to the resources and expertise that the government has access to which the local people do not, and/or may reflect a perception that the local environment is both nationally and globally important, and therefore the government have a responsibility to protect it. In addition, as discussed in section 8.6.4, there is migration into the region, and some respondents may feel that the government should be involved as they may not feel as though the local community would have authority on migrant populations. They may also feel that migrants may not listen to the local communities, but would to the government. So this may also lead to some individuals believing that the government should be in charge of protecting the local environment. As was discussed earlier (section 8.6.4), the differences observed, such as the Kauma thinking the government should be in charge and the Kambe thinking the local community should be, may also reflect the levels of respect for elders and the traditional management approaches. Those who resepct the elders and the traditional management may want the local MIjikenda population to be in charge, whereas those who do not may feel that the government should be in charge.

However, most people believe that the local population should be in charge. As was discussed before (Section 8.5.4), the local people being in charge does not equate to them being solely, or even primarily responsible, as is the case with the existing management approach (NMK, 2008). The results of this project show that the local people do not have the means or ability to protect the sites in the traditional manner, and this is being reflected in the continued degradation of the sites. Therefore, whilst they want the autonomy in how protection of the local environment is done, they need resources (in terms of skills, equipment and money) and support to achieve it.

There is variation in the responses about who should be in charge of protecting the sites according to people's ethnicity, religion, and the regions (Table 7.229 – 8.32). For example, Kauma respondents, pagans and those in Ganze sub-district as well as Jaribuni location are all more likely to be interested in the government having more control of environmental conservation, whereas the Kambe, Christians and Muslims, and those in Kaloleni sub-district as well as Kambe location are all likely to want more autonomy for the local community. The results show that no Pagans said that the local Mijikenda should be in charge of protecting the local environment. As the pagan Elders are traditionally in charge of the protection of the SNS, and are noted as being so in the management plans, this highlights further issues with the current plans. Most pagans think that the government should be in charge of the conservation of the environment. It is possible that they have this opinion because they are aware that they are unable to do so, and want help to halt the degradation of the sites. It may also reflect a shift in attitudes towards ownership of and responsibility towards the sites. Issues associated with ownership, responsibility and subsequent conservation of the SNS has been noted previously, and it has been argued that if Elders were given ownership of the sites they would be more inclined to take responsibility for their protection (Githitho, 2003; Nyamweru et al., 2008; Mwita, 2014).

Due to the different responses given by various groups, different management styles and approaches, as well as varying levels of involvement from the government and NGOs will be needed at different sites and areas. Therefore, as has been noted for all the management and intervention approaches discussed in this and previous chapters about how conservation should be done, who should be in charge, and to what degree different actors should be involved, all must be managed on a site-by-site and adaptable basis.

8.6 Conclusion

The results from this chapter show that local people are aware of the link between their culture and the natural environment, and that protecting culture will help to protect the environment. However, there has been a decrease in levels of local traditional cultural knowledge, and the ways in which information is transmitted are altering. Cultural knowledge could be reduced further if this decrease in knowledge is not addressed and managed. The results suggest that the communities are concerned about the degradation of both the local Mijikenda cultures and the local natural environment, and that they are likely to engage with conservation of these, but new approaches are needed. Conservation of both

cultural heritage and biodiversity needs to address the gaps between generations and groups within and between communities. Approaches need to be designed on a site-by-site basis, allowing for autonomy of the Mijikenda community to be incorporated into plans, with the level of governmental and NGO involvement varying according to the communities, to meet their wants and expectations while ensuring all groups have the resources they need. As noted in previous chapters, future conservation of the SNS and the associated culture and traditions needs to reflect the diversity of the sites as well as the communities that surround them.

Chapter 9: Synthesis and Discussion

9.1 Discussion of the main findings and their implications to local and global conservation

9.1.1 Importance of the Mijikenda SNS for conservation and their current threat from encroachment from degradation and deforestation

Key Findings:

- This thesis provided a technique to map culturally sensitive SNS for the assessment of potential biodiversity. The methodology is one that can be used to compare not only the Mijikenda SNS to one another, but could be used to compare culturally sensitive areas around the world.

- In addition it found that the 20 SNS that were surveyed in this study (which are 19 ecologically distinct sites) contain at least 1.4% of Kenyas East African Coastal Forest habitat. This shows that the Mijikenda SNS hold a significant proportion of this unique ecosystem, and are therefore highly important for biodiversity conservation, both locally and globally.

- Most of the sites have undergone encroachment and forest loss, and this study provides the first accurate estimations of both encroachment and forest loss within the sites.

- The amount of forest loss within the SNS over the period 2002 – 2012 was significantly lower than the SNS compared to forest loss outside of the SNS.

It is estimated that sacred natural sites (SNS) cover approximately 15% of the Earth's surface (Palmer, 2008), exist in a number of countries worldwide, and cover a range of different environments and ecosystems. They are connected to numerous different faiths, and are known to be important to biodiversity conservation around the world (Gadgil and Vartak, 1976; Burges et al., 1998; Githitho, 2003; Mgumia and Oba, 2003; Palmer and Finlay, 2003; Bhagwat, 2005; Dudley et al., 2005, MEA, 2005; Bhagwat and Rutte, 2006, Dudley et al., 2009, Bhagwat et al., 2012; Berhane et al., 2013; Ray et al., 2014). The Mijikenda SNS are part of the globally important East African Coastal Forest ecosystem (Burgess et al., 2000; Githitho, 2003; Matiku, 2003; Azeria et al., 2007; Anderson et al., 2007a; NMK, 2008; Metcalfe et al., 2010). To investigate the potential biodiversity within the sites, and the

amount of forest loss and encroachment, habitat maps and GIS analysis were used. The findings in this research contribute knowledge on a number of sites within this biome. It provides a more up-to-date account of the sites, highlighting the significant role that they play in biodiversity conservation within the region and ecosystem in general. This study provides the first set of accurate measurements of the extent of coastal forest within a number of sites. The results indicate that they contain approximately 4.2% to 5.6% of Kenya's Coastal forest. In addition this research helps to highlight areas which may hold rare and endemic species, as well as viable populations of the flora and fauna of the region. In addition to giving contemporary accounts of sites previously analysed, this research also provides information on a number of SNS which have not been studied in any detail before. It emphasises the importance of the Mijikenda SNS, both locally and globally, for the preservation of species, forests and ecosystem services (ES). It also provides another example of SNS which are important to biodiversity from those already described in the literature.

The mapping techniques used in this project could serve as a basis for the assessment of SNS and their importance to biodiversity. The approaches used in this study allow for the analysis of sites without violating cultural traditions (such as no-entry zones). Limited access is a feature of a number of SNS around the world, including Australia, Malawi, Madagascar and Kenya (Wild & McLeod, 2008, Tengö and von Heland, 2011, Shepheard-Walwyn, 2012 pers. obs.). The methods used in this research could be applied to any site worldwide, as long as those in charge of their protection gave permission for satellite imagery to be used. If so, this methodology could be used as a standard for assessing all SNS, and if all sites were surveyed in a systematic manner this would allow for comparison of SNS on a global scale. This would provide a greater insight into the roles of SNS with regards to forest protection, ecosystem services biodiversity conservation, and carbon stocks on local, national and international scales.

Mapping SNS allows greater understanding of their number, coverage, and position in the landscape. However, some communities may not want their sites to be known. Mapping sites may increase people's awareness of them, but if such sites require secrecy for their sanctity to be preserved, or this attention allows for greater exploitation of the sites, mapping could have negative impacts (Bhagwat, 2013). While these issues are noted, mapping sites can have many benefits. It allows for more detailed information on the importance of the sites

and their role in the landscape. It helps with understanding how sites are connected, as well as allowing for information to be gathered on the ecosystem services they may provide and their contribution to biodiversity. The maps in this study were produced with the consent of the Kaya Elders. They contribute up-to-date information about the coverage and location of SNS worldwide and should be included within projects such as 'Mapping the Sacred' (https://mappingthesacred.org/).

While the research in this project helps contribute to the literature on the importance of SNS to biodiversity and provides methodologies for analysis, it also highlights an example of sites which are suffering from habitat loss and degradation. The encroachment into, and degradation of SNS is a global issue that has been observed around the world, including in Bénin, Ethiopia, Japan, Kenya, Sierra Leone, and Uganda (Githitho, 2003; Banana *et al.,* 2008; Berhane-Selassie, 2008; Lebbie *et al*., 2008; Siebert, 2008; Bermbaum, 2012; Fukamachi and Rackham, 2012). Although it is noted that there are many indigenous cultures that are sympathetic towards, and in some cases even beneficial to the conservation of nature (as discussed in Chapter 1.1), it has been observed that a number of SNS, which were once well preserved refuges for biodiversity, are being degraded and may lose the species that depended on them. The Mijikenda SNS are one such example and this project aimed to investigate these issues further.

9.1.2 The diversity of Mijikenda demographics; the ways in which local communities think about and behave towards the Kayas; and the identification of individuals as 'users' of SNS

Key findings

- Whilst the local populations surrounding the SNS are predominantly Mijikenda, there is a diversity in their ages, genders, religions, ethnicities, and marital status.
- There is diversity in local people's attitudes and values towards the traditional Mijikenda culture, and traditions, as well as environmental conservation.
- The 'Mijikenda' are not a single homogenous group.
- There is a mix in the level of adherence to traditional practices, attitudes, values and perceptions.
- There has been an apparent shift in culture amongst many of the groups; however, some (such as the Rabai) have undergone greater cultural shift than others (such as the Kauma).

- The differences in level of cultural shift may be associated with many different factors, including changes within the social structure of the community, development, migration, emigration, and ease of access to resources and major cities.

- Whilst some people do still think that the Kayas are sacred, the majority do not.

- The perception of the Kayas as sacred sites varies according to a range of different demographic factors.

- There is a contrast in how people 'think about' the Kayas and the reasons they think that they are important.

- The Kayas are perceived conceptually as cultural and spiritual places, whereas they are considered important predominantly for regulating/supporting and provisioning services.

- The contradiction in how people think about the sites, and the reasons they believe they are important, may have significant impacts on the conservation of the sites. In addition, these differences may explain contradictions within the existing literature, which suggests that local people have reverence and respect for the sites, yet also contribute to the degradation of the sites through use which is in violation of their sanctity.

- Majority of people claim not to use the SNS and those who do, claim only to do so infrequently.

- The variation in the groups indicates that a management plan designed on the premise that the 'Mijikenda' are a homogenous group with similar attitudes and values is likely to be ineffective.

- New management plans that are adapted on a site-by-site basis which account for the variation amongst communities and the cultural changes that have occurred, need to be developed.

As noted in chapter 1.1.6, the current management plan associated with the conservation of the Mijikenda SNS is based on the assumption that the Mijikenda are a homogeneous group who adhere strictly to traditional values and practices, and that the culture is static and has not changed in recent years. Questionnaires were used to investigate the diversity of the local populations surrounding the SNS. The results from this research highlight that the communities surrounding the Mijikenda SNS in Kilifi District are varied in their demographics, attitudes and values. In addition it shows that they have undergone, and are still going

through a period of cultural change. Some of the ethnic groups surrounding the SNS were found to have experienced greater cultural shift than others. The Rabai were most commonly found to no longer partake in traditional practices, or hold traditional values compared to the Kambe or Kauma. This research highlighted that whilst there are many drivers which may influence cultural shift, there were some traits that may indicate why the Rabai have undergone what appears to be a greater level of cultural shift. As discussed in chapters Four, Five and Six, the Rabai live in an area where there has been greater development, higher rates of migration into the region, and due to the proximity to the Mombasa-Nairobi highway, those living in the region are more mobile, and have greater access to the major cities. Whereas the Kambe and Kauma are more isolated, and there has been less development in those areas. It is therefore possible that the development, and movement of people around the Rabai region has influenced why they have undergone greater cultural shift. In addition, both the Kambe and Kauma have experienced mining threats to their Kayas, and they have, so far, been able to prevent the mines from destroying their SNS due to their importance to the local culture (discussed in Chapter 8.6.1 and 8.6.3).Therefore it is possible that these communities have upheld their culture, and feel that it is important, as it has helped to prevent potential damage to their SNS.

In Chapter 1.1.2 and 1.1.6, the dynamic and ever evolving nature of cultures was discussed, and this research shows that likely significant drivers of this cultural shift amongst these communities include globalisation (through development, and the promotion of 'modernity' amongst rural communities, including the introduction of a national curriculum, and conversion to mainstream faiths), as well as the movement of people in and out of the areas surrounding the SNS. Cultural shift due to globalisation and the mobilisation of people is happening both in Kenya and worldwide (Mishler, 2001; Smith, 2001; Maiero and Shen, 2004; Dudley *et al*., 2005; Hoekstra, 2010). Changes in culture due to globalisation and migration have been observed for the Mijikenda through their conversion to mainstream faiths, as well as those who identify as having no religion or belief system (which is rare in Africa) (Bhagwat *et al.,* 2011). The results indicate that there are currently a number of people of non-Mijikenda ethnicities living in the area, and with the development going on in the region (highlighted in Chapter Three), this is likely to increase. As new groups move into the region the Mijikenda people are likely to be influenced by them and their culture will be altered further.

While there are some communities around the world who want to continue functioning in line with their traditional customs with no development, such as the Tagaeri and Taromenane tribes in the Ecuadorian Amazon who live in voluntary isolation (Finer *et al.,* 2009), many do not and are embracing modernisation. In a number of cases there are both perspectives within the community, and some individuals want to achieve modernisation without undermining or losing cultures and traditions. These various perspectives were observed within the communities studied in this research. While there is a large amount of literature on indigenous cultures and their contribution to biodiversity conservation, there is a lack of research that seeks to understand how shifts in culture may affect the conservation of traditionally managed sites. This work addresses this lack of knowledge. It helps to highlight problems associated with cultural change (such as loss of traditional knowledge and the decrease in the perception of the value of culture and traditions), and brings to light issues encountered when groups have various perspectives towards change.

At present the existing conservation management plan for the Mijikenda SNS is based on an outdated and essentially idealistic concept of 'The Mijikenda' as a homogenous static group. However, the findings in this research highlight that the communities are diverse in their demographics as well as in their values, attitudes, beliefs and behaviours (Chapters Four, Five, Six, Seven and Eight). The management plans also assume that if people still think the sites are sacred they will follow the traditional regulations associated with them. Yet, the results of this project indicate that while people may value the sites as cultural and spiritual spaces, they use them in different ways. In addition to changes in the use of sites, the results show a reduction in transmission of knowledge, awareness and adherence to the traditional laws associated with the sites. These changes need to be acknowledged, and steps taken to find new ways for local people to learn about their culture, value the sites (if cultural values are no longer adequate), engage with local cultural and environmental conservation, and follow the laws associated with the sites. These findings along with the diversity of the communities and the continued degradation of the sites, brings the efficacy of the existing management plan into question. The results suggest that a new approach to the preservation of the local culture and the SNS is required which accounts for the diversity among the people in the region and the cultural changes that have occurred.

This research indicates that the management plans would increase their effect and efficiency by adapting to the changes within the local cultures, rather than attempting to encourage

people to adhere to a historical cultural system which they no longer connect with. Cultures must adapt with communities or they become historical relics which are no longer relevant and die out. This is especially likely to be the case if, as has been suggested by some in the communities studied in this research, the traditional culture is perceived as holding people back from progressing (Mwachiro, 2014). If cultural change is not considered in management plans it can lead to the loss of knowledge, cultural diversity and associated biodiversity (Sutherland, 1993; Chawala, 1998; Maffi, 2001; Mishler, 2001; Smith, 2001; Maiero and Shen, 2004; Maffi, 2005; Hoekstra, 2010). The results from this research indicate that this process has begun among the Mijikenda with the reduction in the knowledge and transmission of cultural knowledge, as well as changes in behaviour which are detrimental to both the culture and local biodiversity. To address these issues, management plans need to allow those who want to follow traditional practices and lifestyles to do so, but it must also work to re-frame perspectives towards the culture so it is not seen to limit progress and development for those that want to modernise. This will involve addressing how traditional cultures are perceived among communities, exploring new ways to teach people about the traditional culture and indigenous knowledge, and identifying values that people have for the SNS beyond their cultural and spiritual alone (ways to address these are discussed in Appendix 6). The Mijikenda communities are one of many groups undergoing such changes across the world. This research can help to provide a basis for monitoring and understanding the threats that such groups (and their environment) face and can be used to help with the conservation of community-conserved areas globally for groups currently undergoing such changes.

The findings from this research indicate that the way in which the existing international guidelines on how management of SNS should be conducted (as outlined by Dudley *et al*., 2005) has been interpreted too simplistically for the Mijikenda SNS. The international guidelines focus on the rights of indigenous people to access traditional lands, to be able to maintain their cultures and to conserve the sites according to traditional beliefs and practices (Dudley *et al*., 2005). While the recognition of the importance of these factors is vital, it must be noted that for many communities, the cultures are dynamic and the people within them are diverse. Although the management should be done in a way that maintains the sanctity of the sites, this study shows that for management to be effective, it must include all perspectives from the local community, not just those who follow the traditional faith and practices. If the management does not take into account alternative uses and perspectives

within the community, this may cause conflicts and limit the efficacy of the preservation of sites.

9.1.3 The use of international frameworks in assessing perceptions of SNS and the use of resources

Key Findings

- International frameworks provide useful ways of framing our understandings of SNS.
- There are some major limitations to their terminologies and interpretations when applying them to real-world examples.
- The MEA's current groupings of ES are too prescriptive for some categories, and too broad for others.
- The perceptions and use of the environment cannot always be separated into distinct categories.
- The MEA is missing a specification of the ecosystem service of 'social services' that nature provides.
- Modified versions of the MEA's ES categories can be used to successfully compare perceptions and uses of the natural environment and its resources across different communities.
- This thesis provided a methodology of comparing perceptions of nature and use of resources across different groups which could be applied world wide.

Attempts to incorporate different values and perspectives into conservation have been made within the literature and international frameworks. As noted in Chapter 1.1.5, the MEA is one such framework. However, whilst there are useful aspects to the MEA, there are a number of limitations with the way in which the different perspectives are conceptualised and represented (as outlined in Chapter One). These limitations were further brought to light in this research (Chapter Five). The results highlight that the existing classifications for the MEA ecosystem services (ES) are too rigid, have poor definitions, and lack meaningful detail with regards to social, cultural and spiritual services. In addition the existing framework separates concepts in ways that do not always exist in the understandings of indigenous people. Interpretations of the ES categories need to be more fluid and allow for cross-categorisation to align with alternative perspectives. This work indicates that social services gained from the natural environment are different from cultural services, however this

understanding is missing from the MEA. By trying to include them they have oversimplified cultural and spiritual values to a point where it is difficult to define what certain services may be (as discussed in Chapters One and Five).

The findings from this research indicate that more work needs to be done to truly incorporate the views and values of indigenous and traditional people into such frameworks. It highlights the need to address the complexity of these perspectives, rather than oversimplifying them. To include them, further steps need to be made to bridge the gap between the current thinking within conservation planning/ guidelines and those of local communities and indigenous groups. The results highlight the need to allow for a more inclusive and holistic outlook when dealing with ES and indigenous viewpoints. New forms of dialogue are needed to better integrate both sets of perspectives and to give them equal weight. In addition, such frameworks need to reflect the dynamism of communities and their cultures and allow for a more adaptive way of understanding the environment and ES.

9.1.4 Use of plants and animals from the Kayas and the potential impact on the conservation of the SNS and their biodiversity

Key Findings:

- The local communities surrounding the SNS use the Kayas for a range of resources for different purposes.
- There is a significant level of extractive use of both plants and animals, which is unmonitored. This could be detrimental to the preservation of the sites, and the biodiversity that they contain.
- Many plants and animals are used for cultural and spiritual purposes, indicating that there is still some adherence to traditional values and practices.
- The type of resources used, and the way in which they are used varies according to age, gender, ethnicity and region in which individuals live.

The results of this study show that the communities surrounding the SNS use a range of plants and animals from the SNS. Much of this use is extractive, and this research indicates that extractive use may be a driver in the degradation of the sites. However, from the mapping (highlighted in Chapter Three) and from the comments made by the communities (noted in Chapter Eight) local people are not the only individuals taking resources from the SNS and their surrounding areas. One major potential drivers for the degradation of the SNS

is likely to be the noted extraction of resources by wealthy individuals and large companies. Chapter Three highlighted mining sites next to, or near to some of the SNS (Kaya Kame and Kaya Kauma). Active mining has been put on hold at most of these sites, and mining companies have been threatened with having licences revoked by the Kilifi District government if their work encroaches on the sites (Masha, 2014). However, issues with title deeds have resulted in the illegal sale of land from within Mijikenda SNS on both the north and south coasts, and sites are suffering from mining, development and other forms of encroachment (Mwita, 2014). Threats to SNS from development and mining affect many SNS around the world, including China (Xu *et al.*, 2005), and Sierra Leone (Lebbie and Guries, 2008). Despite the warnings from the government, it is clear mining and development are still significant threats to the Mijikenda SNS. It has been noted that a major step to ensuring the protection of the sites against mining and development would be to give ownership of the Kayas to the Mijikenda Elders and ensuring they have clear marked boundaries. However, to date, the Kenyan government has shown no interest in doing so (Githitho, 2003; Nyamweru et al., 2008; Mwita, 2014).

However, alongside the wealthy individuals and companies, the un-monitored and un-regulated extraction of resources by the local community is also posing a threat to the SNS and their biodiversity. As discussed in Chapters One, Five and Seven, use of resources from SNS is described in much of the existing literature. In some cases, for example, the Maloca people in the north-west Amazon and the Tandory people in Madagascar (Tengö and von Heland, 2011; Richel, 2012), resource use is sustainable. However, extraction of resources from SNS, especially in contradiction to existing laws, is often unsustainable, as seen in both Madagascar and Uganda (Banana *et al.*, 2008; Andriamarovololona and Jones, 2012). The use of the Mijikenda SNS for resource extraction has been noted as a threat, and it has been posited that due to their small size, and the large number of people within the surrounding communities, any use is unlikely to be sustainable (Nyamweru, 1997; Githitho, 2003).

The use of these sites for extractive purposes does not necessarily mean that the Mijikenda no longer regard the SNS as important sites, or hold them sacred. In fact, this research demonstrates that the communities do think they are important, believe that they should be conserved, perceive them as cultural spaces, and many still think of them as sacred (Chapter Five). However, as demonstrated in Chapters Five, Six and Seven, people's perceptions, attitudes and values can be different from the behaviours that they conduct. This is also

noted within the literature, and Kühl *et al*. (2009) state that this can occur when an individual's personal circumstances overrules their attitudes and values. As shown in chapters Five and Seven, this is likely to be the case for many of the communities surrounding the Mijikenda SNS due to high poverty levels in this region (Nyamweru, 1997; Matiku, 2003; SID, 2014). The surrounding landscape has been degraded to the point where the Mijikenda SNS are some of the only forest patches left in the region (as shown in Chapter Three), and the majority of uses for both plants and animals are for food, drink, or medicinal purposes. The combination of these factors suggests that the local people use the Kayas to obtain resources vital to their survival, which they have no other access to. Therefore it is likely that the circumstances and situation of the local people are such that their need for resources overrules any cultural or spiritual values they hold for the sites. Therefore the degradation of SNS may therefore be driven in part by extractive purposes, which may be a result of both cultural erosion as well as need driven resource use which overrides cultural values.

In addition, as discussed in Chapter 1.1.2, there is an argument that indigenous cultures which support the preservation of biodiversity have evolved through self-interest and as a means for communities to survive (Berkes *et al.,* 1995). If this is taken to be the case, then it is likely that when these cultural practices no longer support people's survival, and in fact can hinder it, adherence will decrease. This argument is supported by the situation of the Mijikenda. The forests were originally their homesteads and protected them from conflicts with other tribes (Spear, 1978). When they left the forests and started to cultivate the surrounding land, the forests were then believed to be where ancestral spirits resided. The communities believed that protecting the forests protected the spirits who in turn protected the communities. In addition, the communities could return to the forests as places of refuge if they encountered conflicts with other tribal groups (Spear, 1978). As such, the forests helped to protect the Mijikenda and helped them to survive. Bloodshed was banned within the forests and no resources were allowed to be extracted except by certain members for specific rituals or purposes, such as by medicine men. All resources were to be obtained from other, non-sacred, forested areas in the region (Spear, 1978). Over time all alternative forest patches have been removed, by local people, the government (both the British Colonial government and the Kenyan government post-independence), migrants into the regions and private companies. Therefore, the survival of these poor communities surrounding the sites depends on their departure from the traditional laws and the use of forest resources from within the SNS.

Through this investigation it has become apparent that the existing management of the SNS, which assumes the adherence of local people to traditional laws, is no longer effective. In addition, this work brings to light issues associated with the romanticism of the relationship between indigenous communities and the natural environment, within some of the literature, international frameworks, and management plans, by not accurately reflecting issues that these communities face on a daily basis. While the results show that the Mijikenda SNS have, in the past, been well-protected (most likely due to their cultural significance), they also suggest that the local people will exploit the natural environment, if required to do so, in order to survive and support their families. These findings are in line with the existing literature which criticises romanticised and idealistic conceptualisations of traditional people 'living in harmony with nature' (Ellen, 1986; Krech, 1999, Ellingson, 2001; Selin, 2003; Hames, 2007). It has been shown that the interactions between many local and indigenous groups, and their natural environment, are highly complex, and that for most there is little in the way of core 'conservation' values within their cultures (Ellen, 1986; Hames, 2007).

The findings from this research would suggest that the culture and values of the Mijikenda are not based on conservation. Instead it seems the protection of biodiversity has been a by-product of regulations enforced through cultural norms to ensure survival of the communities that have since become less effective. However, in contrast, it is also argued that behaviours which go against traditional customs and hinder conservation of the environment are exhibited due to extreme circumstances (such as the poverty and local forest and resource degradation experienced by the Mijikenda), and fundamentally, these are not voluntary behaviours, but are forced through circumstance (Sponsel, 2007). This theory would imply, that given the choice, the Mijikenda would not want to violate the laws and damage their SNS, but do so only because they have no other means of survival. This idea is supported by the interviews conducted in this research.

In light of the existing literature, the findings from this research tell a more rounded story than either of the opposing arguments. The results suggest that the past traditions and cultures are likely to have been born from self-preservation (as argued by Berkes *et al.,* 1995), and not through some romantic altruistic 'love' of nature. However, they also suggest that the majority of people in the communities do value their culture and the spirituality

associated with the sites, and if given access to alternatives would seek to preserve their SNS and the biodiversity that they contain. Nevertheless, circumstance has driven these communities to behave in a manner which is contradictory to their own values, in order to survive and support their families, and as such they are contributing to the degradation of their SNS. Whilst the findings here are a case study of the Mijikenda, it is likely that this more holistic understanding is applicable to communities around the world, such as those mentioned previously who are unsuitably extracting resources from their own SNS. These understandings bring to light another problem with the existing conservation management plan and interventions associated with the Mijikenda SNS: to date there has been no successful provision of alternative resource or livelihoods presented to the communities surrounding the SNS. These issues are explored further in Appendix 6 section 3.

9.1.5 Culture, conservation and the preservation of the Mijikenda culture and SNS

Key Findings

- There is a perceived connection between the preservation of culture and the preservation of the SNS.
- Most people would like the Kayas and SNS to be conserved.
- People are aware and concerned about the loss of the Mijikenda culture.
- There are a large number of the local Mijikenda populations who do not know about their culture, and do not remember being taught about it.
- The way in which people feel that culture should be taught has changed with more emphasis put on mainstream educational approaches.
- People identify certain individuals as being important for passing on the MIjikenda culture. However, which people are identified as being important, does not reflect whether they have the actual ability to pass on the information (for example, it does not reflect if they have adequate knowledge of the Mijikenda culture or relevant resources).
- The majority of people think that the local Mijikenda population should be in charge of protecting the local culture and natural environment; however, some think the government should be in charge.
- The responsibility for conservation of the culture and natural environment does not reflect the ability to do so, and many note that the local communities do not have the resources, or influence, to protect their culture and the environment.

- New approaches to educating people (both young and old) about the Mijikenda culture and the conservation of the SNS need to be found. Due to the shift to mainstream education, this may include pushing for local culture and conservation to be taught as part of the curriculum.
- Alternative approaches to the conservation of both the traditional culture and the SNS are needed, and based on the diversity in attitudes across communities towards these, management needs to be designed on a site-by-site basis.

The results from this research show that many people do not know about their culture, or remember being taught about it. This indicates a significant level of cultural degradation. It was also noted that one of the main ways people think that information on both the Mijikenda culture and the natural environment should be taught to children is through teachers at school. This suggests that the conversion to mainstream schooling has changed how people think that children should obtain knowledge. However, at present there is no incorporation of local culture into the national curriculum (Otanga and Nyandusi, 2010). If this is not accounted for, and other individuals are not taking on the responsibility of teaching the children about the Mijikenda culture, this will lead to further cultural degradation. As the connection between the preservation of the environment, the local culture, and SNS are all noted as being intertwined both in the literature (Sutherland, 1993; Maffi, 2001; Mishler, 2001; Smith, 2001; Maiero & Shen, 2004; Maffi, 2005), and by the local communities (Chapter Eight) it follows that the loss of the culture could lead to the loss of the SNS. This shift in perceptions towards education is indicative of a general change that the majority of these communities are facing. There is a desire to modernise and develop across Kenya, driven by both the government and the people. This research shows that the drive to develop is influencing and impacting the Mijikenda communities (Chapters Four, Five, Six and Eight). Communities have converted to new mainstream faiths, attend mainstream schools, and are leaving the region in order to get better jobs with higher pay

Globalisation is noted to be a threat to the conservation of cultural diversity and biodiversity (Maiero and Shen, 2004, as discussed in Chapter 1.1.3). The push for development results in dominant groups (of people and species) taking over, leading to the possible extinction of smaller populations. Globalisation started with colonisation and the impacts on indigenous communities and biodiversity can been seen throughout the world. Species are lost due to urbanisation, invasive species, and overexploitation from unchecked demand. Communities

suffer from the loss of identity, cultural knowledge, languages, land ownership and traditions. These losses result in monocultures of people and species worldwide (Sutherland, 1993; Chawala, 1998; Maffi, 2001; Mishler, 2001; Smith, 2001; Maiero and Shen, 2004; Vilà and Weiner, 2004; Maffi, 2005; Hoekstra, 2010; Turvey *et al*., 2010). However, despite the threats, modernisation and globalisation are the aims of many governments as exemplified by China, where mega-development projects and monoculture farming have been encouraged, often resulting in the relocation of people and attempts to 'civilise' indigenous groups (Xu *et al.,* 2005) such as the Kuchang who were moved from their mountain homes and resettled in farming regions. Xu et al. (2005) note that the result of the push for globalisation in China has been the loss of local languages, as well as traditional knowledge, practices (including those that protected biodiversity), and identities as minorities are encourages to assimilate into mainstream society. Communities across Kenya are facing the conflict between development and preservation of cultural and biological diversity, including the Mijikenda communities in Kilifi district.

The research shows that not everyone values the preservation of the traditional culture, and it highlights that in some cases the traditional culture is perceived as holding people back. It is believed by some that in order to do well people must abandon these practices and values (Chapter 5.5.4). Much of the literature on globalisation discusses the issues with development being forced onto communities, and the impacts that it has on them, as well as investigating communities who are resisting development and holding onto traditional ways of life (Mishler, 2001; Smith, 2001; Maiero and Shen , 2004; Dudley *et al*., 2005; Hoekstra, 2010). However, this research focuses on communities where the majority of people want things to change, and would like to have both modernity and their cultural heritage. This shows that while it is important to understand the issues and threats that come with globalisation on these communities, it must not be done with the perspective that all indigenous groups would rather go back to a traditional lifestyle.

These findings bring to light the oversimplification that exists within the literature which forces people into categories of those who want to develop and have no interest in traditions, versus those who want to stay the same. While this may exist for some, in these Mijikenda communities there are many who want parts of both lifestyles. The diversity of attitudes within communities and the importance of indigenous people having autonomy over their own future and development is reflected in international conventions such as the

'Indigenous and Tribal People's Convention'. The convention states that traditional communities should 'have the right to decide their own priorities for the process of development as it affects their lives, beliefs, institutions and spiritual well-being' (ILO, 1989, Article 7.1). Therefore, it is important that development in regions such as the areas surrounding the Mijikenda SNS, allow the preservation of cultural heritage for those that want a more modern lifestyle, and gives those who want to follow traditional practices the opportunities to do so.

The issues of conflict between local customs and modernisation that have been encountered amongst the Mijikenda have been due to the inability to adapt traditions and development to allow a joint existence. Instead members of the community seem to be pushed towards following either traditional or modern value sets (Chapters Four, Five and Eight). One example of this is the current system of mainstream schooling. As noted in Chapter Eight, while there are many benefits to the mainstream schooling system, there is currently no scope for education about traditional cultures, the local environment and local history (Otanga and Nyandusi, 2010). This therefore divides education between 'traditional' and 'modern' education and knowledge with no overlap between the two. Again, this is a problem that exists in other areas of Kenya, and around the world (Milton, 1996; Maffi, 2001). Potential ways to address and overcome the division between traditions and globalisation are discussed further in Appendix 6.

The mixed management of traditions and modernisation, and the diversity of attitudes and values towards the preservation of both the Mijikenda culture and the SNS, is likely to impact all interventions and approaches to protecting these sites. The complexity is highlighted in the mix of perceptions as to who should be responsible for the conservation of both the culture and the natural environment, and highlights a number of issues associated with both the current, and potential future management plans. The communities surrounding the SNS have different perceptions as to the extent of responsibility that they should have for the protection of their culture and the sites. In addition, different age groups perceive things differently also. The reasons behind these attitudes are diverse, and a number of them are likely to influence the type of conservation that is done in different locations.

For some, the preservation of the sites is the government's responsibility. This may be due to the lack of ownership of the land by the Mijikenda, therefore they feel that they should

not be in charge. It may also be due to the fact that many individuals are aware of the range of threats that the sites face from development, mining, migration, and cultural change, that they are aware that the local communities do not have the resources and/or influence to protect the culture and the sites. Therefore they feel that the government should do so. The attitude may also be driven by cultural shift, where those who no longer ascribe to traditional attitudes and values, do not believe that the Elders have any authority, or that it is a matter for the local people, and therefore feel that the government should be responsible. The underlying reasons for the attitudes must be understood before effective conservation plans can be put into place. However, it is evident that in areas where local communities do not believe they should be responsible, if the conservation of the SNS is left solely to the local communities, it is not likely to be successful.

For those that think that the local community should be in charge, again this could be for a number of reasons. They could feel that as the sites are located within their proximity, they have the rights to the sites, and therefore should also be in charge of looking after them. The reasons could be based on a lack of trust for the government and outside groups. The perception of the government as being corrupt, as well as other outside organisations, is common amongst many communities in Kenya (Matiku, 2003). Therefore individuals may feel that they cannot trust the government to protect the SNS and their culture. Due to a drive for globalisation across Kenya, it may be felt like the government undermines the local culture. People may also feel that local people should be in charge if they have a strong connection to the traditional practices and values as they have always been so. Again the drivers for why the local people should be in charge needs to be understood to be able to find ways for the local people to work with the government to achieve the protection of the Mijikenda culture and SNS. However, it must also be noted, that regardless of the extent to which the communities feel the local people should be in charge, it is evident from the level of degradation of the SNS (shown in Chapter Three) they will not be able to achieve this without effective resources and support. Again, the results show that a standardised approach to the conservation of the Mijikenda SNS is not feasible and it must be done on a site-by-site basis.

9.2 Conclusion

The Mijikenda SNS are important to both local and global biodiversity, as well as the preservation of the traditional Mijieknda culture. However, they are threatened by forest

loss, habitat degradation, and the loss of biodiversity. The existing management plans are too simplistic and idealistic. They do not take into account the diversity within the Mijikenda communities, the extent of the cultural shift that the local communities have undergone, the threats that the sites face from development and globalisation, and they do not reflect the ways in which the sites are used, or the extent of degradation that they have undergone. In order to protect both the traditional Mijikenda culture, and the SNS, a range of interventions will be needed. Management needs to be redesigned on a site-by-site basis, which reflects the status of the SNS, the threats that each site faces, the influx of migrants (in areas where this may affect the SNS), and the attitudes, values, and needs of the local community. New approaches which preserve the sanctity of the sites, whilst allowing for the use of the sites in line with the current cultures and ideals of the local communities need to be found. Suggested interventions, and possible approached to the conservation of the Mijieknda culture and the SNS are discussed in Appendix 6.

9.3 Future Research

9.3.1 Mapping of all Mijikenda and other SNS on north and south coast

While the location of a number of the Mijikenda SNS is known, a map of all sites in existence, and the recording of areas where sites were once located has not been complied. To understand the full extent of the Mijikenda SNS a systematic approach to map all the SNS on both the north and south coast should be done. In addition, detailed maps of all sites should be produced so that features and habitats can be compared, and the full contribution to local and global biodiversity estimated. As well as providing information on these sites alone, the maps should then also be included within projects such as 'Mapping the Sacred' so that they can be incorporated into global analyses.

9.3.2 New systematic survey of the plants within coastal SNS

The last comprehensive survey of the plants in a large number of the Mijikenda SNS was conducted over twenty years ago (Robertson and Luke, 1993). To fully understand the importance of the sites for conservation and the preservation of biodiversity an up-to-date survey is needed. A full survey of the plants that are contained within the sites will provide information on the ability of different sites to hold viable populations and it will highlight any sites which contain rare and/or endemic species. Such surveys will also provide detailed habitat information which will help to indicate the importance of the sites to local fauna as well as flora.

9.3.3 Systematic faunal surveys of all Mijikenda SNS

As noted in Chapter 3.2 studies on the fauna of the sites has so far been limited. A more comprehensive analysis of the fauna contained in the SNS is needed to gain a true understanding of the value of the sites to biodiversity conservation. Studies that look at a range of taxonomic groups across the sites are needed to understand the dynamics of populations in the region, and the role that the sites play as refuges for biodiversity in a degraded landscape. In addition, a number of sites have the potential to contain rare and endemic species. Therefore surveys of all sites are needed to understand the role that they play in protecting such species and to allow for focused conservation efforts.

9.3.4 Detailed investigation into use of plants and animals

As well as conducting an inventory of all plants and animals found within the Kayas, a survey into what and how they are used is vital for effective conservation management. A range of plants and animals and their uses were highlighted by this research (Chapter Seven); however, it was noted that a number of plants and animals were not able to be identified. Projects, in which members of the community physically show researchers which plants they use, and how they do so, will be important to gain a full understanding of the value of such resources to the local communities. In addition it will help to highlight species that may be under threat of over-exploitation. As well as gaining a more detailed understanding of which plants and animals are used, assessments of the rate that species are being extracted are also needed. Over-exploitation of plants and animals is a significant threat to the survival of both biodiversity and the communities that depend on them, and therefore extractive use needs to be monitored and managed for.

9.3.5 Investigation into alternative protein sources

As noted in Chapter Seven, a number of animals are hunted in the Kayas for food. Bushmeat is often the primary source of protein for people in Sub-Saharan Africa (Asibey, 1974). This puts pressure on the animals within the Kayas, and if hunted at levels that exceed the breeding rates of these species, is likely to result in local extinctions. Therefore, if sustainable use is not possible, alternatives need to be investigated. Around the world, invertebrates are used as a sustainable source of protein, due to their occurrence in large numbers. The feasibility of farming invertebrates for consumption and the attitudes of local people to eating them should be investigated as this would improve protein intake and relieve pressure on fauna within the Kayas.

9.3.6 Identifying flagship or culturally important species within Mijikenda SNS

Flagship species (recognisable species which can acquire support for the conservation of the wider ecosystem), and culturally important species can help to gain support for the conservation of the environments in which they are found (Bowen-Jones and Entwistle, 2002; Garibaldi and Turner, 2004; Veríssimo et al., 2009; Na et al., 2012; Rodriguez-Navarro, 2012). It was noted in Chapter Seven that a number of the animals that are used from the Kayas are done so for cultural purposes, therefore it is possible that the sites contain culturally important species. In addition, there is the potential for some of the sites to contain endemic species, such as the golden-rumped elephant-shrew which could act as a flagship species. Research into identifying any potential flagship species, or culturally important species within the Mijikenda SNS could help inform outreach work to raise funds and support for the conservation of the sites.

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Appendix 1

Questionnaires

Definitions For Questionnaire
To be covered during the training of enumerators
Please read/show this page to the participant and keep on hand whilst conducting the questionnaire.

Below are the definitions for the terminology used within this questionnaire. All participants are asked to answer the questions strictly as they pertain to these definitions, and not in relation to any alternative meanings and/or concepts that the terms may be associated with.

Culture: A set of distinctive spiritual, material, intellectual, values and emotional features of society or social group. Culture includes intangible heritage (Practices, representations, expressions, knowledge, skills), as well as art, literature, lifestyles, ways of living together, value systems, traditions and beliefs.

Intangible Cultural Heritage: Practices, representations, expressions, knowledge, skills – as well as the associated instruments, objects, artefacts and cultural spaces – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. UNESCO, 2003

Cultural History: Past events and experiences that have shaped the culture, and peoples understanding and experience of the culture, as well as the background knowledge and understanding of the culture.

Cultural Identity: An individual's perception of themselves within their culture. It is the understanding of oneself with reference to the worldviews, values, attitudes, and beliefs shared with their cultural/social group.

Spiritual belief System Faith/religion/Belief system: A belief in, devotion to, or trust in a supernatural being; a system associated with people's beliefs and opinions concerning the existence, nature, and worship of God, a god, or gods, and divine involvement in the universe and human life; an institutionalized or personal system of beliefs and practices relating to the divine; or a set of strongly-held beliefs, values, and attitudes that somebody lives by in accordance to a belief in a supernatural power.

Traditional Laws: Laws set by the local group, and abided by local people – normally the 'local group/people' are the indigenous tribe/peoples of the region. These laws tend to reflect the cultural values and norms of the group. Local laws may not be considered as 'legitimate' by the government or people from outside the group.

Section 1: Cultural Identity and Cultural History

This section is looking at the identity of the participant, as well as their understanding and perception of themselves, and their culture. The definitions of the words/terms used in this section are:

Culture: A set of distinctive spiritual, material, intellectual, values and emotional features of society or social group. Culture includes intangible heritage (Practices, representations,

expressions, knowledge, skills), as well as art, literature, lifestyles, ways of living together, value systems, traditions and beliefs.

Intangible Cultural Heritage: Practices, representations, expressions, knowledge, skills – as well as the associated instruments, objects, artefacts and cultural spaces – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. UNESCO, 2003

Cultural History: Past events and experiences that have shaped the culture, and peoples understanding and experience of the culture, as well as the background knowledge and understanding of the culture.

Cultural Identity: An individual's perception of themselves within their culture. It is the understanding of oneself with reference to the worldviews, values, attitudes, and beliefs shared with their cultural/social group.

Section 2: Religion and Belief Systems:
This section is looking at the spiritual system/faith/religion/belief system of the participant. The definitions of the words/terms used in this section are:

Spiritual System Faith/religion/Belief system: A belief in, devotion to, or trust in a supernatural being; a system associated with people's beliefs and opinions concerning the existence, nature, and worship of God, a god, or gods, and divine involvement in the universe and human life; an institutionalized or personal system of beliefs and practices relating to the divine; or a set of strongly-held beliefs, values, and attitudes that somebody lives by in accordance to a belief in a supernatural power.

Section 3: Traditional Laws
This section is looking at the participants understanding and view of local laws. The definitions of the words/terms used in this section are:

Traditional Laws: Laws set by the local group, and abided by local people – normally the 'local group/people' are the indigenous tribe/peoples of the region. These laws tend to reflect the cultural values and norms of the group. Local laws may not be considered as 'legitimate' by the government or people from outside the group.

Local people: The Mijikenda ethnic group/tribe that live in the area.

Section 4: Kaya Forests
This section is looking at the participants views relating to the Kaya forests, and how the participant uses them and their resources.

Section 5: Immigration of People settling into the Area
This section is looking at the participants observation, understanding and opinions of immigration in the local area.

<div align="center">

The questionnaire
Spiritual belief systems, attitudes, values, culture and traditions of persons living near the Mijikenda Kayas

</div>

QN. NO................ Date of interview................................Enumerator's Name...Time..........

Location of interview: District............................... Location..................................... Village..

Nearest Kaya/Sacred Grove/Sacred Cave/Sacred Site...

Section 1: Identity, Culture, Cultural Identity and Cultural History

1) Name of respondent:...

2) Gender: Male/Female
(please circle the correct response)

3) Age/ or year of birth: ....
(Please note 'APX' if value is approximated, and 'KN' if this is an exact known value)

4) Ethnic group:.........................Religion:...........................Occupation:...........................

5) Residential

   District:...............................Location:................................Village:...........................

6) Marital status: Not married/ Married/ Separated / Widowed
(please circle the correct response)

7) How many children do you have   :   M........... F.............
(please write correct number after each gender letter)

8) How old are your children?
(Please tick the correct box, and indicate the number of children in that age group below)

0-2	3-5	6-8	9-11	12-14	15-17	18 +
☐	☐	☐	☐	☐	☐	☐

Number   ....

9)   Where were you born (please note both location and village)?

Location: ....   Village: ....

10) Are both your parents Mijikenda?   Yes/ No
(If no please go to question 12, Section 1, page 4)

11)   If yes, which sub-tribes were they from?
        (Please tick the correct response)

	Chonyi	Digo	Duruma	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe
Father	☐	☐	☐	☐	☐	☐	☐	☐	☐

	Chonyi	Digo	Duruma	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe
Mother	☐	☐	☐	☐	☐	☐	☐	☐	☐

12)   If no, from which ethnic group are they from

Father...………

Mother..……….

13) Where were your parents born (village and location)?

Mother: Location.. Village ....

Father: Location... Village ....

14) How many years has your family lived in this village?   ....
(Please not 'APX' if value is approximated, and 'KN' if this is an exact known value, N/A if the family do not live in the village)

15)   Which kaya do your parents belong to?

Mother ....………

Father ....………

16)   Which Kaya do you feel you belong to? ....
(Please note N/A if the respondent does not feel they belong to any Kaya)

17) Do you use any of the Kayas?   Yes/No
(Please circle correct response)

18) If yes, which Kaya(s) do you use? ....

19) If you have children, which ethnic group do your children identify with? ....
(If they have more than one child, or the children identify with different groups please note this overleaf – please note 'NA' if the respondent does not know which ethnic group their children identify with)

20) Do you believe cultural identity influences how you view the world?   Yes/No/Maybe
(Please circle the correct response. If no go to question 20, Section 1, page 5)

21) Do you believe it has a positive or negative influence on how you view the world?
(Please circle the correct response)

Positive/Negative/Both/Don't know

Please explain why

....

....

....

22) How important is your cultural identity to you? (Please circle the correct response)

Very important	Quite Important	Neutral	Of little Importance	Of no importance
1	2	3	4	5

Please explain why:

....

....

....

23) How much does your cultural identity affect how you behave on a daily basis?
(Please circle the correct response)

Very much	Quite a lot	Neutral	Not much	Not at all
1	2	3	4	5

Please explain in what ways:

....

....

....

24) If you have children, do you believe that having children has made your cultural identity more or less important to you?

(Please circle the correct response. If you do not have children please circle N/A)

More important/Less important/Neither/Don't know/NA

25) Did you have the same cultural identity when you were a child?   Yes/No
(Please circle the correct response – if yes please go to question 25, Section 1, page 6)

26) If no which cultural group, and (if relevant) Kaya did you belong to?
(Please write and circle the correct group which is either (i) a tribal group or (ii) an ethnic group; and write the Kaya)

....tribal / ethnic group

27) How important was your cultural identity to you as a child?
(Please circle the correct response)

Very important	Quite Important	Neutral	Of little Importance	Of no importance
1	2	3	4	5

28) How important do you think your parents' cultural identity is/was to them?
(Please circle the correct response)

Mother:

Very important	Quite Important	Neutral	Of little Importance	Of no importance	Unknown
1	2	3	4	5	9

Father:

Very important	Quite Important	Neutral	Of little Importance	Of no importance	Unknown
1	2	3	4	5	9

29) How important do you think your parents' cultural identity is to you?
(Please circle the correct response)

Very important	Quite Important	Neutral	Of little Importance	Of no importance
1	2	3	4	5

30) Do you believe your understanding of your cultural history influences how you view the world?

(Please circle the correct response. If no please go to question 30, Section 1, page 7)

Yes/No/Maybe

31) If yes, Do you believe it has a positive or negative influence on how you view the world? (Please circle the correct response)

Positive/Negative/Both

Please explain why

………

………

………

32) How important is your cultural history to you?
(Please circle the correct response)

Very important	Quite Important	Neutral	Of little Importance	Of no importance
1	2	3	4	5

Please explain why:

………

………

………

33) How much does your cultural history affect how you behave on a daily basis?
(Please circle the correct response)

Very much	Quite a lot	Neutral	Not much	Not at all
1	2	3	4	5

Please explain in what ways:

………

………

………

34) If you have children, do you believe that having children has made cultural history more or less important to you?

(Please circle the correct response. If you do not have children please circle N/A)

More important/Less important/Neither/Don't know/NA

35) How important was your cultural history to you as a child?
(Please circle the correct response)

Very important	Quite Important	Neutral	Of little Importance	Of no importance
1	2	3	4	5

Please explain in why:

……

……

……

36) How important do you think your parents cultural history is/was to them?
(Please circle the correct response)

Mother:

Very important	Quite Important	Neutral	Of little Importance	Of no importance	Unknown
1	2	3	4	5	9

Father:

Very important	Quite Important	Neutral	Of little Importance	Of no importance	Unknown
1	2	3	4	5	9

37) How important is your parents cultural history to you?
(Please circle the correct response)

Very important	Quite Important	Neutral	Of little Importance	Of no importance
1	2	3	4	5

38) Do you remember being taught about your culture, cultural identity, and cultural history when you were younger?

Yes/No

39) Who do you remember teaching you about your culture, cultural identity, and cultural history?

(Please tick all that apply and rank in order of how important you feel their information was in teaching you about your culture, cultural identity and cultural history; where 1 is the most and 11 is the least. Only rank those that you have ticked)

Rank 1-11 ✔

☐ ☐ Mother

☐ ☐ Father

☐ ☐ Grandparents

☐ ☐ Siblings

☐ ☐ Other Family Member (please specify)..

☐ ☐ Village Priest/Preacher/Faith leader

☐ ☐ External Priest/Preacher/Faith leader (outside of the village)

☐ ☐ School Teacher

☐ ☐ Village Elders

☐ ☐ Other village member (please specify)...

☐ ☐ Other (please specify)..

40) In what ways were you taught about your culture, cultural identity, and cultural history?

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(Please tick all that apply and rank in order of which methods were used the most to teach you about culture, cultural identity and cultural history; where 1 is the most and 9 is the least. Only rank those that you have ticked)

Rank 1-9 ✔

☐ ☐ Songs - including those that told stories and/or were conducted during rituals and ceremonies

☐ ☐ Stories/myths and legends – not in the form of dance or song, but including those that were conducted during rituals and ceremonies

☐ ☐ Dances and performances – including those that tell stories, contained songs and/or those that were conducted during rituals and ceremonies

☐ ☐ Being taken to places important to your culture, cultural identity, and cultural history, not including during rituals and ceremonies (if possible please explain where they were below)

☐ ☐ Rituals and ceremonies (if possible please note below which ceremonies and where they took place)

☐ ☐ In the rules that you were given as a child

☐ ☐ In lessons (either at school or in the village)

☐ ☐ Other (please specify) ....
....
....

If you would like to/are able to, give more detail about the ways in which you were taught (such as what songs/stories you heard, as well as details of places and ceremonies) please do so here:

……
……
……
……
……

41) If you have children, do you think it is important for them to be taught about their culture, cultural identity, and cultural history?

Yes/No/Maybe/Don't know/NA

42) Who do you think should teach children about their culture, cultural identity, and cultural history?
(Please tick all that apply and rank in order of how important you feel their information was in teaching you about your culture, cultural identity and cultural history; where 1 is the most and 11 is the least. Only rank those that you have ticked)

Rank 1-11   ✔

☐ ☐ Mother

☐ ☐ Father

☐ ☐ Grandparents

☐ ☐ Siblings

☐ ☐ Other Family Member (please specify)...

☐ ☐ Village Priest/Preacher/Faith leader

☐ ☐ External Priest/Preacher/Faith leader (outside of the village)

☐ ☐ School Teacher

☐ ☐ Village Elders

☐ ☐ Other village member   (please specify)   ....

☐ ☐ Other   (please specify)   ....

43) In what ways should children be taught about their culture, cultural identity, and cultural history?

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(Please tick all that apply and rank in order of which methods were used the most to teach you about culture, cultural identity and cultural history; where 1 is the most and 9 is the least. Only rank those that you have ticked)

Rank 1-9 ✔

☐ ☐ Songs - including those that told stories and/or are conducted during rituals and ceremonies

☐ ☐ Stories/myths and legends – not in the form of dance or song, but including those conducted during rituals and ceremonies

☐ ☐ Dances and performances – including those that tell stories, contained songs and/or those that were conducted during rituals and ceremonies

☐ ☐ Being taken to places important to their culture, cultural identity, and cultural history not including during rituals and ceremonies (if possible please explain where below)

☐ ☐ Rituals and ceremonies (if possible please note below which ceremonies and where they would take place)

☐ ☐ In the rules they are given as a child

☐ ☐ In lessons (either at school or in the village)

☐ ☐ Other (please specify) ....

....

....

If you would like to give more detail about the ways in you feel your children should be taught (such as what songs/stories, as well as details of places and ceremonies) please do so here:

....

....

....

....

....

Section 2: Religion and Belief Systems

44) Do you believe in the kaya traditional spiritual belief system?   Yes/No
(Please circle the correct response)

45) If NO, what spiritual belief system do you belong to?
(If the respondent does not believe in any belief system please note 'NONE' below and go to question 48, Section 2, page 14)

………..........

46) Do you believe your spiritual belief system influences how you view the world? Yes/No
(Please circle the correct response – If no please go to question 46, Section 2, page 13)

47) Do you believe it has a positive or negative influence on how you view the world?
(Please circle the correct response)

Positive/Negative/Both/Don't know

Please explain why
………
………
………

48) How important is your spiritual belief system to you? (Please circle the correct response)

Very important	Quite Important	Neutral	Of little Importance	Of no importance
1	2	3	4	5

Please explain in why:

……
……
……

49) How much does your spiritual belief system affect how you behave on a daily basis?
(Please circle the correct response)

Very much	Quite a lot	Neutral	Not much	Not at all
1	2	3	4	5

Please explain in what ways:

……
………

50) If you have children, do you believe that having children has made your spiritual
     system/faith/religion/belief system more or less important to you?

(Please circle the correct response. If you do not have children please circle N/A)

More important/Less important/Neither/Don't know/NA

51) Did you have or believe in a spiritual belief system when you were a child?   Yes/No
(please circle the correct response – if no please go to question 52, Section 2, page 14)

52) If yes, what spiritual belief system did you belong to?

....

53) How important was your spiritual belief system to you as a child?
(Please circle the correct response)

Very important	Quite Important	Neutral	Of little Importance	Of no importance
1	2	3	4	5

Please explain in why:

....
....
....

54) Do you remember being taught about your/a spiritual belief system when you were younger?
(Please circle correct response – If no please go to question 55, page 17)

Yes/No

55) Who do you remember teaching you about your spiritual belief system?

(Please tick all that apply and rank in order of how important you feel their information was in teaching you about your/the/a spiritual system/faith/religion/belief system, where 1 is the most and 11 is the least. Only rank those that you have ticked)

Rank 1-11 ✔

☐ ☐ Mother

☐ ☐ Father

☐ ☐ Grandparents

☐ ☐ Siblings

☐ ☐ Other Family Member (please specify) ....

☐ ☐ Village Priest/Preacher/Faith leader

☐ ☐ External Priest/Preacher/Faith leader (outside of the village)

☐ ☐ School Teacher

☐ ☐ Village Elders

☐ ☐ Other village member (please specify) ....

☐ ☐ Other (please specify) ....

56) In what ways were you taught about your/the/a spiritual belief system?

(Please tick all that apply and rank in order of which methods were used the most to teach you about your/the/a spiritual system/faith/religion/belief system, where 1 is the most and 9 is the least. Only rank those that you have ticked)

Rank 1-9 ✔

☐ ☐ Songs - including those that told stories and/or were conducted during rituals and ceremonies

☐ ☐ Stories/myths and legends – not in the form of dance or song, but including those that were conducted during rituals and ceremonies

☐ ☐ Dances and performances – including those that tell stories, contained songs and/or those that were conducted during rituals and ceremonies

☐ ☐ Being taken to places important to your/the/a spiritual system/faith/religion/belief system, not including during rituals and ceremonies (if possible please explain where they were below)

☐ ☐ Rituals and ceremonies (if possible please note below which ceremonies and where they took place)

☐ ☐ In the rules that you were given as a child

☐ ☐ In lessons (either at school or in the village)

☐ ☐ Other (please specify)...
....
....

If you would like to/are able to give more detail about the ways in which you were taught (such as what songs/stories you heard as well as details of places and ceremonies) please do so here:

....
....
....
....
....

57) If you have children, do you think it is important for them to be taught about their/the spiritual belief system?

(Please circle the correct response. If you do not have children please circle NA. If No/NA please go to question 58, page 19)

Yes/No/Maybe/Don't know/NA

58) Who do you think should teach children about their/the/a spiritual belief system?

(Please tick all that apply and rank in order of how important you feel their information was in teaching you about their/the/a spiritual system/faith/religion/belief system; where 1 is the most and 11 is the least. Only rank those that you have ticked)

Rank 1-11 ✔

☐ ☐ Mother

☐ ☐ Father

☐ ☐ Grandparents

☐ ☐ Siblings

☐ ☐ Other Family Member (please specify)..

☐ ☐ Village Priest/Preacher/Faith leader

☐ ☐ External Priest/Preacher/Faith leader (outside of the village)

☐ ☐ School Teacher

☐ ☐ Village Elders

☐ ☐ Other village member (please specify)..

☐ ☐ Other (please specify) ....

59) In what ways should children be taught about their/the/a spiritual belief system?
(Please tick all that apply and rank in order of which methods were used the most to teach them about their/the/a spiritual system/faith/religion/belief system; where 1 is the most and 9 is the least. Only rank those that you have ticked)

Rank 1-9   ✔

☐ ☐ Songs - including those that told stories and/or were conducted during rituals and ceremonies

☐ ☐ Stories/myths and legends – not in the form of dance or song, but including those that were conducted during rituals and ceremonies

☐ ☐ Dances and performances – including those that tell stories, contained songs and/or those that were conducted during rituals and ceremonies

☐ ☐ Being taken to places important to their/the/a spiritual system/faith/religion/belief system, not including during rituals and ceremonies (if possible please explain where below)

☐ ☐ Rituals and ceremonies (if possible please note below which ceremonies and where they would take place)

☐ ☐ In the rules that you were given as a child

☐ ☐ In lessons (either at school or in the village)

☐ ☐ Other (please specify) ....
....
....

If you would like to/are able to give more detail about the ways in which you were taught (such as what songs/stories, as well as which places and ceremonies) please do so here:

....
....
....
....
....
....

60) Did/do your parents have a spiritual belief system?　　　　Yes/No/Don't know
(Please circle the correct response if no/don't know please go to question 62, Section 3, page 20)

61) If yes, what belief system do/did your parents belong to?

Mother...

Father...

62) If your parents have/had a spiritual belief system, how important do you think it is/was to them?　　(Please circle the correct response)

Mother:

Very important	Quite Important	Neutral	Of little Importance	Of no importance	Unknown
1	2	3	4	5	9

Father:

Very important	Quite Important	Neutral	Of little Importance	Of no importance	Unknown
1	2	3	4	5	9

63) If your parents have/had a spiritual belief system, how important do you think it is to you?

Of no importance	Of little Importance	Neutral	Quite Important	Very important
1	2	3	4	5

Section 3: Traditional Laws

64) Are you aware of any traditional laws?   Yes/ No
(Please circle the correct response)

65) Who sets and enforces the traditional laws (which individuals in the group)?
(Please list all those known, by position in the local community and name where possible, or just via position in local community. Please note 'UNKNOWN' if the respondent does not know.)

....

....

....

66) Do you abide by traditional laws in your daily life?   Yes/No/Sometimes
(Please circle the correct response)

67) How important are traditional laws to you?
(Please circle the correct response)

Of no importance	Of little Importance	Neutral	Quite Important	Very important
1	2	3	4	5

Please explain in why:

....

....

....

68) What do you believe are the 5 most important traditional laws?
(Please state in order of importance where 1 is the most important)

1)..

2)..

3)..

4)..

5)..

69) What 5 traditional laws have the most severe punishments if they are ignored/broken? And what are the punishments?

(Please state in order of most severe punishment where 1 holds the worst punishment)

1)...

Punishment: ....

....

2)...

Punishment: ....

....

3)...

Punishment:...

....

4)...

Punishment: ....

....

5)...

Punishment:...

....

Section 4: The Kaya Forests

70) Do you have any responsibility or role relating to your Kaya Forest(s)?
(Please note position name/description and outline responsibilities)

....

....

....

71) What 5 words do you think of when you think of the Kaya Forests?

1)…………………………………………………

2)…………………………………………………

3)…………………………………………………

4)…………………………………………………

5)…………………………………………………

72) Please indicate how much you **agree** with the following statements – There is no right or wrong answer.

1 = strongly disagree   2 = disagree   3 = neutral   4 = agree   5 = strongly agree

The Kaya Forests are important to me	1	2	3	4	5
It is important to teach our children about the Kaya forests	1	2	3	4	5
The Kayas are no more important than other surrounding forests	1	2	3	4	5
I feel happy when I visit the Kaya forests	1	2	3	4	5
The Kaya forests are not sacred to me	1	2	3	4	5
When I visit the Kayas I feel as though I am connected to my ancestors	1	2	3	4	5

73) If you believe the Kaya forests are important, please list 5 reasons why in order of importance:

(Please state in order of importance where 1 is the most important)

1)...

2)...

3)...

4)...

5)...

74) How often do you visit the Kaya forests?

(Please tick the correct box)

Daily	Weekly	Monthly	A few times a year	Only for specific ceremonies	Never
☐	☐	☐	☐	☐	☐

75) When do you use the Kaya forests?

(Please tick the correct response)

Morning	Day time	Evening	Night
☐	☐	☐	☐

Long Dry Season (December – April)	Long rains (April – August)	Short Dry Season (August – Sept)	Short rains (Sept – Dec)
☐	☐	☐	☐

76) Do you use any other sacred groves/sacred caves/sacred sites?   Yes/No

(Please circle the correct response. If Yes go to question 77, if no please go to question 80, section 4 page 24)

77) If yes which do you use?...

78) How often do you use the sacred groves?

(Please tick the correct response)

Daily	Weekly	Monthly	A few times a year	Only for specific ceremonies	Never
☐	☐	☐	☐	☐	☐

79) When do you use the sacred groves/sacred caves/sacred sites?
(Please tick the correct response)

Morning	Day time	Evening	Night
☐	☐	☐	☐

Long Dry Season (December – April)	Long rains (April – August)	Short Dry Season (August – Sept)	Short rains (Sept – Dec)
☐	☐	☐	☐

80) Please indicate how much you **agree** with the following statements – There is no right or wrong answer.

1 = strongly disagree   2 = disagree   3 = neutral   4 = agree   5 = strongly agree

The Kaya forests provide me with valuable resources	1	2	3	4	5
Preservation of the Kaya forests is not important	1	2	3	4	5
The Kaya Forests are important for my cultural identity	1	2	3	4	5
I would be sad if the Kaya forests were no longer here	1	2	3	4	5
People who are not from the village do not respect the Kaya forests	1	2	3	4	5

81) In what ways do you use the Kaya forest?
(Please list up to 5 ways in which you use the Kaya forests in the order of importance where 1 is the most important, and rank the uses A – E in order of frequency of activity, where A is the most frequent. The uses do not have to be extractive or relate to tangible use of the sites.)

Frequency A - E

1)... ☐

2)... ☐

3)... ☐

4)... ☐

5) .... ☐

82) What resources do the Kaya forests provide you with?
(Please list the top 10 resources in order of importance, where 1 is the most important)

1) ....

2) ....

3) ....

4) ....

5) ....

6) ....

7) ....

8) ....

9) ....

10) ....

83) What do you believe are the 5 most important traditional laws associated with visiting/the use of the Kaya forests? (Please state in order of importance where 1 is the most important)

1)..

2) ....

3) ....

4) ....

5) ....

84) Do you believe the Kaya forests were important to your ancestors? Yes/No/Don't know
(Please circle the correct answer)

If yes, please list up to 5 reasons why you think the Kaya forests were important to your ancestors. (Please list in order of importance where 1 is the most important)

1)..

2)..

3)..

4)..

5)...

85) Please list up to 10 animals and/or plants from the Kayas that you use, and how you use them:

(Please write the name of the plant/animal used; the way that it is used; note if use is extractive Y = Yes, N = No, U = Unknown; and mark how frequently the plant/animal is used according to the number code below)

Frequency:					
1 = Daily	**2 = Weekly**	**3 = Monthly**	**4 = A few times a year**	**5 = Only for specific occasions**	**6 = Never**

	Animal/Plant	Use	Extractive Y/N/U	Frequency 1-6
1)	....	....	....	....
2)	....	....	....	....
3)	....	....	....	....
4)	....	....	....	....
5)	....	....	....	....
6)	....	....	....	....
7)	....	....	....	....
8)	....	....	....	....
9)	....	....	....	....

10) ....
.   .

86) Please list up to 10 animals that live in the Kaya(s) which you think are important, and
    explain why:

(Please list up to 10 animals here, in order of importance where 1 is the most important. If you can think of more than 10
animals that you believe are particularly important please list them at the end of the questionnaire)

1) ....

Why it's important..

2) ....

Why it's important..

3) ....

Why it's important..

4) ....

Why it's important..

5) ....

Why it's important..

6) ....

Why it's important..

7) ....

Why it's important..

8) ....

Why it's important...

9) ....

Why it's important...

10) ....

Why it's important...

87) Please indicate how much you **agree** with the following statements – There is no right or wrong answer.
(Please circle the correct number for each statement)

In this question respect is taken to mean that the individual holds the plant/animal in high esteem and shows the plant/animal regard and consideration

1 = strongly disagree   2 = disagree   3 = neutral   4 = agree   5 = strongly agree

It is important to teach our children about animals and plants	1	2	3	4	5
The plants and animals in the Kaya forests are important to local culture	1	2	3	4	5
We have a moral obligation to protect plants and animals	1	2	3	4	5
Some of the animals in the Kaya forests are pests	1	2	3	4	5
It is OK to hunt animals in the Kaya forests	1	2	3	4	5
I respect all the animals and plants in the forests	1	2	3	4	5
My ancestors showed all plants and animals respect	1	2	3	4	5

88) What do you think are the 5 main threats to the Kaya forests, plants and animals?
(Please state in order of the level of threat where 1 is the main/most severe threat that face the forests, plant and animals)

1) ....

2) ....

3) ....

4) ....

5) ....

89) Do you think that protecting the local cultural heritage would help to protect the natural environment? (Please circle the correct answer)

Yes/No/Maybe

Please explain why:

....
....
....

90) How concerned are you that the Mijikenda culture is under threat of being lost?
(Please circle the correct response)

Very concerned	Slightly concerned	Neither concerned nor unconcerned	Not concerned at all
1	2	3	4

Please explain in why:
....
....
....

91) What do you think are the 5 main threats to the local culture?
(Please state in order of the level of threat where 1 is the main/most severe threat that faces the culture)

1) ....

2) ....

3) ....

4) ....

5) ....

92) Who do you think should be in charge of protecting the local culture?
(Please tick all that apply)

☐ The government

☐ A Non-governmental organisation

☐ Local people (those who are members of the local Mijikenda ethnic group)

☐ Other people who live in the area (those who are not member of the local Mijikenda ethnic group)

93) Who do you think should be in charge of protecting the local environment?
(Please tick all that apply)

☐ The government

☐ A Non-governmental organisation

☐ Local people (those who are members of the local Mijikenda ethnic group)

☐ Other people who live in the area (those who are not member of the local Mijikenda ethnic group)

Section 5: Immigration of People settling into the Area

94) Have you noticed an increase in the number of people who have settled in the local area (within 5 miles/10 km)?
(Please circle the correct response, if no please go to question 91, page 31)

           Yes/No

95) Please list 5 reasons you can think of as to why people have settled in the area:

1) ....

2) ....

3) ....

4) ....

5) ....

96) Do you think the increase in the number of people settling in the area has happened rapidly (sudden increase in recent years) or that numbers of people has gone up gradually over a long period of time (50-100 years)? (Please circle the correct response)

         Rapidly/Long period

97) Which is the most common nationality/ethnic/subtribe group of people who are settling in the area?

....

98) Please indicate how much you **agree** with the following statements – There is no right or wrong answer.   (Please circle the correct response)

In this question only circle N/A if you think the assumptions in the question are incorrect – for example for statement number 1 if you do not believe people are moving into the area then you would circle N/A.

(Please make a note at the end of the questionnaire what you believe the incorrect assumption to be.)

1 = strongly disagree   2 = disagree   3 = neutral   4 = agree   5 = strongly agree

I am pleased that people are settling in the area	1	2	3	4	5	N/A
Lots of people who have moved/settled into the area do not respect our culture	1	2	3	4	5	N/A
There are more jobs in the area now than when I was younger	1	2	3	4	5	N/A
Our cultural heritage makes this region a desirable place to visit	1	2	3	4	5	N/A
The destruction of the forests is due to the people who have settled here	1	2	3	4	5	N/A

The Mijikenda are the rightful owners of the land	1	2	3	4	5	N/A
The local environment is being destroyed	1	2	3	4	5	N/A
It is important for development for lots of people to settle into the area	1	2	3	4	5	N/A

Tourism is not important for local development	1	2	3	4	5	N/A
We are able to protect our environment better now than when I was young	1	2	3	4	5	N/A

Local people get a fair share of the money made through tourism	1	2	3	4	5	N/A
Tourism damages the local environment	1	2	3	4	5	N/A
Local belief systems are no longer important	1	2	3	4	5	N/A
Only local people care about the environment	1	2	3	4	5	N/A

99) If there is anything else you would like to tell us please do so here:

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Maana ya misamiati iliyotumika katika kifaa hiki cha mahojiano

Kushughulikiwa wakati wa mafunzo ya watu watakaoshughulika na kuhoji washiriki

Tafadhali soma / onyesha ukurasa huu kwa mhojiwa na uwe nayo mkononi wakati unaendesha mahojiano

Hapa chini kuna maana ya misamiati iliyotumika katika kifaa hiki cha mahojiano. Wahojiwa wanahimizwa kujibu maswali sambamba na matumizi ya misamiati na maana yake kama ilivyoelezwa hapa na wala sio kulingana na maana badala au misiamiati inayoweza kuhusishwa nayo.

Utamaduni: Mkusanyiko wa viashirio vya imani asilia, vyombo, elimu na ujuzi,itikadi na hisia ambazo jamii ya watu inatambulika nazo tofauti na wengine. Utamaduni unaweza kuwa urithi usiogusika na pia sanaa, utunzi, hali ya maisha, hali za kuishi pamoja, mfumo wa itikadi, mila pamoja na imani za watu.

Urithi wa kitamaduni kisichogusika: Hali za maisha ya watu, vitambulishi vyao, wanavyojionesha, hali za ufahamu, ujizi pamoja na vifaa husika, vyombo, vyombo vya kale na sehemu za kufanyia mila na tamaduni- ambazo jamii , na wakati mwengine makundi ya watu wanatambua kama urithi wao wa kitamaduni. UNESCO, 2003

Historia ya utamaduni: miondoko ya/ shughuli za kale na mapitio ambayo yameunda utamaduni na ufahamu wa watu kuhusu utamaduni wao pamoja na ufahamu wa kumbukumbu za mwanzo wa utamaduni.

Kujitambulisha na kitamaduni chako: Hali ya fikira, imani na hisia kuhusu thamani/ kutambuliwa/kushirikishwa na utamaduni wao. Pia ni vile mtu binafsi anavyojitambulisha kuambatana na maono yake ya ulimwengu, itikadi, tabia na imani ambayo inahusishwa na kundi la watu au Utamaduni.

Mfumo wa imani asilia/ ya kitamaduni/ dini/ kuabudu: Hii ina husu imani, kujitolea au kuamini kwa nguvu za kiroho/ binadamu asiye wakawaida; mfumo unaohusishwa na imani ya watu, maono yao, fikira zao, itikadi zao kuhusu uhai wao, maumbile na kuabudu Mungu na ushirikishi wa nguvu za kiroho katika dunia na maisha ya binadamu; ama mfumo wa imani/ dini inayoshikiliwa kwa nguvu, itikadi, tabia, na mila ambayo mtu anaishi kuambatana na imani yake kwa nguvu za kiroho

Sheria za kitamaduni/ kimila: sheria ambazo zimetungwa, kukubaliwa na kuheshimiwa na jamii ya watu wa utamaduni mmoja na wanaoishi katika eneo moja. Sheria hizi huashiria vile jamii inathamini utamaduni na mila zao. Sheria za kitamaduni zaweza kuwa hazitambuliki na serikali na watu nje ya kundi la jamii hiyo.

Jamii asilia/ jamii ya eno/ wakaaji wa eneo: Jamii ya watu wa asilia ya kimijikenda wanaoishi katika eneo hilo.

Sehemu 1: Kielelezo cha mila na historia ya utamaduni

Sehemu hii inaangazia kitambulisho cha mhojiwa pamoja na ufahamu, hisia na heshima yake kuhusu utamaduni, mila na desturi za watu wa jamii yake.

Sehemu 2: dini na mfumo wa imani:

Sehemu hii inachunguza mfumo wa imani ya kiroho/ asilia/ kitamaduni/ dini ambayo mhojiwa anajitambulisha au kujihusisha nayo.

Sehemu 3: sheria za kitamaduni/ mila/ kiasili

Sehemu hii inaangalia ufahamu na hisia ya mhojiwa kuhusu sheria za kitamaduni/ asilia/ kimila ambacho yeye anajitambulisha nacho

Sehemu 4: Misitu ya kaya/makaya

Sehemu hii inafuatilia ufahamu na maoni ya mhojiwa kuhusu misitu ya kaya na vile yeye anavyotumia kaya na raslimali zake.

Sehemu5: Uhamiaji wa watu kwa eneo/makaazi

Sehemu hii inaangazia ufahamu na maoni ya mhojiwa kuhusu uhamiaji wa watu kutoka sehemu zingine kuingia eneo hilo kwa mnajili wa kubuni makao.

KIFAA CHA MAHOJIANO
Mifumo ya imani, itikadi, desturi na mila za jamii zinazoishi karibu na Misitu ya Makaya ya wamijikenda

Nambari ya kifaa cha mahojiano............. Tarehe ya mahojiano..................Jina la mwenye kuhoji................... Saa..........

Mahala pa mahojiano:
Wilaya...Kata..Kijiji................................

Msitu wa kaya ulioko karibu/Eneo lolote la Mila /Panga ama mzimu/sehemu ama mahala pa matambiko)...

Sehemu 1: Kielelezo cha mila na historia ya utamaduni

1) Jina la muhojiwa:...

2) Jinsia (chora mzunguko kwa jibu lililo sahihi):   Mume/ Mke

 3) Umri/ au mwaka wa kuzaliwa: ....
(Tafadahali andika' APX' kama umri ni wa kukadiria au 'KN' kama umri ni wa uhakika)

 4) Kabila:............................... Dini:............................... Kazi ya kila siku:...........................

 5) Wilaya:.................................... Kata:............................... kijiji:.......................................

 6) Hali ya familia: Sijaoa au kuolewa / nimeoa au nimeolewa/nimetengana/nimefiliwa
(weka alama ya mzunguko kwa jibu sahihi)

 7) Umebarikiwa kupata watoto wangapi   waume...............wake....................
(tafadhali andika nambari ya sawa baada ya kila jinsia)

 8) Watoto wako ni wa umri gani?
(tafadhali weka tick kwa kisanduku sahihi na uandike idadi ya watoto wa kiwango cha umri hapa chini)

	0-2	3-5	6-8	9-11	12-14	15-17	18 +
	☐	☐	☐	☐	☐	☐	☐
Idadi ya watoto	....	....	....	....	....	....	....

 9) Ulizaliwa sehemu gani?
(Kata na Kijiji)

Kata:..   Kijiji:...

10) Je wazazi wako wote wawili ni waMijikenda?   Ndio/ La
(kama jibu ni La, enda kwa swali 12, Sehemu 1, ukrasa 4)

11) Kama ndio, je ni wa mbari gani za kimijikenda?
(Weka alama ya ✔ kwa jibu sahihi)

	Chonyi	Digo	Duruma	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe
Baba:	☐	☐	☐	☐	☐	☐	☐	☐	☐

	Chonyi	Digo	Duruma	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe
Mama :	☐	☐	☐	☐	☐	☐	☐	☐	☐

12) Kama jibu ni La, je wametoka kutoka kabila gani?

Baba..

Mama...

13) Wazazi wako walizaliwa sehemu Gani (kata and Kijiji)

Mama: Kata... Kijiji...

Baba: Kata... Kijiji...

14) Ni kwa muda gani uko wako umeishi katika Kijiji hiki?   ....
(tafadhali andika 'APX' jibu ni la kukadiria au 'KN' kama ni la uhakika na N/A kama familia haiishi katika kijiji)

15) Je wazazi wako ni wa kaya Gani?

Mama ....

Baba ....

16) Je wewe unajitambulisha kuwa wa kaya Gani? ....
(tafdhali andika 'NONE' kama mhojiwa hajitabulishi na kaya yoyote)

17) Jee unaitumia kaya kwa njia yoyote?   Ndio/La
(Weka alama ya mzunguko kwa jibu sahihi)

18) Kama ndio, ni kaya ipi haswaa unayoitumia? ....

19) Kama Una watoto, je wanajitambulisha na Mbari (kabila) gani? ....

(kama una watoto zaidi ya mmoja ama watoto wanajitambulisha na makundi tofauti ya mbari, tafdhali andika nyuma ya karatasi hili au NA kama mhojiwa hajui mbari ambayo watoto wake wanajitabulisha nayo.)

20) Je unaamini kama kuijitambulisha na utamaduni wako inaashiria vile unavyouona ulimwengu wa sasa?

(tafadhali chora mzunguuko kwa jawabu sahihi, kama sivyo elekea kwa Swal20 ,sehemu ya 1 ukurasa wa 5)

Ndio/La/Labda

21) Kama Ndio, je unaamini ni kwa uzuri au ubaya vile inachangaia fikira zako juu ya ulimwengu wa sasa?(tafadhali chora mzunguuko kwa jawabu sahihi)

Uzuri/Ubaya/Vyote uzuri na ubaya/ sijui

Tafadhali eleza sababu?

………

………

………

22) Je kutambuliwa na utamaduni wako kunaumuhimu gani kwako?

(tafadhali chora mzunguuko kwa jawabu sahihi)

Muhimu sana	Muhimu tu	Niko katikati	Ya umuhimu mchache	Siyamuhimu hata kidogo
1	2	3	4	5

Tafadhali eleza sababu zako:

………

………

………

23) Je kutambuliwa kwa utamataduni wako kunaathiri vipi kazi zako za kila siku?

(tafadhali chora mzunguuko kwa jawabu sahihi)

Sana sana	Sana	Sina uhakika	Sio sana	Haiathiri hata kidogo
1	2	3	4	5

Tafadhali eleza sababu zako:

………

………

………

24) Kama una watoto, je unaamini kuwa na watoto kumeboresha au kupunguza umuhimu wa kutambuliwa kwako katika utamaduni wako?
(tafadhali chora mzunguuko kwa jawabu sahihi, na kama huna watoto weka simuhimu)

Muhimu zaidi/simuhimu vile/nimuhimu na simuhimu/sifahamu/sihusiki

25) Je kutambuliwa kwako kitamaduni ni kule ulikokuwanako ukiwa mtoto?
Ndio/La
(tafadhali chora mzunguuko kwa jawabu sahihi. Kama Ndio endelea swali la 25,sehemu ya 1 ukrasa wa6)

26) Kama jibu ni La, eleza kundi la kitambulisho cha utamaduni wako

....Kabila au Mbari ya kitamaduni

27) Je kutambuliwa na kundi la utamaduni wako kulikuwa na umuhimu gani ukiwa mtoto?
(tafadhali chora mzunguuko kwa jawabu sahihi)

Muhimu sana	muhimu tu	Ni ko katikati	Muhimu kidogo	Si ya muhimu
1	2	3	4	5

28) Je kitambulisho cha kitamaduni cha wazazi wako inaashiria kilikuwa na umuhimu gani kwao?
(tafadhali chora mzunguuko kwa jibu lifaalo)

Baba

Muhimu sana	Muhimu tu	Ni ko katikati	Muhimu kidogo	Si ya muhimu
1	2	3	4	5

Mama

Muhimu sana	Muhimu tu	Ni ko katikati	Muhimu kidogo	Si ya muhimu
1	2	3	4	5

29) Je kitambulisho cha kitamaduni cha wazazi wako kinaashiria umuhimu gani kwako?
(tafadhali chora mzunguuko kwa jawabu sahihi)

Muhimu sana	Muhimu tu	Ni ko katikati	Muhimu kidogo	Si ya muhimu
1	2	3	4	5

30) Je unaamini kama kuijitambulisha na historia au kumbukumbu ya kitamaduni chako inaashiria vile unavyouona ulimwengu wa sasa?
(tafadhali chora mzunguuko kwa jawabu sahihi, kama sivyo elekea kwa Swali30, sehemu ya 1ukurasa wa 7)

Ndio/La/Labda

31) Kama Ndio, je unaamini ni kwa uzuri au ubaya vile inachangia fikira zako juu ya ulimwengu wa sasa?(tafadhali chora mzunguuko kwa jawabu sahihi)

Uzuri/Ubaya/Vyote uzuri na ubaya/ sijui

Tafadhali eleza sababu?

………

………

………

32) Je kutambua historia au kumbukumbu ya utamaduni wako unaumuhimu gani kwako?
(tafadhali chora mzunguuko kwa jawabu sahihi)

Muhimu sana	Muhimu tu	Niko katikati	Ya umuhimu mchache	Siyamuhimu hata kidogo
1	2	3	4	5

Tafadhali eleza sababu zako:

………

………

………

33) Je kutambua historia au kumbukumbu ya utamataduni wako kunaathiri vipi kazi zako za kila siku?
(tafadhali chora mzunguuko kwa jawabu sahihi)

Sana sana	Sana	Sina uhakika	Sio sana	Haiathiri hata kidogo
1	2	3	4	5

Tafadhali eleza sababu zako:

………

………

………

34) Kama una watoto, je unaamini kuwa na watoto kumeboresha au kupunguza umuhimu wa historia au kumbukumbu ya utamaduni wako?
(tafadhali chora mzunguuko kwa jawabu sahihi, na kama huna watoto weka simuhimu)

Muhimu zaidi/simuhimu vile/nimuhimu na simuhimu/sifahamu/sihusiki

35) Je kutambua historia au kumbukumbu ya kundi la utamaduni wako kulikuwa na umuhimu gani ukiwa mtoto?
(tafadhali chora mzunguuko kwa jawabu sahihi)

Muhimu sana	muhimu tu	Ni ko katikati	Muhimu kidogo	Si ya muhimu
1	2	3	4	5

Tafadhali eleza sababu zako:

……

……

……

36) Je historia au kumbukumbu ya kitamaduni cha wazazi wako unaashiria kilikuwa na umuhimu gani kwao?
(tafadhali chora mzunguuko kwa jawabu sahihi)

Baba:

Muhimu sana	Muhimu tu	Ni ko katikati	Muhimu kidogo	Si ya muhimu	Unknown
1	2	3	4	5	9

Mama:

Muhimu sana	Muhimu tu	Ni ko katikati	Muhimu kidogo	Si ya muhimu	Unknown
1	2	3	4	5	9

37) Je kufahamu historia au kumbukumbu ya kitamaduni cha wazazi wako unaashiria kina umuhimu gani kwako?
(tafadhali chora mzunguuko kwa jawabu sahihi)

Muhimu sana	Muhimu tu	Ni ko katikati	Muhimu kidogo	Si ya muhimu
1	2	3	4	5

38) Je unakumbuka kufunzwa kuhusu utamaduni, kitambulisho cha kitamaduni na historia ya utamaduni wako ukiwa mtoto ?

(tafadhali chora mzunguko kwa jawabu sahihi. Kama ni La, enda kwa swali 39 sehemu ya 1 ukrasa 11 kama ndio swali 37 ukrasa 9)

Ndio/La

39) Ni nani unayemkumbuka kukufunza kuhusu utamaduni, kitambulisho cha kitamaduni na historia ya utamaduni wako?

(tafadhali weka tiki kwa sehemu zinazofaa na umuhimu wao katika kuwasilisha ujumbe au ufahamukatika mafunzo kuhusu utamaduni, kitambulisho cha kitamaduni na historia ya kitamaduni; ambapo 1 ni muhimu zaidi na 11 ni ya muhimu wa chini zaidi. Orodhesha zile ulizozipiga tiki peke yake)

Panga 1- ✔

☐ ☐ Mama

☐ ☐ Baba

☐ ☐ Mababu na Nyaya

☐ ☐ Mandugu

☐ ☐ Wanafamilia wengine (Tafadhali eleza)   ....

☐ ☐ Kiongozi wa kidini katika kijiji/mhubiri/kiongozi wa kidini

☐ ☐ Kasisi wa nje ya kijiji/Mhubiri/Kiongozi wa kidini (kutoka nje ya kijiji)

☐ ☐ Mwalimu wa shule

☐ ☐ Wazee wa vijiji

☐ ☐ Mwana kijiji mwengine (Tafadhali eleza)   ....

☐ ☐ Wengine   (tafadhali eleza)   ....

40) Ni kwa kupitia njia gani ulivyofunzwa kuhusu utamaduni wako, kitambulisho cha utamaduni na historia ya utamaduni?

(tafadhali weka tiki kwa sehemu zinazofaa na umuhimu wao katika kuwasilisha ujumbe au ufahamukatika mafunzo kuhusu utamaduni, kitambulisho cha kitamaduni na historia ya kitamaduni; ambapo 1 ni muhimu zaidi na 9 ni ya muhimu wa chini zaidi. Orodhesha zile ulizozipiga tiki peke yake)

Panga 1-9 ✔

☐ ☐ Nyimbo -inajumuisha zile zinazohadithia mambo ya kale na zinafanywa katika sherehe za kitamaduni na matambiko

☐ ☐ Hadithi/itikadi na ngano za kale – sio katika hali ya michezo or nyimbo na inajumisha zote zilizokuwa zikifanywa katika sherehe za kitamaduni na matambiko

☐ ☐ Kucheza na maonyesho – inujumuisha zote zenye kutoa hadithi, ngano zilizoko kwenye nyimbo ambazo hutekelezwa wakati wa sherehe za kitamaduni na matambiko

☐ ☐ Kupelekwa sehemu mbali mbali zilizo muhimu kwa utamaduni, kiashiria cha utamaduni na historia ya utamaduni wako na haijumuishi sherehe za kitamaduni na matambiko (Ikiwezekana tafadhali eleza kama ni wapi hapa chini)

☐ ☐ Matambiko na sherehe za kitamaduni (ikiwezekana tafadhali andika aina za sherehe na kule zilikofanfwa)

☐ ☐ Katika sheria ambazo nilipewa nikiwa kijana

☐ ☐ Katika masomo (shuleni au kijijini)

☐ ☐ Mengine (tafadhali eleza) ....
....
....

Kama ungetamani au unaweza kutoa ujumbe zaidi kuhusu njia tofauti ulizofundishwa (kama vile aina za nyimbo/ hadithi/ngano pamoja na ujumbe wa sehemu zilipotekelezwa na aina za sherehe) tafadhali fanya hivyo katika sehemu hii:

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41) Kama una watoto, je unaona ni muhimu kwao kufunzwa kuhusu utamaduni wao, kitambulisho cha utamaduni na historia ya kitamaduni?

(tafadhali chora mzunguuko kwa jawabu sahihi. Kama hauna watoto, tafadhali chora mzunguuko kwa sehemu sihusiki kasha uende kwa swali 42 sehemu 2, ukurasa wa13)

Ndio/La/labda /sijui/sihusiki

42) Je unafikiria ni wakina nani ambao wanapswa kuelimisha watoto kuhusu utamaduni na historia?

(tafadhali weka tiki kwa sehemu zinazofaa na umuhimu wao katika kuwasilisha ujumbe au ufahamukatika mafunzo kuhusu utamaduni, kitambulisho cha kitamaduni na historia ya kitamaduni; ambapo 1 ni muhimu zaidi na 11 ni ya muhimu wa chini zaidi. Orodhesha zile ulizozipiga tiki peke yake)

Panga 1-- ✔

☐ ☐ Mama

☐ ☐ Baba

☐ ☐ Mababu na nyanya

☐ ☐ Wandungu

☐ ☐ Mwanafamilia mwengine (tafadhali taja) ....

☐ ☐ Muhuibri katika kijiji/muhubiri/kiongozi wa kidini

☐ ☐ Muhubiri kutoka nje ya kijiji/muhubiri/kiongozi wa kidini (kutoka nje ya kijiji)

☐ ☐ Mwalimu wa shule

☐ ☐ Wazee wa kijiji

☐ ☐ Mwanakijiji mwengine (tafadhali eleza) ....

☐ ☐ Mwengine (tafadhali eleza) ….…….........................…......

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43) Ni kupitia njia gani unafikiria watoto wanaweza kuelimishwa bora kuhusu utamaduni na asilia yao?

(weka tiki kwa sehemu zinazofaa na umuhimu wao katika kuwasilisha ujumbe au ufahamukatika mafunzo kuhusu utamaduni, kitambulisho cha kitamaduni na historia ya kitamaduni; ambapo 1 ni muhimu zaidi na 9 ni ya muhimu wa chini zaidi. Orodhesha zile ulizozipiga tiki peke yake)

Panga 1-9   ✔

☐ ☐ Nyimbo -inajumuisha zile zinazohadithia mambo ya kale na zinafanywa katika sherehe za kitamaduni na matambiko

☐ ☐ Hadithi/itikadi na ngano za kale – sio katika hali ya michezo or nyimbo na inajumisha zote zilizokuwa zikifanywa katika sherehe za kitamaduni na matambiko

☐ ☐ Kucheza na maonyesho – inujumuisha zote zenye kutoa hadithi, ngano zilizoko kwenye nyimbo ambazo hutekelezwa wakati wa sherehe za kitamaduni na matambiko

☐ ☐ Kupelekwa sehemu mbali mbali zilizo muhimu kwa utamaduni, kiashiria cha utamaduni na historia ya utamaduni wako na haijumuishi sherehe za kitamaduni na matambiko (Ikiwezekana tafadhali eleza kama ni wapi hapa chini)

☐ ☐ Matambiko na sherehe za kitamaduni (ikiwezekana tafadhali andika aina za sherehe na kule zilikofanfwa)

☐ ☐ Katika sheria ambazo nilipewa nikiwa kijana

☐ ☐ Katika masomo (shuleni au kijijini)

☐ ☐ Mengine (tafadhali eleza)...
....
....

Kama ungetaka kutoa ujumbe zaidi kuhusu vile unahisi vijana wanaweza kuelimishwa kuhusu ni waelimishwe kuhusu (kama vile aina za nyimbo/ hadithi/ngano pamoja na ujumbe wa sehemu zilipotekelezwa na aina za sherehe) tafadhali fanya hivyo katika sehemu:

....
....
....
....

Sehemu 2: Dini na mifumo imani

44) Je unaimani na kitamamaduni asilia cha kaya?   Ndio/La
(tafadhali chora mzunguuko kwa jawabu sahihi)

45) Kama jibu ni La , ni imani gani unayojitambulisha nayo?
(kama mhojiwa hana imani na mfumo wowote wa imani, tafadhali andika 'NONE' hapa chini na uende swali la 48, Sehemu 2, ukrasa 14)

....

46) Je unaamini kuwa hali yako ya imani inachangia vile unavyouona ulimwengu wa sasa?
(tafadhali chora mzunguuko kwa jawabu sahihi, kama sivyo elekea kwa Swali 48, sehemu 2 ukurasa wa 13)

                                                                            Ndio/La

47) Kama Ndio, je unaamini ni kwa uzuri au ubaya vile inachangaia fikira zako juu ya
    ulimwengu wa sasa? (tafadhali chora mzunguuko kwa jawabu sahihi)

                            Uzuri/Ubaya/Vyote uzuri na ubaya/ sijui

Tafadhali eleza sababu?

....
....
....

48) Je imani yako asilia inaumuhimu gani kwako?
(chora mzuunguko kwa jibu lifaalo)

Muhimu sana	Muhimu kiasi	Niko katikatil	Ya muhimu duni	Si muhimu
1	2	3	4	5

Tafadhali eleza sababu:

....

....

....

49) Je imani yako asilia inaathiri vipi kazi zako za kila siku?
(chora mzunguko kwa jibu lifaalo)

Sana sana	Sana	Sina uhakika	Sio sana	Haiathiri hata kidogo
1	2	3	4	5

Tafadhali eleza ni kwa njia gani:

....

....

....

50) Kama una watoto, je unaamini kuwa na watoto kumeboresha au kupunguza umuhimu
wa imani yako asilia? (tafadhali chora mzunguuko kwa jawabu sahihi, na kama huna watoto weka simuhimu)

Muhimu zaidi/simuhimu vile/nimuhimu na simuhimu/sifahamu/sihusiki

51) Je ulikuwa na au kuamini katika imani ya kitamaduni wakati ukiwa kijana?   Ndio/La
(tafadhali chora mzunguuko kwa jawabu sahihi, na kama ni La needa kwa swali 52,sehemu ya 2, ukrasa wa 14)

52) Kama jibu ni Ndio, ni imani gani ya kitamaduni uliyojitambulisha nayo?

....

53) Imani yako ya kitamaduni ilikuwa ya umuhimu gani kwako ukiwa mtoto?
(tafadhali chora mzunguuko kwa jawabu sahihi)

Muhimu sana	Muhimu kiasi	Si muhimu na ni muhimu	Ya umuhimu duni	Si ya muhimu
1	2	3	4	5

Tafadhali eleza sababu zako:

....

....

....

54) Je unakumbuka kufunzwa kuhusu imani yako ya kitamaduni wakati ukiwa mdogo?
(tafadhali chora mzunguuko kwa jawabu sahihi, na kama ni La needa kwa swali 55 ukrasa wa 17)

Ndio/La

55) Ni nani unayemkumbuka kukufunza kuhusu imani yaso asilia?

(tafadhali weka tiki kwa sehemu zinazofaa na umuhimu wao katika kuwasilisha ujumbe au ufahamu katika mafunzo kuhusu imani asilia/ kitamaduni; ambapo 1 ni muhimu zaidi na 11 ni ya muhimu wa chini zaidi. Orodhesha zile ulizozipiga tiki peke yake)

Panga 1- ✔

☐ ☐ Mama

☐ ☐ Baba

☐ ☐ Mababu na Nyaya

☐ ☐ Mandugu

☐ ☐ Wanafamilia wengine (Tafadhali eleza) ....

☐ ☐ Kiongozi wa kidini katika kijiji/mhubiri/kiongozi wa kidini

☐ ☐ Kasisi wa nje ya kijiji/Mhubiri/Kiongozi wa kidini (kutoka nje ya kijiji)

☐ ☐ Mwalimu wa shule

☐ ☐ Wazee wa vijiji

☐ ☐ Mwana kijiji mwengine (Tafadhali eleza) ....

☐ ☐ Wengine (tafadhali eleza) ....

56) Ni kwa kupitia njia gani unakumbuka ulifunzwa kuhusu imani asilia ya utamaduni wako?

(tafadhali weka tiki kwa sehemu zinazofaa na umuhimu wao katika kuwasilisha ujumbe au ufahamukatika mafunzo kuhusu imani ya kitamaduni/ asilia; ambapo 1 ni muhimu zaidi na 9 ni ya muhimu wa chini zaidi. Orodhesha zile ulizozipiga tiki peke yake)

Panga 1-9   ✔

☐ ☐ Nyimbo -inajumuisha zile zinazohadithia mambo ya kale na zinafanywa katika sherehe za kitamaduni na matambiko

☐ ☐ Hadithi/itikadi na ngano za kale – sio katika hali ya michezo or nyimbo na inajumisha zote zilizokuwa zikifanywa katika sherehe za kitamaduni na matambiko

☐ ☐ Kucheza na maonyesho – inujumuisha zote zenye kutoa hadithi, ngano zilizoko kwenye nyimbo ambazo hutekelezwa wakati wa sherehe za kitamaduni na matambiko

☐ ☐ Kkupelekwa sehemu mbali mbali zilizo muhimu kwa utamaduni, kiashiria cha utamaduni na historia ya utamaduni wako na haijumuishi sherehe za kitamaduni na matambiko (Ikiwezekana tafadhali eleza kama ni wapi hapa chini)

☐ ☐ Matambiko na sherehe za kitamaduni (ikiwezekana tafadhali andika aina za sherehe na kule zilikofanfwa)

☐ ☐ Katika sheria ambazo nilipewa nikiwa kijana

☐ ☐ Katika masomo (shuleni au kijijini)

☐ ☐ Mengine (tafadhali eleza) ....
....
....

Kama ungetamani au unaweza kutoa ujumbe zaidi kuhusu njia tofauti ulizofundishwa njia tofauti ulizofundishwa (kama vile aina za nyimbo/ hadithi/ngano pamoja na ujumbe wa sehemu zilipotekelezwa na aina za sherehe) tafadhali fanya hivyo katika sehemu hii:

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....

57) Kama una watoto, je unaona ni muhimu kwao kufunzwa kuhusu imani ya kitamaduni/ asilia?

(tafadhali chora mzunguuko kwa jawabu sahihi. Kama hauna watoto, tafadhali chora mzunguuko kwa sehemu sihusiki kasha uende kwa swali 58 sehemu ya 2 ukurasa wa 19)

Ndio/La/labda /sijui/sihusiki

58) Je unafikiria ni wakina nani ambao wanapswa kuelimisha watoto kuhusu imani tamaduni?

(tafadhali weka tiki kwa sehemu zinazofaa na umuhimu wao katika kuwasilisha ujumbe au ufahamukatika mafunzo kuhusu imani tamaduni ; ambapo 1 ni muhimu zaidi na 11 ni ya muhimu wa chini zaidi. Orodhesha zile ulizozipiga tiki peke yake)

Panga 1- ✔

☐ ☐ Mama

☐ ☐ Baba

☐ ☐ Mababu na nyanya

☐ ☐ Wandungu

☐ ☐ Mwanafamilia mwengine (tafadhali taza)   ....

☐ ☐ Muhuibri katika kijiji/muhubiri/kiongozi wa kidini

☐ ☐ Muhubiri kutoka nje ya kijiji/muhubiri/kiongozi wa kidini (kutoka nje ya kijiji)

☐ ☐ Mwalimu wa shule

☐ ☐ Wazee wa kijiji

☐ ☐ Mwanakijiji mwengine   (tafadhali eleza)   ....

☐ ☐ Mwengine   (tafadhali eleza)   ....

59) Ni kupitia njia gani unafikiria watoto wanaweza kuelimishwa bora kuhusu imani asilia?
(weka tiki kwa sehemu zinazofaa na umuhimu wao katika kuwasilisha ujumbe au ufahamukatika mafunzo kuhusu imani asilia; ambapo 1 ni muhimu zaidi na 9 ni ya muhimu wa chini zaidi. Orodhesha zile ulizozipiga tiki peke yake)

Panga 1-9   ✔

☐ ☐ Nyimbo -inajumuisha zile zinazohadithia mambo ya kale na zinafanywa katika sherehe za kitamaduni na matambiko

☐ ☐ Hadithi/itikadi na ngano za kale – sio katika hali ya michezo or nyimbo na inajumisha zote zilizokuwa zikifanywa katika sherehe za kitamaduni na matambiko

☐ ☐ Kucheza na maonyesho – inujumuisha zote zenye kutoa hadithi, ngano zilizoko kwenye nyimbo ambazo hutekelezwa wakati wa sherehe za kitamaduni na matambiko

☐ ☐ Kupelekwa sehemu mbali mbali zilizo muhimu kwa utamaduni, kiashiria cha utamaduni na historia ya utamaduni wako na haijumuishi sherehe za kitamaduni na matambiko (Ikiwezekana tafadhali eleza kama ni wapi hapa chini)

☐ ☐ Matambiko na sherehe za kitamaduni (ikiwezekana tafadhali andika aina za sherehe na kule zilikofanfwa)

☐ ☐ Katika sheria ambazo nilipewa nikiwa kijana

☐ ☐ katika masomo (shuleni au kijijini)

☐ ☐ Mengine (tafadhali eleza)...
....
....

Kama ungetaka kutoa ujumbe zaidi kuhusu vile unahisi vijana wanaweza kuelimishwa kuhusu imani asilia (kama vile aina za nyimbo/ hadithi/ngano pamoja na ujumbe wa sehemu zilipotekelezwa na aina za sherehe) tafadhali fanya hivyo katika sehemu hii:

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....

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60) Je wazazi wako wana / walikuwa na mfumo wa imani ya kitamaduni/ asilia?
(tafadhali chora mzunguuko kwa jibu lifaalo, kama jibu ni La, nenda swali 62, sehemu ya 3 ukrasa 20)

Ndio/La/sifahamu

61) Kama jibu ni LA, ni mfumo gani wa imani ambayo wazazi wako walijitambulisha nayo?

Mama ....

Baba ....

62) Kama wazazi walikuwa na imani ya kitamaduni/ asilia je unafikiria inaumuhimu gani kwako?
(tafadhali chora mzunguuko kwa jibu lifaalo)

Baba:

Muhimu sana	Muhimu tu	Ni ko katikati	Muhimu kidogo	Si ya muhimu	Unknown
1	2	3	4	5	9

Mama:

Muhimu sana	Muhimu tu	Ni ko katikati	Muhimu kidogo	Si ya muhimu	Unknown
1	2	3	4	5	9

63) Kama wazazi wako wana/ walikuwa na mfumo wa imani wa kiroho, je unafikiri inaumuhimu gani kwako?
(tafadhali chora mzunguuko kwa jibu lifaalo)

Si ya muhimu	Ya muhimu kidogo	Si muhimu na ni muhimu	Muhimu kiasi	Muhimu sana
1	2	3	4	5

Sehemu 3: Sheria za kitamaduni

64) Je unafahamu sheria zozote za kitamaduni?   Ndio/ La
(tafadhali chora mzunguuko kwa jibu lifaalo)

65) Ni akina nani hutengeza/ hutunga na kulinda sheria hizi za kitamaduni (ni watu gani katika Jamii)?
(Tutajie wote kwa majina na madaraka yao ama nyadhifa zao katika jamii, ama nyadhifa zao . kama muhojiwa hajui , andika 'UNKNOWN'.)

....

....

....

66) Je unatii na kuheshimu sheria za kitamaduni katika kazi zako za kila siku?
(tafadhali chora mzunguuko kwa jibu lifaalo)

                              Ndio/La/wakati mwengine

67) Je sheria hizi za kitamaduni zinaumuhimu gani kwako?
(tafadhali chora mzunguuko kwa jibu lifaalo)

Si muhimu	Za muhimu duni	Ni muhimu na simuhimu	Ni muhimu kadri	Muhimu sana
1	2	3	4	5

Tafadhali eleza sababu zako:

....

....

....

68) Je ni sheria gani 5 za kitamaduni unazoamini ni muhimu sana kwako?
(tafadhali taja kufuatana na umuhimu wake ambapo 1 ni muhimu zaidi)

1)...

2)...

3)...

4)...

5)...

69) Je ni sheria gani 5 za kitamaduni zilizo na adhabu kali kama zimevunjwa au zimepuuzwa? Na ni adhabu gani?

(tafadhali nakili kufuatana na ukali wa adhabu ambapo 1 ina adhabu kali)

1)..

Adabu yake: ....

....

2)..

Adabu yake: ....

....

3)..

Adabu yake: ....

....

4)..

Adabu yake: ....

....

5)..

Adabu yake: ....

....

Sehemu 4: Misitu ya Kaya/ Makaya

70) Je unamamlaka ama jukumu lolote katika kaya yako?   Ndio/La
(weka alama ya mzunguko kwa jibu sahihi. Kama ndio tafadhali orodhesha cheo na majukumu yake)

....

....

....

71) Ni maneno gani matano yanayokuja kwa fikira yako wakati unapowaza kuhusu misitu
ya kaya?

1)..

2)..

3)..

4)..

5)..

72) Tafadhali onyesha vile unakubaliana na sentensi zifuatazo – hakuna jibu sahihi au
makosa.
(tafadhali chora mzunguuko kwa jibu lifaalo)

1 = nakataa katakata	**2 = nakataa**	**3 = niko katikati**	**4 = nakubali**	**5 =Nakubali kikamilifu**

Misitu ya kaya ni muhimu kwangu	1	2	3	4	5
Ni muhimu kufundisha watoto kuhusu misitu ya kaya	1	2	3	4	5
Makaya si muhimu tena kushinda misitu mingine karibu yetu	1	2	3	4	5
Ni nasikia furaha nikitembelea misitu ya kaya	1	2	3	4	5
Misitu ya Kaya si takatifu kwangu	1	2	3	4	5
Nikitembelea makaya nahisi kama nimeunganishwa na wazee waangu waliofariki zamani	1	2	3	4	5

73) Kama unaamini misitu ya kaya ni muhimu, tafadhali eleza sababu 5 kulingana na uzito wa umuhimu wake kwako :

1)...

2)...

3)...

4)...

5)...

74) Wewe Hutembelea misitu ya kaya baada Ya Muda gani?
(tafdhali weka tiki kwa kisanduku kifaacho)

Kila siku	Kila wiki	Kila mwezi	Mara chache kwa mwaka	Wakati tu kuna sherehe Fulani	Siendi kabisa
☐	☐	☐	☐	☐	☐

75) Ni wakati gani unapo utumia msitu wa kaya?
(weka alama ya tiki kwa jibu sahihi)

Asubui	Mchana	Jioni	Usiku
☐	☐	☐	☐

Majira ya kiangazi/kazkazi (December – April)	Masika (April – August)	Kusi/muda mfupi wa kiangazi (August – Sept)	Vuli/Muda mfupi mvua (Sept – Dec)
☐	☐	☐	☐

76) Jee unai tumia sehemu yoyote nyengine iliotengwa kwa matambiko ya kimila (mzimu, panga ama sehemu yoyote ya kimila)
(weka alama ya mzunguko kwa jibu sahihi. Kama jibu ni ndio, angalia swali la 77, kama ni La angalia swali 80, sehemu 4 ukurasa wa 24)

Ndio/La

77) Kama jibu ni Ndio, ni ipi unayoitumia, ama panaitwaje?..

78) Ni kwa kipindi gani unapoitumia sehemu ama pahala hapa pa mila/matambiko?
(weka alama ya mzunguko kwa jibu sahihi)

Kila siku	Kila wiki	Mwezi	Mara chache kwa mwaka	Wakati wa sharehe muhimu za mila	Hapana
☐	☐	☐	☐	☐	☐

79) Ni wakati gani ambapo wewe huitumia sehemu hii ya mila/panga, mzimu/sehemu takatifu ya mila?
(weka alama ya tiki kwa jibu sahihi)

Asubui	Mchana	Jioni	Usiku
☐	☐	☐	☐

Majira ya kiangazi/kazkazi (December – April)	Masika (April – August)	Kusi/muda mfupi wa kiangazi (August – Sept)	Vuli/Muda mvua (Sept – Dec)
☐	☐	☐	☐

80) Tafadhali onyesha vile unakubaliana na sentensi zifuatazo – hakuna jibu sahihi au makosa. (Tafadhali chora mzunguuko kwa jibu lifaalo)

1 = Nakataa vikali **2 = Nakataa** **3 = Niko katikati** **4 = Nakubali** **5 = Nakubali kabisakikamilifu**

Misitu ya kaya inanipatia mimi raslimali muhimu	1	2	3	4	5
Kuhifadhi misitu ya kaya si muhimu	1	2	3	4	5
Misitu ya kaya ni muhimu kwa kuwa ni kitambulisho cha utamaduni wangu	1	2	3	4	5
Nigehuzunika kama misitu ya kaya haingekuwepo hapa	1	2	3	4	5
Watu wasiokuwa wa kijiji hiki hawaheshimu misitu ya kaya	1	2	3	4	5

81) Ni kwa njia gani unatumia au kufaidika na misitu ya kaya?
(Tafadhali orodhesha hadi njia 5 tofauti ambazo unatumia misitu ya kaya kulingana na uzito wa umuhimua wake kwako
ambapo 1 ni muhimu zaidi na uzipange katika mpangilio wa A-E kulingana na mara shughuli hiyo inavyotekelezwa, ambapo A
ni ile shunguli inayotekelezwa mara nyingi zaidi. Matumizi si lazima yawe ya kutoa raslimali au kuhusika na matumizi
unayoweza kushika ya eneo..)

Wingi wa mara shughuli inatekelezwa A - E

1)... ☐

2)... ☐

3)... ☐

4)... ☐

5)... ☐

82) Ni raslimali gani unazopata kutoka kwa misitu ya kaya?
(Tafadhali orodhesha 10 bora, ambapo 1 ni bora zaidi)

1) ....

2) ....

3) ....

4) ....

5) ....

6) ....

7) ....

8) ....

9) ....

10) ....

83) Eleza sheria 5 za kitamaduni unazoamini ni muhimu kuhusu utembeleaji au matumizi ya misitu ya kaya?

(tafdhali ziweke kulingana na ubora wake ikiwa 1 ni Muhimu zaidi)

1)...

2)...

3)...

4)...

5)...

84) Je unaamini misitu ya kaya ilikuwa muhimu vizazi vilivyokutangulia ambao hawako hai sasa?

(tafadhali chora mzunguuko kwa jibu linalofaa)

                                                            Ndio/La/Sifahamu

Kama Ndio, tafadhali orodhesa sababu 5 unazo fikiri misitu ya kaya ilikuwa muhimu kwa vizazi vilivyokutangulia na ni marehemu kwa sasa.

(tafadhali weka katika hali ya ubora ambapo 1 ni muhimu sana)

1)...

2)...

3)...

4)...

5)...

85) Tafadhali weka orodha ya wanyama 10 na/au mimea kutoka kwa kaya ambayo wewe hutumia na vile unavyoitumia :

(tafadhali andika jina la mnyama/ mumea unaotumika, vile unavyotumika, onyesha kama ni matumizi ya kutoa au kuvuna Ndio/ La/ Sijui na mara unazotumika kulinga na viashirio ulivyoonyeshwa hapa chini)

<u>Baada ya muda gani:</u>

1 = kila siku   **2 = kila wiki**   **3 = kila mwezi**   **4 = mara chache kwa mwaka**   **5 = kwa sababu Fulani tu**   **6 = situmii**

	Mnyama/mumea	Matumizi	Ya kutoa Ndio/La/sijui	Wingi wa matumizi 1-6
1)	………………………… .	…………………………… ..	………………… .	…………
2)	………………………… .	…………………………… ..	………………… .	…………
3)	………………………… .	…………………………… ..	………………… .	…………
4)	………………………… .	…………………………… ..	………………… .	…………
5)	………………………… .	…………………………… ..	………………… .	…………
6)	………………………… .	…………………………… ..	………………… .	…………
7)	………………………… .	…………………………… ..	………………… .	…………
8)	………………………… .	…………………………… ..	………………… .	…………
9)	………………………… .	…………………………… ..	………………… .	…………

10) ....
    .   ..   .

86) Tafadhali weka orodha ya wanyama wasiopungua 10 ambao wanaishi kwa misitu ya kaya ambayo unafikiria ni muhimu na ueleze ni kwa sababu gani:

(tafadhali weka kwa ubora wa umuhimu wao ambapo 1 ni muhimu zaidi. Kama unaweza kufikiria zaidi ya wanyama 10 ambao unaamini ni muhimu, tafadhali waandike katika mwisho wa jarida hili)

1) ....

Sababu ya muhimu wake..

2) ....

Sababu ya muhimu wake..

3) ....

Sababu ya muhimu wake..

4) ....

Sababu ya muhimu wake..

5) ....

Sababu ya muhimu wake..

6) ....

Sababu ya muhimu wake..

7) ....

Sababu ya muhimu wake..

8) ....

Sababu ya muhimu wake...

9) ....

Sababu ya muhimu wake...

10) ....

Sababu ya muhimu wake...

87) Tafadhali onyesha vile unakubaliana na sentensi zifuatazo – hakuna jibu sahihi au makosa.
(tafadhali chora mzunguuko kwa nambari inayofaa kwa kila hoja)

Katika swali hili heshima inachukuliwa kumaanisha kwamba mtu anathamini mumea/ munyama na anaonyesha heshima na hadhi kubwa sana

1 = Nakataa katakata	2 = Nakataa	3 = niko katikati	4 = nakubali	5 = Nakubali kikamilifu

Ni muhimu kufundisha watoto wetu kuhusu wanyama na mimea	1	2	3	4	5
Mimea na wanayama iliyoko katika misitu ya kaya ni muhimu kwa utamaduni wa jamii husika	1	2	3	4	5
Tuko na jukumu kuilinda mimea na wanyama	1	2	3	4	5
Badhi ya wanayama katika misitu ya kaya ni wadudu waharibifu	1	2	3	4	5
Ni sawa kuwinda wanyama katika misitu ya kaya	1	2	3	4	5
Ninaheshimu nI Kuthamini wanayama na mimea iliyoko katika mistu ya kaya	1	2	3	4	5
Vizazi vilivyotutangulia sisi vilionyesha heshima kwa wanyama na mimea yote	1	2	3	4	5

88) Je unafikiria ni tisho gani muhimu 5 zinazokumba misitu ya kaya, mimea na wanyama wake?
(tafadhali taja kulingana na hali ya tisho ambapo 1 ndio tisho baya zaidi)

1) ....

2) ....

3) ....

4) ....

5) ....

89) Je unafikiria kulinda urithi wetu wa kitamaduni waweza saidia kulinda mazingira asilia?
(tafadhali chora mzunguuko kwa jawabu linalofaa)
Ndio/La/Labda

Tafadhali eleza ni kwa nini:

....

....

....

90) Unatofu gani kwamba utamaduni wa waMijikenda uko katika tisho la kuangamizwa?
(tafadhali chora mzunguuko kwa jibu lifaalo)

Unatofu sana	Unatofu kiasi	Siko upande wowote	Sinahofu kabisa
1	2	3	4

Tafadhali eleza sababu:

....

....

....

91) Je unafikiria ni tisho gani muhimu 5 zinazokumba kitamaduni cha watu asilia?
(tafadhali taja kulingana na hali ya tisho ambapo 1 ndio tisho baya zaidi)

1) ....

2) ....

3) ....

4) ....

5) ....

92) Ni nani unayefikiria anastahili kuongoza/ kusimamia kulinda tamaduni asilia?
(weka tiki pale inafaa)

☐ Serikali

☐ Shirika lisilo la kiserikali

☐ Jamii iishiyo karibu na msitu (watu ambao ni wa asilia ya kimijikenda

☐ Watu wengine wanaoiishi katika eneo (ambao si wa ukoo wa kimijikenda

93) Ni nani unayefikiria anastahili kuongoza/ kusimamia kulinda mazingira asilia?

(weka tiki pale inafaa)

☐ Serikali

☐ Shirika lisilo la kiserikali

☐ Jamii iishiyo karibu na msitu (watu ambao ni wa asilia ya kimijikenda

☐ Watu wengine wanaoiishi katika eneo (ambao si wa ukoo wa kimijikenda

Sehemu ya 5: Uhamiaji wa watu kwa makaazi katika eneo

94) Je umewahi kushuhudia idadi kubwa ya watu wanaohamia katika eneo hili kwa sababu ya makaazi (katika umbali wa maili 5 /kilomita 10)?

(Tafadhali chora mzunguuko kwa jibu sahahihi na kama ni La enda kwa swali 97, sehemu ya 5, ukrasa wa 31)

Ndio/La

95) Tafadhali orodhesha sababu 5 ambazo zinafanya watu kutafuta makaazi katika sehemu hii:

1) ....

2) ....

3) ....

4) ....

5) ....

96) Unafikiria kuongezeka kwa idadi ya watu katika eneo kumefanyika kwa haraka sana (ongezeko la ghafula kwa miaka michache ya hivi karibuni) ama idadi imeongeza pole pole kwa muda mrefu (miaka 50-100)?

(chora mzunguuko kwa jibu sahihi)

Muda mfupi/Muda mrefu

97) Ni watu wa mbari gani/ kabla gani/ nchi gani wanaohamia kwa wingi katika eno?

....

98) Tafadhali onyesha vile unakubaliana na sentensi zifuatazo – hakuna jibu sahihi au makosa. (chora mzunguuko kwa jibu lifaalo)

Katika swali hili, chora mzunguuko tu kwa Haifai kama unafikiria makusudio kwenye swali hayako sawa – kwa mfano katika sentensi ya 1 kama hauamini kwamba watu wanahamia katika eneo hilo, chora mzunguuko kwa HAIFAI (tafadhali onyesha baada ya mwisho wa jarida hili vile unaamini kuwa makusudio kamili)

1 = Napinga vikali   **2 = Napinga**   **3 = niko katikati**   **4 = Nakubali**   **5 = Nakubali kikamilifu**

Nina furaha kwamba watu wanahamia sehemu hii	1	2	3	4	5	HAIFAI
Baadhi kubwa ya watu waliohamia eneo hili hawaheshimu utamaduni wetu	1	2	3	4	5	HAIFAI
Kuna sehu nyingi za kazi za kuajiriwa zaidi ya vile ilivyokuwa nikiwa mdogo	1	2	3	4	5	HAIFAI
Urithi wetu wa kitamaduni umeifanya sehemu hii eneo bora la kutembelea	1	2	3	4	5	HAIFAI
Uharibifu wa misitu unachangiwa na watu waliohamia eneo hili	1	2	3	4	5	HAIFAI

Wamijikenda ndio wenye haki ya umiliki wa aridhi kwani ilikuwa mali ya wazazi wao	1	2	3	4	5	HAIFAI
Mazingira asilia yana haribiwa	1	2	3	4	5	HAIFAI
Ni muhimu kimaendeleo kwa watu wengi kuhamia sehemu hii	1	2	3	4	5	HAIFAI
Utalii si muhimu kwa maendeleo katika kijiji	1	2	3	4	5	HAIFAI
Tunauwezo wa kulinda misitu yetu vyema sasa kushinda wakati ni kiwa mdogo	1	2	3	4	5	HAIFAI

Watu katika kijiji wanapata haki yao ya mgao wa pesa kutoka kwa biashara ya utalii	1	2	3	4	5	HAIFAI
Utalii unaharibu mazingira asilia	1	2	3	4	5	HAIFAI
Imani asilia za watu wa kijiji sio muhimu tena	1	2	3	4	5	HAIFAI
Ni watu asilia/ wenyeji wanashughulia/ tunza mazingira	1	2	3	4	5	HAIFAI

99) Kama una maoni au ujumbe Fulani ungetaka kutupatia, tafadhali jisikie huru kufanya hivyo hapa chini:

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Appendix 2

Google Earth Satellite Image Details

Table A2.1: Satellite Image information for surveyed SS

Sacred Site (SS)	Company satellite Images were produced by	When Images were produced	Resolution of Images
Bedida	Digital Globe	9/3/2012	65 cm
Bomu/Fimboni	Digital Globe	21/3/2012	65 cm
Chasimba	Digital Globe	20/1/2011	65 cm
Chivara	Digital Globe	20/1/2011	65 cm
Chizani	Digital Globe	9/3/2012	65 cm
Chonyi	Digital Globe	21/3/2012	65 cm
Fungo	Cnes/Spot	20/1/2011	15 m
Jibana	Digital Globe	21/3/2012	65 cm
Jorore	Cnes/Spot	20/1/2011	15 m
Kambe	Digital Globe	20/1/2011	65 cm
Kambe-Kauma	Digital Globe	20/1/2011	65 cm
Kauma	Digital Globe	21/3/2012	65 cm
Kizingo	Digital Globe	20/1/2011	65 cm
Mudzimuvia	Digital Globe	21/3/2012	65 cm
Mudzimwiru	Digital Globe	21/3/2012	65 cm
Mwarakaya	Digital Globe	20/1/2011	65 cm
Mzizima	Digital Globe	21/3/2012	65 cm
Ribe	Digital Globe	9/3/2012	65 cm
Tsolokero	Digital Globe	20/1/2011	65 cm

Appendix 3

Analysis Tables

A3.1 Additional analysis tables from Chapter Four

Table A3.1: Chi-square results for analysis of if people belong to a Kaya according to ethnicity and age

Legend: Sig = Significance. [*]Denotes that there is a significant difference between proportions on that row to the $p \leq 0.05$. NS = not significant. Different letters denote proportions (based on observed count compared to expected count) that are significantly different from each other. Where: a = Greatest proportion; b = significantly less than 'a' and significantly greater than 'c' etc.

			Age in Groups					Sig
			17 - 25	26 - 35	36 - 45	46 - 55	56 +	
Giriama	Do they belong to a Kaya	Yes	42_b	$51_{a, b}$	$48_{a, b}$	$36_{a, b}$	48_a	*
		No	11_a	$8_{a, b}$	$5_{a, b}$	$4_{a, b}$	0_b	*
Kauma	Do they belong to a Kaya	Yes	24_b	14_b	22_b	$22_{a, b}$	41_a	*
		No	6_a	5_a	7_a	$3_{a, b}$	0_b	*
Rabai	Do they belong to a Kaya	Yes	$61_{a, b}$	41_b	$42_{a, b}$	33_b	39_a	*
		No	$15_{a, b}$	16_a	$12_{a, b}$	11_a	1_b	*

Table A3.2: Multinomial Regression for 'The Importance of Cultural Identity'

Legend: Dependent variable: Importance of cultural identity; Reference category is: Of No Importance. Independent Variables: Age, Gender - Reference category: Female; Ethnicity - Reference category: Ribe. (b) This parameter is set to zero because it is redundant.

		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	95% Confidence Interval for Exp(B) Upper Bound
Very Important	Intercept	-2.824	.329	73.531	1	.000			
	Age	.048	.005	77.954	1	.000	1.050	1.038	1.061
	Male	.452	.161	7.902	1	.005	1.571	1.147	2.152
	Female	0.000[b]			0				
	Chonyi	1.245	.301	17.070	1	.000	3.472	1.924	6.266
	Giriama	1.431	.286	24.960	1	.000	4.181	2.385	7.330
	Jibana	1.771	.408	18.861	1	.000	5.878	2.643	13.074
	Kambe	1.992	.317	39.380	1	.000	7.332	3.935	13.661
	Kauma	1.830	.331	30.649	1	.000	6.234	3.261	11.915
	Rabai	1.029	.305	11.360	1	.001	2.799	1.538	5.092
	Ribe	0.000[b]			0				
Quite Important	Intercept	-3.312	.445	55.516	1	.000			
	Age	.034	.007	27.546	1	.000	1.035	1.022	1.048
	Male	.367	.196	3.523	1	.061	1.444	.984	2.119
	Female	0.000[b]			0				
	Chonyi	1.240	.427	8.453	1	.004	3.457	1.498	7.977
	Giriama	1.107	.418	6.999	1	.008	3.025	1.332	6.867
	Jibana	1.115	.591	3.556	1	.059	3.050	.957	9.722
	Kambe	1.248	.466	7.166	1	.007	3.483	1.397	8.687
	Kauma	1.338	.472	8.017	1	.005	3.810	1.509	9.619
	Rabai	2.663	.390	46.691	1	.000	14.333	6.678	30.761
	Ribe	0.000[b]			0				
Neutral	Intercept	-2.128	.473	20.256	1	.000			
	Age	.010	.009	1.225	1	.268	1.010	.993	1.027
	Male	-.050	.246	.042	1	.838	.951	.587	1.540
	Female	0.000[b]			0				
	Chonyi	1.199	.426	7.919	1	.005	3.316	1.439	7.642
	Giriama	1.085	.412	6.927	1	.008	2.958	1.319	6.634
	Jibana	.678	.673	1.015	1	.314	1.969	.527	7.358
	Kambe	-1.581	1.072	2.174	1	.140	.206	.025	1.683
	Kauma	-.759	.810	.880	1	.348	.468	.096	2.287
	Rabai	1.122	.424	7.013	1	.008	3.070	1.338	7.042
	Ribe	0.000[b]			0				
Of Little Importance	Intercept	-2.456	.400	37.666	1	.000			
	Age	.030	.007	19.541	1	.000	1.030	1.017	1.044
	Male	-.192	.205	.881	1	.348	.825	.553	1.232
	Female	0.000[b]			0				
	Chonyi	1.578	.358	19.450	1	.000	4.846	2.403	9.772
	Giriama	.630	.376	2.806	1	.094	1.878	.898	3.925
	Jibana	-.460	.820	.316	1	.574	.631	.127	3.146
	Kambe	-.154	.535	.083	1	.773	.857	.300	2.446
	Kauma	.963	.429	5.036	1	.025	2.619	1.130	6.072
	Rabai	1.526	.356	18.348	1	.000	4.600	2.288	9.247
	Ribe	0.000[b]			0				

Table A3.3: Multinomial Regression for 'The Local Belief System is No Longer Important'
Legend: Dependent variable: If respondents agree with the statement "The local belief system is no longer important", Reference category: Strongly Agree. Independent Variables: Importance of cultural identity, Reference category: Not Important; Ethnicity, Reference category: Ribe; Importance of an individual's Spiritual Belief System, Reference category: Not Important

			B	SE	Wald	df	Sig.	Exp(B)	95% C.I. for Exp(B)	
									L.Bound	U.Bound
Strongly disagree		Intercept	-.411	.486	.716	1	.397			
	Cultural Identity	Very important	1.288	.464	7.709	1	.005	3.626	1.460	9.001
		Quite important	.240	.539	.199	1	.656	1.272	.442	3.660
		Neither important / not	.239	.650	.136	1	.713	1.270	.356	4.538
		Of little importance	.299	.536	.311	1	.577	1.348	.472	3.851
		Not important	.000 [b]			0				
	Ethnicity	Chonyi	1.598	.713	5.026	1	.025	4.942	1.223	19.974
		Giriama	.456	.513	.789	1	.375	1.578	.577	4.315
		Jibana	.820	.690	1.412	1	.235	2.271	.587	8.784
		Kambe	2.250	1.129	3.972	1	.046	9.485	1.038	86.683
		Kauma	.421	.588	.514	1	.473	1.524	.481	4.826
		Rabai	1.135	.584	3.781	1	.052	3.112	.991	9.772
		Ribe	.000 [b]			0				
	Spiritual belief system	Very important	.081	.440	.034	1	.855	1.084	.458	2.567
		Quite important	-.220	.471	.218	1	.640	.802	.319	2.021
		Neither important / not	-1.261	.936	1.815	1	.178	.283	.045	1.775
		Of little importance	-.166	.678	.060	1	.807	.847	.224	3.200
		Not important	.000 [b]			0				
Disagree		Intercept	-.695	.490	2.009	1	.156			
	Cultural Identity	Very important	1.029	.451	5.205	1	.023	2.799	1.156	6.775
		Quite important	1.151	.497	5.368	1	.021	3.160	1.194	8.366
		Neither important / not	.501	.612	.668	1	.414	1.650	.497	5.480
		Of little importance	.487	.505	.930	1	.335	1.627	.605	4.375
		Not important	.000 [b]			0				
	Ethnicity	Chonyi	2.035	.697	8.508	1	.004	7.648	1.949	30.011
		Giriama	.061	.516	.014	1	.906	1.063	.386	2.924
		Jibana	-.195	.740	.069	1	.792	.823	.193	3.508
		Kambe	3.411	1.109	9.459	1	.002	30.296	3.446	266.335
		Kauma	1.103	.569	3.756	1	.053	3.014	.988	9.199
		Rabai	1.510	.570	7.019	1	.008	4.526	1.481	13.828
		Ribe	.000 [b]			0				
	Spiritual belief system	Very important	.584	.426	1.879	1	.170	1.793	.778	4.129
		Quite important	.523	.443	1.397	1	.237	1.688	.709	4.019
		Neither important / not	.372	.699	.284	1	.594	1.451	.369	5.714
		Of little importance	.020	.646	.001	1	.975	1.020	.287	3.622
		Not important	.000 [b]			0				
N		Intercept	1.494	.380	15.438	1	.000			

			B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
	Cultural Identity	Very important	-.254	.448	.322	1	.571	.776	.323	1.865
		Quite important	.040	.488	.007	1	.935	1.040	.399	2.710
		Neither important / not	.612	.554	1.220	1	.269	1.844	.623	5.463
		Of little importance	.691	.472	2.140	1	.144	1.996	.791	5.036
		Not important	.000 [b]			0				
	Ethnicity	Chonyi	1.157	.639	3.278	1	.070	3.180	.909	11.122
		Giriama	-1.389	.448	9.586	1	.002	.249	.104	.601
		Jibana	-.020	.630	.001	1	.974	.980	.285	3.369
		Kambe	1.385	1.093	1.604	1	.205	3.993	.469	34.029
		Kauma	-2.361	.657	12.929	1	.000	.094	.026	.342
		Rabai	.500	.496	1.017	1	.313	1.649	.624	4.359
		Ribe	.000 [b]			0				
	Spiritual belief system	Very important	.060	.429	.020	1	.889	1.062	.458	2.464
		Quite important	-.277	.445	.388	1	.534	.758	.317	1.813
		Neither important / not	-.248	.669	.138	1	.710	.780	.210	2.894
		Of little importance	.212	.605	.123	1	.725	1.237	.378	4.045
		Not important	.000 [b]			0				
Agree		Intercept	.994	.406	5.992	1	.014			
	Cultural Identity	Very important	.553	.445	1.541	1	.214	1.738	.726	4.160
		Quite important	.142	.510	.078	1	.780	1.153	.425	3.129
		Neither important / not	-.186	.581	.103	1	.749	.830	.266	2.594
		Of little importance	.192	.490	.153	1	.695	1.212	.463	3.169
		Not important	.000 [b]			0				
	Ethnicity	Chonyi	1.999	.662	9.116	1	.003	7.382	2.017	27.027
		Giriama	-.034	.464	.005	1	.941	.966	.389	2.400
		Jibana	-1.410	.934	2.278	1	.131	.244	.039	1.524
		Kambe	2.847	1.091	6.808	1	.009	17.231	2.031	146.202
		Kauma	-.401	.571	.493	1	.482	.670	.219	2.051
		Rabai	.440	.538	.670	1	.413	1.553	.541	4.457
		Ribe	.000 [b]			0				
	Spiritual belief system	Very important	-1.273	.437	8.497	1	.004	.280	.119	.659
		Quite important	-1.095	.466	5.516	1	.019	.335	.134	.834
		Neither important / not	.129	.651	.039	1	.843	1.138	.318	4.073
		Of little importance	-.658	.649	1.026	1	.311	.518	.145	1.849
		Not important	.000 [b]			0				

A3.2 Additional analysis tables from Chaper 5

Table A3.4: Cross-tabulation of words associated with Kayas with age groups. Legend: Sig = Significance. [*]Denotes that there is a significant difference between proportions on that row to the p = 0.05 level. NS = not significant. Different letters denote proportions (based on observed count compared to expected count) that are significantly from each other. Where: a = Greatest proportion; b = significantly less than 'a' and significantly greater than 'c' etc.

Age	Advice/Help	Agriculture/Farming	Culture	Medicine/healing	Conservation	Animals	Forest/Trees	Praying/worship	Ceremonies/burials/offerings	Laws/Court/Justice	Water	Social (family/teaching etc.)	Sacred Place	Firewood/Charcoal/construction	Elders	Environment/weather	Tourist/money	Food/Fruit/Meat	Hide/Security	Scary Place	Rain/Brings Rain	Pray for rain/good weather	Witches	Daemons/Si/Disease/Evil	Other	Sig
17 - 25	$15_{a,b,c}$	$2_{a,b,c}$	76_c	$6_{a,b,c}$	$10_{a,b,c}$	$60_{a,b}$	88_a	$57_{a,b,c}$	$56_{a,b,c}$	$17_{b,c}$	$2_{a,b,c}$	$18_{b,c}$	$76_{a,b,c}$	$22_{a,b,c}$	$25_{a,b,c}$	$11_{a,b,c}$	$9_{a,b,c}$	$13_{a,b,c}$	$15_{a,b,c}$	$12_{a,b,c}$	$16_{a,b,c}$	$23_{a,b,c}$	$15_{a,b}$	$10_{a,b,c}$	$9_{a,b,c}$	*
26 - 35	$19_{a,b,c,d}$	$4_{a,b,c,d}$	$87_{a,b,c,d}$	$6_{a,b,c,d}$	$3_{c,d}$	$44_{a,b,c,d}$	$56_{a,b,c,d}$	$59_{a,b,c,d}$	$40_{b,d}$	$23_{a,b,c,d}$	$5_{a,b,c,d}$	$30_{a,b,c,d}$	$64_{a,b,c,d}$	$18_{a,b,c,d}$	$20_{a,b,c,d}$	$16_{a,b,c,d}$	$5_{a,b,c,d}$	$10_{a,b,c,d}$	$16_{a,b,c,d}$	$5_{a,b,c,d}$	$16_{a,b,c,d}$	$14_{a,b,c,d}$	16_a	$9_{a,b,c,d}$	$12_{a,b,c,d}$	*
36 - 45	15_a	2_a	113_a	17_a	16_a	43_a	61_a	58_a	55_a	29_a	9_a	25_a	79_a	23_a	21_a	16_a	6_a	23_a	25_a	4_a	26_a	16_a	5_a	8_a	11_a	NS
46 - 55	12_a	2_a	87_a	11_a	10_a	33_a	38_a	51_a	54_a	16_a	6_a	17_a	64_a	28_a	17_a	19_a	2_a	14_a	19_a	9_a	23_a	14_a	1_a	4_a	6_a	NS
56 +	$23_{a,b,c,d,e,f,g}$	$13_{a,b}$	$138_{a,c}$	$19_{a,b,c,d,e,f,g}$	$7_{a,b,c,d,e,f,g}$	$27_{f,g}$	$38_{e,g}$	$72_{a,b,c,d,e,f,g}$	$65_{a,b,c,d,e,f,g}$	$42_{a,b,c,d}$	$8_{a,b,c,d}$	$44_{a,b,c,d}$	$85_{a,b,c,d,e,f,g}$	$17_{a,b,c,d,e}$	$24_{a,b,c,d,e,f,g}$	12_c	$6_{a,b,c,d,e}$	$20_{a,b,c,d,e,f,g}$	$21_{a,b,c,d,e,f,g}$	$3_{c,d,e,f,g}$	$28_{a,b,c,d,e,f,g}$	$16_{a,b,c,d,e,f,g}$	$1_{c,d,e,f,g}$	$6_{a,b,c,d,e,f,g}$	$11_{a,b,c,d,e,f,g}$	*

Table A3.5: Cross-tabulation of words associated with Kayas with ethnic group
For legend see Table A3.4

		Ethnic Group									Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
Words Associated with Kayas	Advice/Help	14_b	60_a	2_b	5_b	2_b	4_b	$2_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	Agriculture/ Farming	0_b	1_b	$4_{a,b}$	$1_{a,b}$	0_b	16_a	$2_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	Culture	$58_{c,d}$	173_a	$45_{a,b,c}$	76_a	$81_{a,b}$	$69_{b,c,d}$	8_d	$4_{a,b,c,d}$	$1_{a,b,c,d}$	*
	Medicine/ healing	$10_{a,b}$	$21_{a,b}$	14_a	2_b	$6_{a,b}$	$9_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	Conservation	0_c	$12_{b,c}$	$1_{b,c}$	21_a	$7_{b,c}$	$2_{b,c}$	$3_{a,b}$	$0_{a,b,c}$	$0_{a,b,c}$	*
	Animals	$20_{b,c,d,e}$	$18_{c,e}$	$2_{d,e}$	$9_{b,c,d,e}$	32_b	97_a	31_a	$3_{a,b}$	$1_{a,b,c,d,e}$	*
	Forest/ Trees	$43_{c,d,e}$	$32_{e,f}$	4_f	$12_{d,e,f}$	$45_{b,c}$	118_a	$30_{a,b}$	$4_{a,b,c,d}$	$3_{a,b,c}$	*
	Praying/ worship	109_a	85_b	$18_{b,c}$	$44_{a,b}$	10_c	22_c	$12_{b,c}$	$1_{a,b,c}$	$1_{a,b,c}$	*
	Ceremonies/ burials/ offerings	87_a	$46_{b,c,d}$	$28_{a,b}$	13_d	61_a	$27_{b,c,d}$	$20_{a,b,c}$	$0_{a,b,c,d}$	$0_{a,b,c,d}$	*
	Laws/Court/ Justice	$5_{c,e}$	84_a	$1_{b,e}$	$13_{b,d}$	$21_{a,b}$	3_e	$2_{b,c,d,e}$	$0_{a,b,c,d,e}$	$1_{a,b,c}$	*
	Water	2_b	6_b	16_a	0_b	2_b	3_b	$3_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	Social (family/ teaching etc.)	$11_{c,d}$	$54_{a,b}$	1_d	$12_{b,c,d}$	42_a	$6_{c,d}$	$6_{a,b,c,d}$	$2_{a,b,c}$	$0_{a,b,c,d}$	*
	Sacred Place	123_a	$110_{b,c,d,e}$	$20_{c,e}$	$24_{d,e}$	$71_{a,b}$	10_f	$17_{a,b,c,d,e}$	$1_{a,b,c,d,e,f}$	$2_{a,b,c,d,e}$	*
	Firewood/ Charcoal/ construction	$15_{c,d,e,f,g}$	$12_{f,g}$	$16_{a,b,c}$	27_a	$2_{e,g}$	$36_{a,b}$	$1_{b,c,d,e,f,g}$	$2_{a,b,c,d,f}$	$0_{a,b,c,d,e,f,g}$	*
	Elders	$9_{c,d}$	$22_{b,c,d}$	0_d	$14_{a,b,c}$	$20_{a,b,c}$	39_a	$3_{a,b,c,d}$	$3_{a,b}$	$0_{a,b,c,d}$	*
	Environment/ weather	2_d	21_c	23_a	$23_{a,b}$	$2_{c,d}$	$7_{c,d}$	$2_{b,c,d}$	$0_{a,b,c,d}$	$0_{a,b,c,d}$	*
	Tourist/money	15_a	1_b	$0_{a,b}$	$1_{a,b}$	$1_{a,b}$	9_a	$1_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	Food	$14_{b,c,d}$	$11_{b,c,d}$	32_a	9_b	0_d	$14_{b,c}$	$1_{b,c,d}$	$2_{a,b,c}$	$0_{a,b,c,d}$	*
	Hide/Security	6_c	$37_{a,b}$	21_a	$5_{b,c}$	$10_{b,c}$	$20_{a,b,c}$	$6_{a,b,c}$	$0_{a,b,c}$	$0_{a,b,c}$	*
	Scary Place	1_e	$12_{b,c,d,e}$	$0_{c,e}$	$1_{b,c,d,e}$	$10_{a,b,c,}$	0_e	9_a	$1_{a,b,d}$	$0_{a,b,c,d,e}$	*
	Rain/Brings Rain	$21_{b,c,d}$	12_d	$21_{a,b}$	30_a	$7_{c,d}$	$14_{c,d}$	$4_{a,b,c,d}$	$0_{a,b,c,d}$	$1_{a,b,c,d}$	*
	Pray for rain/ good weather	56_a	5_c	$1_{b,c}$	$3_{b,c}$	13_b	2_c	$3_{b,c}$	$0_{a,b,c}$	$0_{a,b,c}$	*
	Witches	0_c	26_a	$2_{a,b,c}$	$0_{b,c}$	$3_{a,b,c}$	$4_{a,b,c}$	$5_{a,b}$	1_a	$0_{a,b,c}$	*
	Daemons/ Sin/ Disease/ Evil	6_a	18_a	5_a	3_a	2_a	2_a	4_a	0_a	0_a	NS
	Other	7_a	17_a	0_a	4_a	5_a	19_a	0_a	0_a	0_a	NS

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Table A3.6: Multinomial Regression for 'Words associated with the Kayas - grouped by ecosystem services'

Legend: Dependent variable: Words people associate with the Kayas, Reference category: Other. Independent Variables: Age; Use Kayas, Reference category: Don't use; Ethnicity, Reference category: Ribe. (b) This parameter is set to zero because it is redundant.

		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
Provisioning	Intercept	-.659	.653	1.018	1	.313			
	Age	.007	.009	.648	1	.421	1.007	.990	1.025
	Use Kayas	.847	.319	7.067	1	.008	2.332	1.249	4.354
	Do not use Kayas	.000[b]			0				
	Chonyi	1.357	.623	4.736	1	.030	3.884	1.144	13.180
	Giriama	.825	.627	1.733	1	.188	2.282	.668	7.794
	Jibana	2.416	.715	11.434	1	.001	11.204	2.761	45.456
	Kambe	2.454	.806	9.275	1	.002	11.637	2.398	56.462
	Kauma	-.198	.733	.073	1	.787	.820	.195	3.451
	Rabai	2.204	.644	11.716	1	.001	9.062	2.565	32.014
	Ribe	.000[b]			0				
Regulating/ Supporting	Intercept	-.114	.628	.033	1	.856			
	Age	.005	.009	.322	1	.571	1.005	.988	1.023
	Use Kayas	.413	.326	1.609	1	.205	1.512	.798	2.864
	Do not use Kayas	.000[b]			0				
	Chonyi	.332	.615	.291	1	.590	1.393	.417	4.652
	Giriama	.754	.598	1.590	1	.207	2.125	.658	6.855
	Jibana	1.697	.699	5.886	1	.015	5.455	1.385	21.479
	Kambe	2.872	.777	13.652	1	.000	17.676	3.852	81.105
	Kauma	.213	.679	.098	1	.754	1.237	.327	4.681
	Rabai	.616	.644	.912	1	.339	1.851	.523	6.545
	Ribe	.000[b]			0				
Cultural	Intercept	1.868	.517	13.048	1	.000			
	Age	.007	.008	.819	1	.365	1.007	.991	1.024
	Use Kayas	.491	.294	2.783	1	.095	1.634	.918	2.909
	Do not use Kayas	.000[b]			0				
	Chonyi	1.121	.487	5.292	1	.021	3.069	1.181	7.976
	Giriama	1.294	.485	7.102	1	.008	3.646	1.408	9.439
	Jibana	.482	.612	.619	1	.431	1.619	.488	5.375
	Kambe	1.732	.705	6.025	1	.014	5.650	1.418	22.519
	Kauma	.930	.546	2.903	1	.088	2.535	.870	7.390
	Rabai	.580	.526	1.214	1	.271	1.786	.637	5.011
	Ribe	.000[b]			0				

		B	Std. Error	Wald	df	Sig.	Exp(B)	Lower	Upper
Social	Intercept	-.340	.620	.300	1	.584			
	Age	.007	.009	.624	1	.430	1.007	.990	1.025
	Use Kayas	.930	.325	8.187	1	.004	2.536	1.341	4.796
	Do not use Kayas	.000[b]	.	.	0	.	.	.	.
	Chonyi	.035	.619	.003	1	.955	1.035	.308	3.481
	Giriama	1.669	.576	8.404	1	.004	5.305	1.717	16.394
	Jibana	.705	.712	.980	1	.322	2.024	.501	8.177
	Kambe	1.130	.805	1.971	1	.160	3.096	.639	15.000
	Kauma	.910	.640	2.024	1	.155	2.484	.709	8.702
	Rabai	.667	.631	1.117	1	.290	1.948	.566	6.706
	Ribe	.000[b]			0				
Cultural and Regulating / Supporting	Intercept	-.685	.753	.827	1	.363			
	Age	.006	.010	.385	1	.535	1.006	.986	1.027
	Use Kayas	-.602	.400	2.269	1	.132	.548	.250	1.199
	Do not use Kayas	.000[b]			0				
	Chonyi	2.004	.700	8.204	1	.004	7.416	1.883	29.216
	Giriama	-.155	.800	.038	1	.846	.856	.179	4.104
	Jibana	-.893	1.267	.496	1	.481	.410	.034	4.908
	Kambe	1.736	.917	3.585	1	.058	5.675	.941	34.230
	Kauma	1.176	.789	2.220	1	.136	3.240	.690	15.213
	Rabai	-.856	1.004	.727	1	.394	.425	.059	3.041
	Ribe	.000[b]			0				
Trees/ animals (no use)	Intercept	2.497	.528	22.357	1	.000			
	Age	-.010	.009	1.338	1	.247	.990	.974	1.007
	Use Kayas	.075	.309	.060	1	.807	1.078	.589	1.974
	Do not use Kayas	.000[b]			0				
	Chonyi	-.612	.505	1.469	1	.225	.542	.202	1.459
	Giriama	-.843	.507	2.765	1	.096	.430	.159	1.163
	Jibana	-1.927	.732	6.931	1	.008	.146	.035	.611
	Kambe	-.184	.737	.062	1	.803	.832	.196	3.530
	Kauma	.148	.558	.070	1	.791	1.159	.388	3.463
	Rabai	.922	.529	3.037	1	.081	2.515	.891	7.094
	Ribe	.000[b]			0				

Table A3.7: Cross-tabulation of words associated with Kayas grouped by ecosystem services with ethnic group. For legend see Table A3.4

		Ethnic Group									Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
Words Associated with Kayas by ecosystem services	Provisioning	$46_{c,d}$	$37_{d,e}$	75_a	$39_{b,c}$	10_e	93_b	$7_{c,d,e}$	$4_{a,b,c,d}$	$0_{a,b,c,d,e}$	*
	Regulating/ Supporting	22_b	43_b	46_a	72_a	15_b	22_b	9_b	$0_{a,b}$	$1_{a,b}$	*
	Cultural	$412_{a,b}$	610_a	$120_{c,d}$	$193_{b,c}$	$285_{a,b}$	184_d	$76_{c,d}$	$11_{a,b,c,d}$	$5_{a,b,c,d}$	*
	Social	22_c	130_a	$24_{a,b}$	$15_{b,c}$	$43_{a,b}$	$28_{b,c}$	$10_{a,b,c}$	$1_{a,b,c}$	$0_{a,b,c}$	*
	Cultural and Regulating	57_a	6_c	$1_{b,c}$	$9_{b,c}$	13_b	2_c	$4_{a,b,c}$	$0_{a,b,c}$	$0_{a,b,c}$	*
	Cultural and Provisioning	10_a	8_a	1_a	0_a	2_a	3_a	0_a	0_a	0_a	NS
	Cultural and trees/animals	$2_{a,b,c,d}$	$2_{c,d}$	$0_{b,d}$	$3_{a,b,c,d}$	$6_{a,b,c,d}$	$3_{a,b,c,d}$	$4_{a,b}$	1_a	$0_{a,b,c,d}$	*
	Trees/animals (intrinsic)	$62_{c,d}$	$55_{d,e}$	6_e	$21_{d,e}$	80_b	214_a	62_a	$7_{a,b,c}$	$4_{a,b,c}$	*
	Other	1_a	5_a	4_a	0_a	1_a	3_a	3_a	0_a	0_a	NS

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Table A3.8: Cross-tabulation of reasons Kayas are important with ethnic group
For legend see Table A3.4

Reasons Kayas Important	Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	Sig
Advice/solve family cases	4_b	$8_{a,b}$	$0_{a,b}$	$1_{a,b}$	12_a	0_a	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
Agriculture	$13_{a,b,c,d,e,f,g,h}$	3_i	$0_{d,f,g,h,i}$	$1_{b,e,g,h,i}$	$3_{a,b,c,d,e,f,g,h,i}$	$5_{a,b,c,d,e,f,g,h,i}$	$0_{c,e,f,h,i}$	1_a	$0_{a,b,c,d,e,f,g,h,i}$	*
Medicine	27_b	75_a	$17_{a,b}$	$13_{a,b}$	11_b	$30_{a,b}$	$10_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
Conservation (Animal/plants/ environment)	$81_{a,b}$	$49_{c,d}$	0_e	$26_{a,b,c}$	$9_{d,e}$	$16_{c,d}$	$8_{b,c,d}$	$1_{a,b,c,d}$	3_a	*
Animals (home for animals)	$20_{a,b,c,d}$	$33_{a,b,c,d}$	$4_{c,d}$	$4_{b,d}$	$17_{a,b,c,d}$	$13_{a,b,c,d}$	12_a	$0_{a,b,c,d}$	$0_{a,b,c,d}$	*
Pray	36_a	64_a	20_a	23_a	19_a	22_a	10_a	0_a	0_a	NS
Rituals/Offerings/ Ceremonies	$29_{b,c,d,e,f}$	$19_{d,f}$	23_b	$7_{b,c,d,e,f}$	64_a	$5_{e,f}$	$9_{b,c,d}$	$1_{a,b,c,d,e,f}$	$0_{a,b,c,d,e,f}$	*
Water	$11_{b,c}$	$22_{b,c}$	18_a	$10_{a,b}$	24_a	1_c	$1_{a,b,c}$	$0_{a,b,c}$	$0_{a,b,c}$	*
Sacred Place	24_a	34_a	$8_{a,b}$	$4_{a,b}$	$5_{a,b}$	2_b	$1_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
Charcoal/Firewood	48_b	30_c	$15_{b,c}$	$18_{b,c}$	1_d	$48_{a,b}$	27_a	$0_{a,b,c,d}$	$1_{a,b,d}$	*
Law	4_b	33_a	$1_{a,b}$	$1_{a,b}$	13_a	$4_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
Culture/identity	10_b	80_a	28_a	19_a	40_a	22_a	$8_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
Conservation of Culture	6_b	34_a	0_b	$10_{a,b}$	$10_{a,b}$	2_b	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
Timber/construction	$18_{a,b,c}$	53_a	$6_{a,b,c}$	$3_{a,c}$	1_c	$22_{a,b}$	$8_{a,b}$	$1_{a,b}$	$0_{a,b,c}$	*
Heal sick/hospital	2_a	2_a	4_a	4_a	1_a	3_a	1_a	0_a	0_a	NS
Money/Tourists	$8_{a,b}$	$15_{a,b}$	0_b	2_b	2_b	$13_{a,b}$	$2_{a,b}$	$0_{a,b}$	1_a	*
Food	39_b	57_b	38_a	13_b	2_c	$15_{b,c}$	$4_{b,c}$	$1_{a,b}$	$0_{a,b,c}$	*
Hideout/security	20_a	28_a	12_a	9_a	12_a	15_a	8_a	0_a	0_a	NS
Prevents soil erosion	2_b	23_a	$0_{a,b}$	$0_{a,b}$	$9_{a,b}$	$10_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
Weather - Rain and clean air	156_a	90_b	36_b	71_a	49_b	114_a	12_b	$2_{a,b}$	$2_{a,b}$	*
Witch/ Witchcraft	0_b	3_b	8_a	$0_{a,b}$	$1_{a,b}$	0_b	$1_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
Pray for rain	16_a	28_a	7_a	4_a	19_a	7_a	4_a	0_a	0_a	NS
Other and combined answers	12_b	$27_{a,b}$	$8_{a,b}$	$10_{a,b}$	$8_{a,b}$	24_a	$4_{a,b}$	$1_{a,b}$	$0_{a,b}$	*

Table A3.9: Multinomial Regression for 'Reason Kayas are important - grouped by ecosystem services'

Legend: Dependent variable: Why people think the Kayas are Important, Reference category: Trees and animals. Independent Variables: Age; Use Kayas, Reference category: Don't use; Ethnicity, Reference category: Ribe; Division, Reference Category: Kikambala. (b) This parameter is set to zero because it is redundant.

Reasons Kayas are Important MEA with new Categories[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
Provisioning	Intercept	-1.737	1.283	1.835	1	.176			
	Age	.010	.007	1.873	1	.171	1.010	.996	1.023
	Use Kayas	.811	.253	10.318	1	.001	2.250	1.372	3.691
	Do not use Kayas	.000[b]	.	.	0	.	.	.	.
	Chonyi	.996	1.009	.974	1	.324	2.708	.374	19.586
	Giriama	.518	.384	1.818	1	.178	1.679	.791	3.564
	Jibana	1.732	.616	7.898	1	.005	5.652	1.689	18.917
	Kambe	1.662	.690	5.804	1	.016	5.272	1.363	20.390
	Kauma	2.217	1.013	4.787	1	.029	9.182	1.260	66.916
	Rabai	1.226	.479	6.542	1	.011	3.407	1.332	8.715
	Ribe	.000[b]	.	.	0	.	.	.	.
	Kaloleni	2.295	1.213	3.582	1	.058	9.927	.922	106.919
	Chonyi	2.483	1.083	5.252	1	.022	11.973	1.433	100.066
	Ganze	-.803	1.400	.329	1	.566	.448	.029	6.967
	Kikambala	.000[b]	.	.	0	.	.	.	.
Regulating / Supporting	Intercept	-.136	1.128	.015	1	.904			
	Age	.000	.007	.000	1	.997	1.000	.986	1.014
	Use Kayas	.249	.252	.980	1	.322	1.283	.783	2.101
	Do not use Kayas	.000[b]	.	.	0	.	.	.	.
	Chonyi	1.431	.988	2.097	1	.148	4.181	.603	28.997
	Giriama	1.155	.423	7.467	1	.006	3.174	1.386	7.267
	Jibana	1.604	.655	5.996	1	.014	4.974	1.377	17.963
	Kambe	3.125	.705	19.640	1	.000	22.751	5.713	90.602
	Kauma	2.199	.890	6.105	1	.013	9.014	1.575	51.574
	Rabai	2.236	.508	19.404	1	.000	9.357	3.460	25.307
	Ribe	.000[b]	.	.	0	.	.	.	.
	Kaloleni	.500	1.035	.234	1	.629	1.650	.217	12.551
	Chonyi	1.463	.870	2.825	1	.093	4.317	.784	23.767
	Ganze	-.273	1.186	.053	1	.818	.761	.074	7.786
	Kikambala	.000[b]	.	.	0	.	.	.	.
Cultural	Intercept	.280	1.088	.066	1	.797			
	Age	.011	.007	2.677	1	.102	1.011	.998	1.025
	Use Kayas	1.164	.255	20.897	1	.000	3.202	1.944	5.273
	Do not use Kayas	.000[b]	.	.	0	.	.	.	.
	Chonyi	1.116	.986	1.282	1	.257	3.054	.442	21.087
	Giriama	.982	.401	5.999	1	.014	2.668	1.217	5.853
	Jibana	1.837	.629	8.533	1	.003	6.279	1.830	21.539
	Kambe	2.155	.698	9.547	1	.002	8.630	2.199	33.867
	Kauma	1.859	.876	4.502	1	.034	6.419	1.152	35.760
	Rabai	1.095	.499	4.811	1	.028	2.989	1.124	7.951
	Ribe	.000[b]	.	.	0	.	.	.	.

		B	Std. Error	Wald	df	Sig.	Exp(B)	Lower	Upper
	Kaloleni	-.472	.999	.223	1	.637	.624	.088	4.417
	Chonyi	-.261	.840	.097	1	.756	.770	.148	3.997
	Ganze	-1.219	1.153	1.119	1	.290	.295	.031	2.828
	Kikambala	.000[b]	.	.	0	.	.	.	.
Social	Intercept	-1.491	1.358	1.205	1	.272			
	Age	.007	.008	.843	1	.358	1.007	.992	1.022
	Use Kayas	.995	.296	11.297	1	.001	2.706	1.514	4.835
	Do not use Kayas	.000[b]	.	.	0	.	.	.	.
	Chonyi	.857	1.195	.514	1	.474	2.356	.226	24.531
	Giriama	.952	.500	3.625	1	.057	2.590	.972	6.899
	Jibana	1.078	.749	2.071	1	.150	2.939	.677	12.763
	Kambe	1.619	.796	4.135	1	.042	5.050	1.060	24.057
	Kauma	1.678	.992	2.862	1	.091	5.355	.766	37.427
	Rabai	.808	.613	1.738	1	.187	2.244	.675	7.466
	Ribe	.000[b]	.	.	0	.	.	.	.
	Kaloleni	.389	1.250	.097	1	.756	1.475	.127	17.091
	Chonyi	.478	1.123	.182	1	.670	1.614	.179	14.565
	Ganze	.204	1.398	.021	1	.884	1.227	.079	18.989
	Kikambala	.000[b]	.	.	0	.	.	.	.
Cultural and Regulating	Intercept	-2.048	1.417	2.089	1	.148			
	Age	.017	.009	3.795	1	.051	1.017	1.000	1.034
	Use Kayas	.929	.345	7.278	1	.007	2.533	1.289	4.976
	Do not use Kayas	.000[b]	.	.	0	.	.	.	.
	Chonyi	1.528	1.333	1.314	1	.252	4.608	.338	62.815
	Giriama	1.161	.637	3.316	1	.069	3.192	.915	11.132
	Jibana	1.742	.855	4.156	1	.041	5.710	1.070	30.490
	Kambe	1.375	.976	1.984	1	.159	3.955	.584	26.800
	Kauma	2.050	1.240	2.732	1	.098	7.769	.683	88.360
	Rabai	.896	.774	1.342	1	.247	2.451	.538	11.165
	Ribe	.000[b]	.	.	0	.	.	.	.
	Kaloleni	-.337	1.244	.073	1	.787	.714	.062	8.176
	Chonyi	-.466	1.060	.193	1	.660	.628	.079	5.009
	Ganze	-1.048	1.458	.517	1	.472	.351	.020	6.109
	Kikambala	.000[b]	.	.	0	.	.	.	.
Cultural and Provisioning	Intercept	-2.727	2.023	1.817	1	.178			
	Age	.025	.012	4.601	1	.032	1.026	1.002	1.050
	Use Kayas	.158	.518	.093	1	.761	1.171	.424	3.233
	Do not use Kayas	.000[b]	.	.	0	.	.	.	.
	Chonyi	.996	1.882	.280	1	.597	2.709	.068	108.368
	Giriama	-1.258	.985	1.632	1	.201	.284	.041	1.958
	Jibana	1.848	.935	3.904	1	.048	6.348	1.015	39.704
	Kambe	1.643	1.026	2.567	1	.109	5.171	.693	38.601
	Kauma	-1.068	1.416	.568	1	.451	.344	.021	5.520
	Rabai	.026	1.023	.001	1	.979	1.027	.138	7.628
	Ribe	.000[b]	.	.	0	.	.	.	.
	Kaloleni	.024	1.834	.000	1	.990	1.024	.028	37.311
	Chonyi	-.842	1.452	.336	1	.562	.431	.025	7.419
	Ganze	.672	1.973	.116	1	.733	1.958	.041	93.610
	Kikambala	.000[b]	.	.	0	.	.	.	.

Table A3.10: Cross-tabulation of reasons Kayas are important by ecosystem services with age. For legend see Table A3.4

		Age in Groups					Sig
		17 - 25	26 - 35	36 - 45	46 - 55	56 +	
Reasons Kayas are Important grouped by Ecosystem Services	Provisioning	105_b	$121_{a, b}$	195_a	$125_{a, b}$	$183_{a, b}$	*
	Regulating/Supporting	200_a	146_b	$156_{b, c}$	143_b	155_c	*
	Cultural	106_b	$126_{a, b}$	$160_{a, b}$	$131_{a, b}$	219_a	*
	Social	35_a	35_a	40_a	33_a	53_a	NS
	Cultural and Regulating	$15_{a, b}$	$19_{a, b}$	$17_{a, b}$	8_b	34_a	*
	Cultural and Provisioning	2_a	5_a	6_a	4_a	8_a	NS
	Trees and Animals	16_a	26_a	19_a	11_a	18_a	NS
	Other	0_a	0_a	0_a	0_a	1_a	NS

Table A3.11: Cross-tabulation of reasons Kayas are important by ecosystem services with ethnicity. For legend see Table A3.4

		Ethnic Group Northern Tribes							Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	
Reasons Kayas are important grouped by ecosystem services	Provisioning	$157_{b, c}$	$236_{a, b, c}$	95_a	56_c	29_d	$131_{a, b}$	$50_{a, b}$	*
	Regulating/Supporting	243_a	$176_{b, d}$	37_d	102_a	$88_{b, c}$	$145_{a, b}$	$21_{c, d}$	*
	Cultural	118_c	$254_{a, b}$	$88_{a, b}$	$70_{a, b, c}$	129_a	77_c	$31_{b, c}$	*
	Social	28_b	72_b	13_b	13_b	54_a	19_b	$9_{a, b}$	*
	Cultural and Regulating	16_a	35_a	8_a	4_a	19_a	7_a	4_a	NS
	Cultural and Provisioning	$4_{a, b}$	5_b	8_a	$5_{a, b}$	$2_{a, b}$	$3_{a, b}$	$3_{a, b}$	*
	Trees and Animals	$20_{a, b}$	$32_{a, b}$	4_b	3_b	$11_{a, b}$	10_b	12_a	*
	Other	0_a	0_a	0_a	0_a	0_a	1_a	0_a	NS

Table A3.12: Multinomial Regression for statement 'The Kayas are not sacred to me'

Legend: Dependent variable: If respondents agree with the statement "The Kayas are not sacred to me". Reference category is: 'Strongly Agree'. Importance of spiritual belief system input as a continuous variable (1 = Very important, 5 = not important at all). Reference categories for categorical independent variables: If respondents believe in the traditional belief system: 'No'; Use of Kayas: 'No'; if respondents agree with the statement 'the Kaya forests are important': 'Strongly disagree'; and if respondents agree with the statement 'the local belief system is no longer important': 'Strongly agree'. b. This parameter is set to zero because it is redundant.

Kayas not sacred to me[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	95% C.I. for Exp(B)	
								L.Bound	U.Bound
Strongly Disagree	Intercept	-3.912	.827	22.397	1	.000			
	Importance of Spiritual Belief System	.356	.113	9.864	1	.002	1.428	1.143	1.783
	Believe in Traditional Belief System- Yes	.689	.401	2.948	1	.086	1.992	.907	4.376
	Believe in Traditional Belief System- No	.000[b]	.	.	0	.	.	.	.
	Use Kayas – Yes	.094	.310	.093	1	.761	1.099	.599	2.016
	Use Kayas – No	.000[b]	.	.	0	.	.	.	.
	Kaya Forests are Important — Strongly Agree	1.466	.636	5.314	1	.021	4.334	1.246	15.078
	Agree	.569	.660	.743	1	.389	1.767	.484	6.448
	Neutral	-.437	.778	.316	1	.574	.646	.141	2.966
	Disagree	.101	.788	.016	1	.898	1.106	.236	5.188
	Strongly Disagree	.000[b]	.	.	0	.	.	.	.
	Local Belief System is no longer important — Strongly Disagree	2.707	.542	24.972	1	.000	14.983	5.182	43.319
	Disagree	2.290	.558	16.825	1	.000	9.878	3.307	29.508
	Neutral	1.525	.609	6.283	1	.012	4.597	1.395	15.155
	Agree	1.817	.574	10.010	1	.002	6.155	1.997	18.974
	Strongly Agree	.000[b]	.	.	0	.	.	.	.
Disagree	Intercept	-3.407	.765	19.847	1	.000			
	Importance of Spiritual Belief System	.203	.098	4.321	1	.038	1.225	1.012	1.484
	Believe in Traditional Belief System- Yes	1.147	.357	10.312	1	.001	3.148	1.563	6.340
	Believe in Traditional Belief System- No	.000[b]	.	.	0	.	.	.	.
	Use Kayas – Yes	-.779	.265	8.643	1	.003	.459	.273	.771
	Use Kayas – No	.000[b]	.	.	0	.	.	.	.
	Kaya Forests are Important — Strongly Agree	1.661	.620	7.186	1	.007	5.264	1.563	17.729
	Agree	2.610	.620	17.709	1	.000	13.594	4.032	45.834
	Neutral	.958	.654	2.149	1	.143	2.607	.724	9.389
	Disagree	.668	.687	.944	1	.331	1.950	.507	7.502
	Strongly Disagree	.000[b]	.	.	0	.	.	.	.
	Local Belief System is no longer important — Strongly Disagree	1.402	.529	7.033	1	.008	4.062	1.442	11.447
	Disagree	2.708	.516	27.505	1	.000	14.993	5.451	41.243
	Neutral	3.008	.521	33.396	1	.000	20.253	7.301	56.180
	Agree	1.844	.515	12.817	1	.000	6.324	2.304	17.357

			B	Std. Error	Wald	df	Sig.	Exp(B)	Lower	Upper
Neutral		Strongly Agree	.000[b]	.	.	0	.	.	.	.
		Intercept	-3.115	1.158	7.233	1	.007			
		Importance of Spiritual Belief System	.063	.108	.342	1	.559	1.065	.862	1.317
		Believe in Traditional Belief System- Yes	.588	.398	2.187	1	.139	1.801	.826	3.927
		Believe in Traditional Belief System- No	.000[b]	.	.	0	.	.	.	.
		Use Kayas – Yes	-1.270	.297	18.312	1	.000	.281	.157	.502
		Use Kayas – No	.000[b]	.	.	0	.	.	.	.
	Kaya Forests are Important	Strongly Agree	1.947	1.103	3.117	1	.078	7.011	.807	60.916
		Agree	3.496	1.091	10.278	1	.001	32.992	3.892	279.695
		Neutral	3.518	1.091	10.409	1	.001	33.734	3.979	286.002
		Disagree	1.255	1.164	1.162	1	.281	3.507	.358	34.346
		Strongly Disagree	.000[b]	.	.	0	.	.	.	.
	Local Belief System is no longer important	Strongly Disagree	.532	.526	1.022	1	.312	1.702	.607	4.768
		Disagree	1.311	.505	6.738	1	.009	3.709	1.379	9.979
		Neutral	1.559	.498	9.799	1	.002	4.753	1.791	12.615
		Agree	.343	.505	.462	1	.497	1.409	.524	3.791
		Strongly Agree	.000[b]	.	.	0	.	.	.	.
Agree		Intercept	-1.416	.759	3.481	1	.062			
		Importance of Spiritual Belief System	-.093	.101	.849	1	.357	.911	.748	1.110
		Believe in Traditional Belief System- Yes	.600	.372	2.607	1	.106	1.823	.879	3.777
		Believe in Traditional Belief System- No	.000[b]	.	.	0	.	.	.	.
		Use Kayas – Yes	-.406	.263	2.384	1	.123	.667	.398	1.116
		Use Kayas – No	.000[b]	.	.	0	.	.	.	.
	Kaya Forests are Important	Strongly Agree	1.233	.716	2.968	1	.085	3.433	.844	13.966
		Agree	2.853	.705	16.360	1	.000	17.341	4.352	69.099
		Neutral	2.226	.712	9.785	1	.002	9.261	2.296	37.351
		Disagree	2.163	.723	8.952	1	.003	8.693	2.108	35.844
		Strongly Disagree	.000[b]	.	.	0	.	.	.	.
	Local Belief System is no longer important	Strongly Disagree	-.407	.456	.795	1	.372	.666	.272	1.628
		Disagree	.280	.435	.415	1	.519	1.324	.564	3.106
		Neutral	1.191	.417	8.158	1	.004	3.291	1.453	7.453
		Agree	.212	.405	.273	1	.601	1.236	.558	2.735
		Strongly Agree	0[b]	.	.	0	.	.	.	.

Table A3.13: Cross-tabulation of awareness of traditional laws with age
For legend see Table A3.4

		Age					Sig
		17 - 25	26 - 35	36 - 45	46 - 55	56 +	
Aware of traditional laws	No	161_a	104_b	$93_{b, c}$	$51_{c, d}$	47_d	*
	Yes	131_d	154_c	$182_{b, c}$	$143_{a, b}$	205_a	*

Table A3.14: Cross-tabulation of 'following traditional laws' with ethnic group layered by awareness of laws
For legend see Table A3.4

			Ethnic Group									Sig
			Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
Not aware	Follow laws?	Yes	$3_{a, b}$	$4_{a, b}$	$1_{a, b}$	8_a	$3_{a, b}$	1_b	1_b	$1_{a, b}$	$0_{a, b}$	*
		No	$38_{a, b, c}$	$41_{c, d}$	$13_{a, b, c}$	$27_{a, b, c, d}$	12_d	$78_{a, b, c}$	59_a	$3_{b, c, d}$	$1_{a, b, c, d}$	*
		Sometimes	$5_{b, c, d, e}$	$11_{a, c, d}$	$0_{b, c, d, e}$	$0_{d, e}$	15_a	$15_{b, c, d, e}$	1_e	$1_{a, b, c, d, e}$	$1_{a, b, c}$	*
Aware	Follow laws?	Yes	$94_{b, c}$	128_a	46_a	74_a	$75_{a, b}$	$74_{c, d}$	9_d	$6_{a, b, c, d}$	$1_{a, b, c, d}$	*
		No	$31_{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p}$	$16_{e, f, g, h, m, n, o, p}$	$1_{i, j, k, l, m, n, o, p}$	$10_{c, d, g, h, k, l, o, p}$	$14_{b, d, f, h, j, l, n, p}$	$35_{a, b, c, d, e, f, g, h}$	17_a	$1_{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p}$	$0_{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p}$	*
		Sometimes	$45_{a, b, c, d}$	$23_{b, c}$	$10_{a, b, c, d}$	$11_{c, d}$	$17_{a, b, c, d}$	51_a	17_a	$1_{a, b, c, d}$	$1_{a, b, c, d}$	*

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A3.3 Additional analysis tables from Chapter Six

Table A3.15: Cross tabulation of use of Kayas with age
For legend see A3.1

		Age in Groups					Sig
		17 - 25	26 - 35	36 - 45	46 - 55	56 +	
Do use kayas?	Yes	89_c	95_c	153_b	110_b	177_a	*
	No	212_a	173_a	133_b	100_b	90_c	*

Table A3.16: Cross-tabulation of use of Kayas with importance of cultural identity
For legend see A3.1

		Importance Cult. Identity					
		Very Important	Quite Important	Neutral	Of Little Importance	Of No Importance	Sig
Do use kayas?	Yes	385_a	94_b	$29_{b, c}$	65_b	63_c	*
	No	172_c	111_b	$70_{a, b}$	107_b	231_a	*

Table A3.17: Cross-tabulation of which Kayas respondents use with location

For legend see A3.1

		Location														Sig
		Bedida	Chasimba	Chivara	Jaribuni	Jibana	Junju	Kambe	Kauma	Kaya Fungo	Mwanamwinga	Mwarakaya (Chonyi)	Rabai	Ribe	Tsangatsini	
Which Kaya Respondents Use	Kaya Chivara	$0_{a, b, c, d}$	$0_{a, b, c, d}$	$4_{a, b}$	$19_{b, c}$	0_d	$0_{a, b, c, d}$	0_d	$0_{a, b, c, d}$	0_d	$0_{a, b, c, d}$	0_d	0_d	$0_{c, d}$	$0_{a, b, c, d}$	*
	Kaya Chonyi	0_b	3_a	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	54_a	0_b	0_b	0_b	*
	Kaya Bomu/ Fimboni	18_a	$0_{b, c,}$	$0_{b, c}$	0_c	0_c	$0_{b, c}$	$0_{b, c}$	$0_{b, c}$	0_c	$0_{b, c}$	0_c	25_b	$0_{b, c}$	$1_{b, c}$	*
	Kaya Fungo	0_c	$0_{b, c}$	0_c	0_c	3_c	1_c	1_c	0_c	85_a	2_c	0_c	1_c	0_c	$12_{a, b}$	*
	Kaya Jibana	0_b	0_b	0_b	0_b	47_a	1_b	0_b	0_b	0_b	0_b	0_b	1_b	0_b	0_b	*
	Kaya Jorore	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	30_a	0_b	0_b	0_b	0_b	*
	Kaya Kambe	0_b	0_b	0_b	0_b	2_b	1_b	72_a	1_b	0_b	0_b	0_b	0_b	0_b	0_b	*
	Kaya Kauma	0_c	$0_{b, c}$	$9_{a, b}$	$56_{a, b}$	0_c	0_c	0_c	33_a	0_c	0_c	0_c	0_c	0_c	0_c	*
	Kaya Mudzimuvia	$0_{a, b}$	$0_{a, b}$	$0_{a, b}$	0_b	0_b	$0_{a, b}$	0_b	$0_{a, b}$	0_b	$0_{a, b}$	0_b	24_a	$0_{a, b}$	$0_{a, b}$	*
	Kaya Mudzimwiru	0_b	$0_{a, b}$	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	66_a	0_b	0_b	*
	Kaya Ribe	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	0_b	36_a	0_b	*
	Kaya Tsolokero	0_b	$0_{a, b}$	$0_{a, b}$	0_b	1_b	8_a	0_b	0_b	0_b	0_b	0_b	0_b	0_b	$0_{a, b}$	*
	Other	0_a	0_a	0_a	3_a	1_a	2_a	5_a	1_a	13_a	2_a	2_a	2_a	0_a	0_a	NS

Table A3.18: Cross-tabulation of how often respondents visit Kayas with location
For legend see A3.1

How often visit Kaya?		Location														Sig
		Bedida	Chasimba	Chivara	Jaribuni	Jibana	Junju	Kambe	Kauma	Kaya Fungo	Mwanamwinga	Mwarakaya (Chonyi)	Rabai	Ribe	Tsangatsini	
How often visit Kaya?	Every Day	$0_{a,b,c,d}$	$0_{a,b,c,d}$	$0_{a,b,c,d}$	$0_{a,b,c,d}$	$7_{b,c}$	$0_{a,b,c,d}$	$1_{a,b,c,d}$	$0_{a,b,c,d}$	$11_{a,b}$	$0_{a,b,c,d}$	0_d	1_d	$1_{a,b,c,d}$	$0_{a,b,c,d}$	*
	Every Week	0_a	0_a	1_a	2_a	1_a	2_a	11_a	1_a	4_a	2_a	4_a	9_a	0_a	0_a	NS
	Every Month	0_a	0_a	0_a	0_a	1_a	2_a	2_a	0_a	2_a	4_a	4_a	5_a	0_a	0_a	NS
	Few Times a Year	$8_{a,b,c,d,e}$	12_a	0_c	18_c	$20_{a,b,c,d,e}$	$2_{b,c}$	$40_{a,b,c,d}$	3_c	22_d	$37_{a,b}$	36_c	$66_{a,b,c}$	$21_{a,b,c,d,e}$	0_e	*
	Ceremonies and Rituals	$8_{a,b,c,d,e}$	$0_{b,c,d,e}$	4_a	$26_{a,b,c}$	$6_{a,d,e}$	$3_{a,b,c,d,e}$	$15_{a,d}$	$7_{a,b,c,d}$	$32_{a,b,c,d}$	4_e	37_c	$30_{a,b,c,d,e}$	$12_{a,b,c,d,e}$	$3_{a,b,c,d,e}$	*
	Every Week + Few Times Year	0_a	0_a	0_a	2_a	0_a	0_a	1_a	0_a	0_a	0_a	0_a	0_a	0_a	0_a	NS
	Few Times Year + Ceremonies	$1_{c,d}$	$0_{c,d}$	$0_{a,b,c,d}$	$0_{c,d}$	$8_{b,c}$	$0_{a,b,c,d}$	0_d	$0_{c,d}$	$8_{c,d}$	$0_{c,d}$	1_d	2_d	$0_{c,d}$	$7_{a,b}$	*
	Few Times Year + Never	0_a	0_a	0_a	0_a	0_a	0_a	0_a	1_a	0_a	0_a	0_a	0_a	0_a	0_a	NS

Table A3.19: Cross-tabulation of how often respondents use other sacred sites with location
For legend see A3.1

| | | | | | | | | Location | | | | | | | | |
		Bedida	Chasimba	Chivara	Jaribuni	Jibana	Junju	Kambe	Kauma	Kaya Fungo	Mwanamwinga	Mwarakaya (Chonyi)	Rabai	Ribe	Tsangatsini	Sig
How often use SS	Every Day	$0_{a,b,c,d,e}$	$0_{d,e}$	$0_{a,b,c,d,e}$	$1_{c,d}$	24_a	$0_{a,c,d,e}$	$0_{b,c,d,e}$	$0_{b,c,d,e}$	$6_{b,c,d,e}$	$1_{a,b,c,d,e}$	$3_{b,c,d,e}$	$0_{b,c,d,e}$	$1_{a,b,c,d,e}$	$0_{b,c,d,e}$	*
	Every Week	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	$1_{a,b}$	$2_{a,b}$	3_a	$3_{a,b}$	$3_{a,b}$	$3_{a,b}$	$1_{a,b}$	0_b	$1_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	Every Month	0_a	0_a	0_a	2_a	0_a	0_a	1_a	0_a	0_a	1_a	1_a	1_a	0_a	0_a	NS
	Few Times a Year	$0_{b,c}$	22_a	$1_{a,b,c}$	$7_{a,b,c}$	7_c	$3_{a,b,c}$	$20_{a,b}$	$2_{a,b}$	$20_{b,c}$	$6_{a,b,c}$	$13_{b,c}$	$5_{a,b,c}$	$1_{b,c}$	$7_{a,b}$	*
	Ceremonies and Rituals	4_a	$4_{b,c,d}$	$4_{a,b}$	$5_{a,b,c,d}$	2_d	$2_{a,b,c,d}$	$6_{a,b,c,d}$	$5_{a,b,c,d}$	$26_{a,b,c}$	$1_{a,b,c,d}$	$17_{a,b,c}$	$8_{a,b,c}$	$5_{a,b,c}$	$1_{a,b,c,d}$	*

Table A3.20: Cross-tabulation of what time of day respondents use other sacred sites with ethnic group. For legend see A3.1

		Ethnic Group									Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	Other	
When use in day?	Morning	$36_{a,b,c}$	28_d	$14_{c,d}$	23_a	$11_{b,c,d}$	$12_{a,b,c}$	$3_{a,b,c,d}$	$0_{b,c,d}$	$1_{a,b,c,d}$	*
	Daytime/ Early Afternoon	11_a	20_a	1_a	2_a	9_a	0_a	0_a	1_a	0_a	NS
	Late Afternoon / Early Evening	$7_{a,b,c,d}$	$9_{a,b,c,d}$	$0_{c,d}$	$0_{b,c}$	$4_{a,b,c,d}$	$4_{a,b,c,d}$	$0_{a,b,c,d}$	1_a	$0_{a,b,c,d}$	*
	Night time	0_a	6_a	3_a	0_a	2_a	0_a	0_a	0_a	0_a	NS
	Morning and Daytime	3_a	2_a	3_a	0_a	0_a	0_a	0_a	0_a	0_a	NS
	Morning and Late Afternoon/Early evening	0_b	21_a	$1_{a,b}$	$0_{a,b}$	$1_{a,b}$	$0_{a,b}$	$1_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	Multiple times of day (other)	1_e	$7_{a,b,c,d,e}$	$9_{a,b,c,d}$	$0_{b,d,e}$	$0_{c,d,e}$	$0_{a,b,c,d,e}$	3_a	$0_{a,b,c,d,e}$	$0_{a,b,c,d,e}$	*

Table A3.21: Cross-tabulation of what time of year respondents use other sacred sites with ethnic group. For legend see A3.1

		Ethnic Group								Sig
		Chonyi	Giriama	Jibana	Kambe	Kauma	Rabai	Ribe	Other Mijikenda	
When use in year?	Dec - April	5_b	7_b	$1_{a,b}$	4_a	14_a	$2_{a,b}$	$2_{a,b}$	$1_{a,b}$	*
	Apr - Aug	15_a	16_a	0_a	0_a	1_a	1_a	1_a	0_a	NS
	Aug - Sept	9_a	12_a	0_a	0_a	0_a	0_a	0_a	0_a	NS
	Sept - Dec	2_a	3_a	0_a	0_a	0_a	1_a	0_a	0_a	NS
	Dec - April and Aug - Sept	0_b	18_a	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
	Sept - April	$0_{a,b}$	0_b	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	1_a	$0_{a,b}$	*
	All year	0_a	11_a	0_a	0_a	0_a	0_a	0_a	0_a	NS

Table A3.22: Cross-tabulation of what time of day respondents use other sacred sites with location

For legend see A3.1

		Location														Sig
		Bedida	Chasimba	Chivara	Jaribuni	Jibana	Junju	Kambe	Kauma	Kaya Fungo	Mwanamwinga	Mwarakaya (Chonyi)	Rabai	Ribe	Tsangatsini	
When use in day	Morning	$2_{b,c,d}$	$25_{a,b}$	$1_{c,d}$	$6_{c,d}$	$14_{c,d}$	$3_{c,d}$	25_a	$4_{c,d}$	17_d	$5_{b,c,d}$	$13_{c,d}$	$10_{a,b,c}$	$3_{c,d}$	$1_{c,d}$	*
	Daytime/ Early Afternoon	$0_{a,b,c,d,e,f,g,h,i}$	$1_{a,b,c,d,e,f,g,h,i}$	$2_{c,e,f,g}$	$7_{b,d,e,f}$	0_g	$4_{a,c,d,e}$	$0_{g,h,i}$	$3_{a,b,c,d,e,f,g,h,i}$	$16_{a,b,c,d,e,f,g,h,i}$	$3_{a,b,c,d,e,f,g,h,i}$	$8_{a,b,c,d,e,f,g,h,i}$	$0_{a,b,c,d,e,f,g,h,i}$	$0_{a,b,c,d,e,f,g,h,i}$	$0_{a,b,c,d,e,f,g,h,i}$	*
	Late Afternoon / Early Evening	2_a	$0_{b,c}$	$2_{a,b}$	$0_{a,b,c}$	0_c	$1_{a,b,c}$	$0_{b,c}$	$2_{a,b,c}$	$8_{a,b,c}$	$1_{a,b,c}$	$6_{a,b,c}$	$3_{a,b,c}$	$0_{a,b,c}$	$0_{a,b,c}$	*
	Night-time	0_a	0_a	0_a	1_a	4_a	0_a	0_a	1_a	4_a	1_a	0_a	0_a	0_a	0_a	NS
	Morning and Daytime	0_a	0_a	0_a	0_a	3_a	0_a	0_a	0_a	2_a	0_a	3_a	0_a	0_a	0_a	NS
	Morning and Late Afternoon/Early evening	$0_{a,b}$	0_b	$0_{a,b}$	1_b	1_b	0_b	0_b	0_b	14_b	0_b	0_b	0_b	$1_{a,b}$	7_a	*
	Multiple times of day (other)	$0_{a,b}$	0_b	$0_{a,b}$	$0_{a,b}$	$9_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	$7_{a,b}$	$0_{a,b}$	$1_{a,b}$	$0_{a,b}$	3_a	$0_{a,b}$	*

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Table A3.23: Cross-tabulation of what time of year respondents use other sacred sites with location

For legend see A3.1

		Location												Sig
		Chasimba	Chivara	Jaribuni	Junju	Kambe	Kauma	Kaya Fungo	Mwanamwinga	Mwarakaya (Chonyi)	Rabai	Ribe	Tsangatsini	
When use in year?	December - April	$0_{e, f, g}$	$2_{a, b, c, d, e}$	$4_{a, b, c, d}$	$1_{a, b, c, d, e, f, g}$	$6_{a, b}$	$8_{b, c}$	2_g	$5_{a, b, c, d, e, f}$	$4_{d, e, f, g}$	$2_{a, b, c, d, e, f}$	$2_{a, b, c, d, e, f}$	$0_{d, e, f, g}$	*
	April - August	8_a	$1_{a, b}$	0_b	0_b	0_b	0_b	14_b	$2_{a, b}$	$7_{a, b}$	$1_{a, b}$	$1_{a, b}$	0_b	*
	August - September	0_a	0_a	0_a	3_a	0_a	0_a	10_a	1_a	7_a	0_a	0_a	0_a	NS
	September - December	0_a	0_a	0_a	0_a	0_a	0_a	2_a	1_a	2_a	1_a	0_a	0_a	NS
	December - April and August - September	0_b	$0_{a, b}$	$0_{a, b}$	$0_{a, b}$	0_b	0_b	11_b	0_b	0_b	$0_{a, b}$	$0_{a, b}$	7_a	*
	September - April	$0_{a, b}$	$0_{a, b}$	$0_{a, b}$	$0_{a, b}$	$0_{a, b}$	$0_{a, b}$	0_b	$0_{a, b}$	$0_{a, b}$	$0_{a, b}$	1_a	$0_{a, b}$	*
	All year	0_a	0_a	0_a	0_a	0_a	0_a	11_a	0_a	0_a	0_a	0_a	0_a	NS

A3.4 Additional analysis tables from Chapter Seven

Table A3.24: Cross-tabulation of use of plants or animals with location

For legend see A3.1

	Location														Sig
	Bedida	Chasimba	Chivara	Jaribuni	Jibana	Junju	Kambe	Kauma	Kaya Fungo	Mwanamwinga	Mwarakaya (Chonyi)	Rabai	Ribe	Tsangatsini	
Plant	109_a	$54_{a,b}$	11_f	$91_{b,c}$	293_b	39_f	240_f	$96_{c,d,e,f}$	396_f	$170_{e,f}$	308_f	$286_{b,c}$	$129_{b,c,d,e}$	$62_{d,e,f}$	*
Animal	7_f	$10_{e,f}$	28_a	$35_{d,e}$	110_e	64_a	240_a	$86_{a,b,c,d}$	444_a	$159_{a,b}$	394_a	$152_{d,e}$	$71_{b,c,d,e}$	$73_{a,b,c}$	*

Table A3.25: Cross-tabulation of types of plants and animals and their uses

For legend see A3.1

	Use1										Sig
	Food/ Drink	Medicine, treatment and promoting health	Culture, Rituals, Spirituality, Predictions	Hides, Traditional clothing, bags & Mats	Safety/ Protect/ Guard	Building materials	Firewood (fuel)	Improve environment/ conservation	Tourists and money	Other	
Rosidae	$278_{c,d,e,f,g}$	$170_{a,b}$	$9_{a,b,c,d,e,f,g}$	$9_{e,f}$	$0_{f,g}$	76_a	$73_{b,c}$	$3_{a,b,c,d,e,f,g}$	$0_{d,e,f,g}$	$6_{b,c,d,e,f,g}$	*
Liliopsida	$152_{a,b}$	$38_{a,b}$	6_a	0_b	$0_{a,b}$	$14_{a,b}$	$22_{a,b}$	$1_{a,b}$	$0_{a,b}$	$1_{a,b}$	*
Building/Firewood Plant (U)	9_c	15_b	$0_{a,b,c}$	$1_{a,b,c}$	$0_{a,b,c}$	17_a	23_a	$0_{a,b,c}$	$0_{a,b,c}$	$0_{a,b,c}$	*
Fruit Plant (U)	292_a	24_c	$6_{a,b,c}$	$2_{b,c}$	$1_{a,b,c}$	$8_{b,c}$	$30_{a,b}$	$2_{a,b,c}$	$0_{a,b,c}$	9_a	*
Vegetable (U)	$54_{a,b}$	$7_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	$1_{a,b}$	0_b	1_a	$0_{a,b}$	$0_{a,b}$	*
Medicinal Plant (U)	84_d	209_a	$2_{b,c,d}$	$15_{b,c}$	$0_{c,d}$	65_a	124_a	$2_{a,b,c,d}$	$0_{c,d}$	$12_{a,b}$	*
Multiple Use Plant (U)	21_g	48_f	$6_{a,b,c,d,e,f}$	$6_{d,e,f}$	$1_{c,e,f,g}$	$32_{a,b,c,d,e}$	79_a	$0_{a,b,c,d,e,f,g}$	$0_{b,c,d,e,f,g}$	$2_{b,c,d,e,f,g}$	*
Aves	$88_{a,b,c}$	4_d	5_a	$3_{a,b,c,d}$	$0_{a,b,c,d}$	$0_{c,d}$	$3_{b,c,d}$	$0_{a,b,c,d}$	$3_{a,b}$	$2_{a,b,c,d}$	*
Small Mammals	212_a	$13_{b,c,d}$	6_a	$1_{b,c,d}$	$0_{a,b,c,d}$	$1_{c,d}$	0_d	$1_{a,b,c}$	$0_{a,b,c,d}$	$4_{a,b}$	*
Antelope	232_b	1_c	$0_{b,c}$	37_a	$1_{b,c}$	1_c	0_c	$0_{a,b,c}$	$1_{b,c}$	$0_{b,c}$	*
Big Game	$49_{d,e,f,g,h,i}$	$22_{c,d,f}$	$0_{a,b,c,d,e,f,g,h,i}$	$16_{a,b}$	$6_{b,c}$	$0_{f,g,h}$	$0_{h,i}$	$2_{a,b,c,d,e}$	$1_{a,b,c,d,e,f,g,h,i}$	$1_{a,b,c,d,e,f,g,h,i}$	*
Artiodactyla	$246_{a,b}$	$23_{c,d}$	$4_{a,b,c}$	$18_{a,b}$	$9_{a,b}$	$3_{c,d}$	1_d	$0_{a,b,c,d}$	$0_{b,c,d}$	12_a	*
Invertebrates	$28_{a,b}$	$11_{a,b}$	$0_{a,b}$	$0_{a,b}$	2_a	$0_{a,b}$	0_b	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	*
Small Cats	28_b	17_b	$1_{a,b}$	0_b	7_a	0_b	0_b	$0_{a,b}$	$1_{a,b}$	$1_{a,b}$	*
Primates	$191_{b,c,d,e}$	4_h	$1_{c,e,f,g,h}$	$2_{d,e,g,h}$	12_b	$1_{f,g,h}$	0_h	$3_{b,c}$	30_a	$3_{b,c,d,e,f,g}$	*
Herptiles	10_b	70_a	9_a	18_a	13_a	0_b	0_b	2_a	11_a	4_a	*

Table A3.26: Cross-tabulation of types of plants and their uses with location
For legend see A3.1

		Bedida	Chasimba	Chivara	Jaribuni	Jibana	Junju	Kambe	Kauma	Kaya Fungo	Mwanamwinga	Mwarakaya (Chonyi)	Rabai	Ribe	Tsangatsini	Sig
Rosidae	Food/ Drink	11_a	3_a	2_a	12_a	29_a	3_a	27_a	20_a	53_a	30_a	36_a	26_a	15_a	9_a	NS
	Medicine, treatment and promoting health	10_a	3_a	2_a	8_a	10_a	7_a	14_a	9_a	37_a	19_a	17_a	14_a	18_a	2_a	NS
	Culture, Rituals, Spirituality, Predictions	0_a	0_a	1_a	1_a	0_a	0_a	0_a	0_a	4_a	1_a	2_a	0_a	0_a	0_a	NS
	Hides, Traditional clothing, bags & Mats	0_a	0_a	0_a	0_a	0_a	1_a	0_a	0_a	2_a	3_a	0_a	2_a	1_a	0_a	NS
	Building materials	4_a	0_a	0_a	1_a	7_a	6_a	10_a	4_a	11_a	6_a	11_a	7_a	3_a	4_a	NS
	Firewood	$\mathbf{4_{a,b}}$	$\mathbf{1_{a,b}}$	$\mathbf{5_a}$	$\mathbf{1_{a,b}}$	$\mathbf{3_b}$	$\mathbf{1_{a,b}}$	$\mathbf{7_{a,b}}$	$\mathbf{3_{a,b}}$	$\mathbf{18_{a,b}}$	$\mathbf{4_b}$	$\mathbf{9_{a,b}}$	$\mathbf{15_{a,b}}$	$\mathbf{0_b}$	$\mathbf{2_{a,b}}$	*
	Improve environment/ conservation	0_a	0_a	0_a	1_a	0_a	0_a	0_a	0_a	1_a	0_a	0_a	0_a	1_a	0_a	NS
	Other	0_a	0_a	0_a	0_a	1_a	0_a	0_a	3_a	0_a	0_a	1_a	1_a	0_a	0_a	NS
Fruit plants (U)	Food/ Drink	11_a	3_a	1_a	15_a	28_a	3_a	33_a	20_a	68_a	25_a	34_a	28_a	15_a	5_a	NS
	Medicine, treatment and promoting health	1_a	1_a	0_a	0_a	2_a	0_a	3_a	2_a	6_a	4_a	1_a	2_a	2_a	0_a	NS
	Culture, Rituals, Spirituality, Predictions	0_a	0_a	0_a	0_a	2_a	1_a	0_a	0_a	3_a	0_a	0_a	0_a	0_a	0_a	NS
	Hides, Traditional clothing, bags & Mats	0_a	0_a	0_a	0_a	0_a	0_a	0_a	0_a	0_a	2_a	0_a	0_a	0_a	0_a	NS
	Safety/Protect/Guard	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{1_a}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_b}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	*
	Building materials	2_a	0_a	0_a	0_a	0_a	0_a	2_a	0_a	2_a	0_a	1_a	0_a	1_a	0_a	NS
	Firewood	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{1_{a,b}}$	$\mathbf{4_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{6_{a,b}}$	$\mathbf{1_{a,b}}$	$\mathbf{1_b}$	$\mathbf{1_b}$	$\mathbf{6_{a,b}}$	$\mathbf{3_{a,b}}$	$\mathbf{2_{a,b}}$	$\mathbf{5_a}$	*
	Improve environment/ conservation	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{1_a}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_b}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{1_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	*
	Other	0_a	0_a	0_a	0_a	1_a	0_a	2_a	0_a	2_a	0_a	1_a	3_a	0_a	0_a	NS
Medicinal plant (U)	Food/ Drink	1_a	2_a	2_a	3_a	6_a	4_a	17_a	3_a	14_a	11_a	8_a	6_a	2_a	4_a	NS
	Medicine, treatment and promoting health	10_a	3_a	3_a	5_a	26_a	10_a	25_a	5_a	45_a	17_a	29_a	18_a	7_a	5_a	NS
	Culture, Rituals, Spirituality, Predictions	0_a	0_a	0_a	0_a	0_a	0_a	0_a	0_a	0_a	0_a	2_a	0_a	0_a	0_a	NS
	Hides, Traditional clothing, bags & Mats	$\mathbf{5_a}$	$\mathbf{1_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{0_b}$	$\mathbf{1_{a,b}}$	$\mathbf{3_{a,b}}$	$\mathbf{1_{a,b}}$	$\mathbf{2_{a,b}}$	$\mathbf{1_{a,b}}$	$\mathbf{0_{a,b}}$	$\mathbf{1_{a,b}}$	*
	Building materials	4_a	0_a	0_a	1_a	8_a	8_a	8_a	2_a	14_a	1_a	5_a	8_a	2_a	4_a	NS
	Firewood	$\mathbf{5_{a,b}}$	$\mathbf{2_{a,b}}$	$\mathbf{2_{a,b}}$	$\mathbf{5_{a,b}}$	$\mathbf{9_{a,b}}$	$\mathbf{2_{a,b}}$	$\mathbf{13_{a,b}}$	$\mathbf{1_{a,b}}$	$\mathbf{19_b}$	$\mathbf{12_{a,b}}$	$\mathbf{16_{a,b}}$	$\mathbf{28_a}$	$\mathbf{10_{a,b}}$	$\mathbf{0_{a,b}}$	*
	Improve environment/ conservation	0_a	0_a	0_a	0_a	0_a	1_a	1_a	0_a	0_a	0_a	0_a	0_a	0_a	0_a	NS
	Other	0_a	1_a	0_a	1_a	1_a	0_a	2_a	1_a	4_a	0_a	2_a	0_a	0_a	0_a	NS

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Table A3.27: Cross-tabulation of how people use animals with location. For legend see A3.1

		Bedida	Chasimba	Chivara	Jaribuni	Jibana	Junju	Kambe	Kauma	Kaya Fungo	Mwanamwinga	Mwarakaya (Chonyi)	Rabai	Ribe	Tsangatsini	Sig
Big Game	Food/ Drink	2_a			8_a	4_a		6_a	4_a	4_a	6_a	5_a	3_a	4_a	3_a	NS
	Medicine, treatment and promoting health	2_a			1_a	2_a		4_a	0_a	7_a	2_a	0_a	0_a	4_a	0_a	NS
	Hides, Traditional clothing, bags & Mats	1_a			0_a	0_a		3_a	0_a	0_a	3_a	3_a	1_a	0_a	3_a	NS
	Safety/Protect/Guard	0_a			0_a	3_a		1_a	0_a	0_a	0_a	1_a	1_a	0_a	0_a	NS
	Improve environment/ conservation	0_a			0_a	0_a		0_a	0_a	0_a	0_a	0_a	0_a	2_a	0_a	NS
	Tourists and money	0_a			0_a	0_a		0_a	0_a	0_a	0_a	1_a	0_a	0_a	0_a	NS
	Other	0_a			0_a	0_a		0_a	0_a	0_a	1_a	0_a	0_a	0_a	0_a	NS
Small Cats	Food/ Drink	0_a		0_a	2_a	0_a		6_a	0_a	6_a	5_a	5_a	0_a	1_a	3_a	NS
	Medicine, treatment and promoting health	1_a		0_a	2_a	0_a		2_a	0_a	4_a	2_a	3_a	0_a	0_a	3_a	NS
	Culture, Rituals, Spirituality, Predictions	0_a		0_a	0_a	0_a		0_a	0_a	1_a	0_a	0_a	0_a	0_a	0_a	NS
	Safety/Protect/Guard	0_a		1_a	0_a	0_a		0_a	1_a	5_a	0_a	0_a	0_a	0_a	0_a	NS
	Tourists and money	$\mathbf{0_{a, b}}$		$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	$\mathbf{1_a}$		$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	$\mathbf{0_b}$	$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	*
	Other	$\mathbf{0_{a, b}}$		$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$		$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	$\mathbf{0_b}$	$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	$\mathbf{1_a}$	$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	*
Herptiles	**Food/ Drink**	$\mathbf{0_{a, b, c, d, e}}$	$\mathbf{0_{a, b, c, d, e}}$	$\mathbf{1_{a, b}}$	$\mathbf{0_{a, b, c, d, e}}$	$\mathbf{0_e}$	$\mathbf{0_{a, b, c, d, e}}$	$\mathbf{3_{a, b, c, d, e}}$	$\mathbf{2_{b, c}}$	$\mathbf{2_{d, e}}$	$\mathbf{0_{a, b, c, d, e}}$	$\mathbf{0_{c, d, e}}$	$\mathbf{1_{a, b, c, d, e}}$	$\mathbf{0_{a, b, c, d, e}}$	$\mathbf{1_{a, b, c, d, e}}$	*
	Medicine, treatment and promoting health	5_a	2_a	0_a	2_a	6_a	1_a	7_a	0_a	22_a	5_a	8_a	4_a	4_a	4_a	NS
	Culture, Rituals, Spirituality, Predictions	0_a	0_a	0_a	0_a	0_a	0_a	1_a	1_a	7_a	0_a	0_a	0_a	0_a	0_a	NS
	Hides, Traditional clothing, bags & Mats	3_a	0_a	0_a	0_a	0_a	0_a	5_a	0_a	3_a	2_a	1_a	0_a	0_a	4_a	NS
	Safety/Protect/Guard	0_a	0_a	0_a	3_a	3_a	0_a	2_a	0_a	4_a	0_a	1_a	0_a	0_a	0_a	NS
	Improve environment/ conservation	0_a	0_a	0_a	0_a	1_a	0_a	0_a	0_a	1_a	0_a	0_a	0_a	0_a	0_a	NS
	Tourists and money	$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	$\mathbf{9_a}$	$\mathbf{0_{a, b}}$	$\mathbf{0_b}$	$\mathbf{0_{a, b}}$	$\mathbf{0_b}$	$\mathbf{1_{a, b}}$	$\mathbf{1_{a, b}}$	$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	$\mathbf{0_{a, b}}$	*
	Other	0_a	0_a	0_a	0_a	0_a	0_a	2_a	0_a	1_a	0_a	0_a	0_a	0_a	1_a	NS

A3.5 Additional analysis tables from Chapter Eight

Table A3.28: Cross-tabulation of If people think protecting the local Mijikenda Culture will help protect the environment with location
For legend see A3.1

| | | Location | | | | | | | | | | | | | | Sig |
		Bedida	Chasimba	Chivara	Jaribuni	Jibana	Junju	Kambe	Kauma	Kaya Fungo	Mwanamwinga	Mwarakaya (Chonyi)	Rabai	Ribe	Tsangatsini	
Will protecting local cultural help protect the environment	Yes	6_h	48_a	$22_{a,b,c,d,e}$	$69_{a,b,c,d,e}$	$46_{b,c,d,e}$	$36_{a,b,c,d,e,f}$	$123_{a,b,e}$	$28_{a,b,c}$	$66_{b,c,d,e,f,g}$	$43_{e,f,g,h}$	$99_{b,c,d,e}$	$104_{g,h}$	$32_{f,g,h}$	$12_{a,b,c,d,e,f,g}$	*
	No	6_a	$0_{b,c}$	$2_{a,b,c}$	3_c	$5_{a,b,c}$	$8_{a,b,c}$	$19_{a,b,c}$	$0_{a,b,c}$	$15_{a,b,c}$	$7_{a,b,c}$	$9_{a,b,c}$	$41_{a,b}$	$11_{a,b,c}$	$0_{a,b,c}$	*
	Maybe	10_a	$0_{e,f,g}$	$0_{c,d,e,f,g}$	$15_{a,b,c,e}$	$8_{a,b,c,d,e,f,g}$	$2_{e,f,g}$	5_g	$1_{b,c,d,e,f,g}$	$17_{a,b,c,d,e,f}$	$27_{a,b,c,d}$	$24_{a,b,c,d,e,f}$	$65_{a,b,c,d}$	$25_{a,b}$	$0_{a,b,c,d,e,f,g}$	*

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Table A3.29: Cross-tabulation of Who should be in charge of protecting local environment with location
For legend see A3.1

		Location														Sig
		Bedida	Chasimba	Chivara	Jaribuni	Jibana	Junju	Kambe	Kauma	Kaya Fungo	Mwanamwinga	Mwarakaya (Chonyi)	Rabai	Ribe	Tsangatsini	
Who should be in charge of protecting the Local Environment	Government	$13_{c,d,e,f,g}$	$1_{f,g,h}$	$3_{c,d,e,f,g,h}$	71_a	0_h	$7_{c,d,e,f,g,h}$	$30_{e,f}$	$23_{a,b}$	$23_{c,d,e,f,g}$	$23_{c,d,e}$	$54_{b,c}$	$42_{d,e,f,g}$	$26_{c,d,e}$	$0_{c,d,e,f,g,h}$	*
	Local (Mijikenda) People	$46_{a,b,c}$	$16_{f,g,h}$	$23_{a,b,c,d,e}$	12_h	$29_{c,d,e,f}$	$27_{a,b,c,d,e,f,g}$	120_a	$7_{f,g,h}$	$66_{a,b,c,d,e}$	$53_{a,b,c,d,e}$	$45_{g,h}$	$110_{d,e,f}$	$63_{b,c,d,e}$	$13_{a,b,c,d,e}$	*
	Government and NGO	0_a	0_a	3_a	6_a	0_a	1_a	3_a	5_a	11_a	6_a	7_a	17_a	6_a	0_a	NS
	Government and Local Mijikenda	$0_{d,e,f,g,h}$	$0_{b,c,d,e,f,g,h}$	$0_{b,c,d,e,f,g,h}$	$0_{g,h}$	29_a	$8_{c,d}$	$0_{f,g}$	$0_{b,c,d,e,f,g,h}$	$8_{b,c,d,e,f,g,h}$	$0_{e,f,g,h}$	$6_{d,e,f,g,h}$	$39_{b,c}$	$13_{b,c,d,e,h}$	$0_{a,b,c,d,e,f,g,h}$	*
	Government, NGO and Local Mijikenda	$0_{d,e,f}$	39_a	$0_{b,c,d,e,f}$	0_f	$0_{d,e,f}$	$7_{c,d}$	$0_{e,f}$	$0_{b,c,d,e,f}$	$1_{e,f}$	$0_{e,f}$	$30_{b,c}$	$6_{d,e,f}$	$0_{e,f}$	$0_{b,c,d,e,f}$	*

Appendix 4

Words for Wordcloud

<u>**Table A4.1:**</u> List of words used in Wordcloud Figures
ES Class. = Classification of word under Ecosystem Services

Number	Word	ES Class.	Number	Word	ES Class.
		Words Associated with Kayas			
1	Advisory	Social	41	High	Social
2	Agriculture	Regulating	42	Holy	Cultural
3	Air	Regulating/ supporting	43	Home	Cultural
4	Ancient	Cultural	44	House	Cultural
5	Animals	Trees/Animals	45	Identity	Cultural
6	Attracts	Social	46	Kaya	Cultural
7	Big	Trees/Animals	47	Know	Social
8	Brings	Provisioning	48	Laws	Social
9	Burial	Cultural	49	Made	Provisioning
10	Capital	Cultural	50	Medicine	Provisioning
11	Caves	Cultural	51	Meetings	Social
12	Ceremonies	Cultural	52	Mijikendas	Cultural
13	Church	Cultural	53	Oath	Cultural
14	City	Cultural	54	Offerings	Cultural/ Provisioning
15	Conservation	Regulating/ supporting	55	Old	Cultural
16	Co-operation	Social	56	Outs	Social
17	Courts	Social	57	Past	Cultural
18	Cultural	Cultural	58	Peace	Social
19	Culture	Cultural	59	People	Social
20	Customs	Cultural	60	Plants	Trees/Animals
21	Demons	Cultural	61	Praying	Cultural
22	Diseases	Social	62	Rain	Regulating / supporting
23	Elders	Cultural	63	Rituals	Cultural
24	Enter	Social	64	Run	Social
25	Environment	Regulating/ supporting	65	Sacred	Cultural
26	Firewood	Provisioning	66	Scary	Cultural
27	Food	Provisioning	67	Security	Social
28	Forest	Trees/Animals	68	Shrine	Cultural
29	Fruits	Provisioning	69	Stones	Provisioning
30	Funerals	Cultural	70	Things	Other
31	Getting	Provisioning	71	Timber	Provisioning
32	God	Cultural	72	Tourism	Social
33	Government	Social	73	Traditional	Cultural
34	Grandparents	Cultural	74	Trees	Trees/Animals
35	Graves	Cultural	75	Unity	Social
36	Great	Cultural	76	Village	Cultural/Social

Number	Word	ES Class.	Number	Word	ES Class.
37	Held	Social	77	Wars	Social
38	Help	Social	78	Water	Provisioning
39	Hide	Social	79	Witchcraft	Cultural
40	Hiding	Social	80	Worship	Cultural

Reason Kayas are Important

Number	Word	ES Class.	Number	Word	ES Class.
1	Agriculture	Regulating	41	Holy	Cultural
2	Air	Regulating/ suooprting	42	Home	Cultural
3	Animals	Trees/Animals	43	House	Cultural
4	Attracts	Social	44	Identity	Cultural
5	Attraction	Social	45	Important	Social
6	Bad	Cultural	46	Kaya	Cultural
7	Basis	Cultual	47	Life	Social
8	Big	Trees/Animals	48	Many	Social
9	Bringing	Provisioning	49	Medicine	Provisioning
10	Brings	Provisioning	50	Meetings	Social
11	Burial	Cultural	51	Never	Cultural
12	Clean	Regulating/ supporting	52	Oathing	Cultural
13	Community	Social	53	Oaths	Cultural
14	Conservancy	Regulating/ supporting	54	Offerings	Cultural/ Provisioning
15	Conservation	Regulating/ supporting	55	People	Social
16	Conserves	Regulating/ supporting	56	Points	Social
17	Construction	Provisioning	57	Poles	Provisioning
18	Cooking	Provisioning	58	Praying	Cultural
19	Court	Social	59	Prevents	Social
20	Cultural	Cultural	60	Protects	Social
21	Culture	Cultural	61	Rain	Regulating/ supporting
22	Dangerous	Social	62	Rituals	Cultural
23	Dead	Cultural	63	Roots	Provisioning
24	Diseases	Social	64	Ropes	Provisioning
25	Done	Social	65	Sacred	Cultural
26	Elders	Cultural	66	Security	Social
27	Environmental	Regulating/ supporting	67	Shrines	Cultural
28	Erosion	Regulating/ supporting	68	Soil	Regulating/ supporting
29	Evil	Cultural	69	Take	Provionsing
30	Firewood	Provisioning	70	Things	Other
31	Food	Provisioning	71	Timber	Provisioning
32	Forest	Trees/Animals	72	Tourists	Social
33	Fresh	Regulating/ supporting	73	Traditional	Cultural
34	Fruits	Provisioning	74	Trees	Trees/Animals
35	Gives	Provisioning	75	Used	Provisioning
36	God	Cultural	76	Wars	Social

37	Good	Cultural	77	Water	Provisioning
38	Grass	Regulating/ supporting	78	Wildlife	Trees/Animals
39	Held	Social	79	Wind	Regulating/ supporting
40	Hideout	Social	80	Worship	Cultural

Appendix 5

Table A5.1 Classification of uses by 'ecosystem service'

Type of Use	Ecosystem Service
Aesthetic purposes	Social
Alcoholic drinks	Provisioning
Arrow poison	Provisioning
Arrows	Provisioning
Attracts rainfall	Regulating/Supporting
Attracts tourists/visators	Social
Authority of Elders	Cultural
Bags (Hides)	Provisioning
Baobab fruits	Provisioning
Baskets	Provisioning
Belt	Provisioning
Body oils	Provisioning
Bones	Provisioning
Brings peace	Cultural
Brings rain	Regulating/Supporting
Building	Provisioning
Building poles	Provisioning
Carving	Cultural and Provisioning
Cashew nut tree fruit is food	Provisioning
Cassava is food	Provisioning
Casting out bad omens	Cultural
Castor oils	Provisioning
Charcoal	Provisioning
Cleanses	Cultural
Cleanses kaya	Cultural
Cleanses those bleading	Provisioning and Social
Cleansing in the kaya	Cultural
Cleansing material	Provisioning
Coconut	Provisioning
Cold	Other
Conserve the big trees	Regulating/Supporting
Container gouard	Provisioning
Cotton/ decorate	Provisioning
Cries at the graveyard	Cultural
Curddling and scheming milk	Provisioning
Decorations worn during traditional dances	Cultural and Provisioning
Defense/security	Social
Drive away demons	Cultural
Drugs	Provisioning
Drums (traditional secret society ceremonial dance - Hides)	Cultural and Provisioning

Eat	Provisioning
faeces	Other
fan off fire by blacksmiths (hides)	Provisioning
Farming	Social
Fire wood	Provisioning
fish poison	Provisioning
Food	Provisioning
For burial	Cultural
For conservation	Regulating/Supporting
For interaction	Cultural
Fruit	Provisioning
Gives honey	Provisioning
Gives oil	Provisioning
Glue	Provisioning
Good shade provider	Social
Good tree to conserve	Regulating/Supporting
Head	Other
Hide - sold	Provisioning and Social
Hides	Provisioning
Honey	Provisioning
Horns	Provisioning
Horns used to make the voice louder during traditional communication	Cultural and Provisioning
I do not know	None
I don't use but others eat	Provisioning
Joins/connects	Cultural
Kaya doors/ gates	Cultural
Kaya protector	Social
Keep the elders company in the forest by their sounds	Cultural
Little gods of the kaya and are for protection	Cultural and Social
Make arrows (feathers)	Provisioning
Make bow arrows	Provisioning
Make charms in traditional medicine (Nails/ toes)	Provisioning
Make doors	Provisioning
Make peace prevail	Cultural
Making bows	Provisioning
making motor and pestle	Provisioning
making pestle for pounding maize	Provisioning
Making predictions about some happenings	Cultural
Making windows	Provisioning
Making wooden bed	Provisioning
Mango is food	Provisioning
Mats	Provisioning
Meat	Provisioning
Medicine	Provisioning

Milk production	Provisioning
Mist so they may not see	Regulating/Supporting
Morning	Other
No meaning/translation	None
Not used as firewood	Other
Oils	Provisioning
Palm fronds	Provisioning
Palm thatch	Provisioning
Palm wine	Provisioning
Pestle and mortar	Provisioning
Place of refuge or hideout	Social
Place of worship	Cultural
plant at home	Provisioning
Poles	Provisioning
Potatoes is food	Provisioning
Prayer rituals	Cultural
Praying	Cultural
Preserve milk	Provisioning
Propagating crops	Provisioning
Propatiating spirits	Cultural
Protect forest	Regulating/Supporting
Protect Kaya	Regulating/Supporting
Protection	Social
Protection against infection	Provisioning
Protection/security	Social
Protector	Social
Protects graves	Cultural
Provides hide for traditional healing	Provisioning
Provides invisible and extraordinary strength	Provisioning
Provides shade	Social
Provides shade	Social
Provides shade	Social
Providing Security at home	Social
Raises blood level	Provisioning
Rearing	Other
Relish	Provisioning
Resurrect / grave	Cultural
Ritual ceremony	Cultural
Ritual purposes and prayers	Cultural
Roots tubers	Provisioning
Ropes	Provisioning
Ropes and twines	Provisioning
Sacred grove (place of sorcery)	Cultural
Sacrificial animal	Cultural

Shade	Social
Shoes (hides)	Provisioning
Signifies	Cultural
Signifies death	Cultural
Signify important happenings	Cultural
Smell good	Other
Soap	Provisioning
Source of drinking water	Provisioning
Special reserves	Cultural
Spicing milk	Provisioning
Spiritual exorcism (hides)	Cultural
Steam off milk in gourds	Provisioning
Sticks for burying the dead	Cultural and Provisioning
Strength	Provisioning
Toothbrush	Provisioning
Theft	Other
Thorns	Other
Timber	Provisioning
Tourism	Social
Tradional medicine	Provisioning
Traditional seats	Provisioning
Traditional Toothbrush	Provisioning
Traditional wine	Provisioning
Treatment	Provisioning
Tree	Other
Tree for building granaries	Provisioning
Tree which is abode of spirits	Cultural
Trees (or building poles)	Provisioning
Trees for traditional ritual prayers	Cultural
Tubers as food	Provisioning
twines or ropes	Provisioning
Tying	Provisioning
Used by blacksmiths (Hides)	Provisioning
Used by herbalists	Provisioning
Used in oathing ceremony	Cultural
Varnish for timber	Provisioning
Vegetables	Provisioning
Very destructive to crops	Other
Visitors take photographs	Social
walking stick	Cultural and Provisioning
Warns people so they may not forget	Cultural
Wild Pigs	Other
Withers for building	Provisioning
You are respected and heard	Social

Appendix 6

Suggested Interventions and management approaches for the conservation of the Mijikenda SNS

1. Working Groups

1.1: Interfaith Groups

The conflict between those who adhere to the traditional faith system and individuals who have converted to mainstream faiths was discussed in Chapters Four and Five. There are a number of misconceptions that were raised in this research, in particular that those who are involved in the traditional faith are witches, and that the traditional faith and SNS are connected to the 'Devil'. In addition a number of people stated that being involved with the traditional customs and visiting the sites would be a violation of their religious teachings. A dialogue between the Kaya Elders (heads of the traditional faith), Priests and Imams in the local communities is needed to address these issues. It is important that the misconceptions that people have are dispelled, and that an understanding is reached with the leaders of the mainstream faiths so that practicing one's religion does not require individuals to abandon their culture. Interfaith workshops, such as those conducted by the Alliance of Religion and Conservation (http://www.arcworld.org/) have been successful in finding common ground amongst members of different faith groups with the aim of conserving nature. Similar such meetings to help find commonalities between the religious groups within the region and engage the leaders in working together would help to bring cohesion to the communities.

In addition, such meetings would help to engage local faith leaders in conservation. As it is noted that religion can have a major influence on an individual's behaviour (Sponsel, 2007), it is likely that engaging local faith groups in the conservation of the sites would help to foster greater support from those in the community who have had little or no involvement to date.

1.2. Intercommunity Groups

Bringing together Elders from different communities would help with communication of successful approaches and provide support for those facing problems with conservation of the SNS. Regular meetings such as these would ensure a more responsive approach and are likely to enable more effective conservation of the SNS in the region if all Elders can work together. Meetings between Elders and other stakeholders from different communities

could facilitate the sharing of experiences and knowledge. They may also identify shared and differing cultures and practices as well as which approaches to conservation work at different sites. Groups can then work closer with those communities who have similar cultures and/or conservation approaches and learn from those that are different. By integrating management approaches across the communities it would foster closer relationships, while still allowing for site-specific approaches where necessary.

2. Education

Although mainstream education is considered to be one of the possible reasons for the decrease in local cultural knowledge and traditional practices, education also provides an opportunity for the conservation of the SNS. By educating children, people living in the area (local and non-local), and tourists, it is possible to raise awareness of the local culture, and instil in them a respect for the traditional practices and values. It is also possible to reach further afield using the media, to teach people and communities across the country and globally about the SNS and the coastal forests in general. Through education people can learn why the sites are important both in terms of cultural heritage and biodiversity conservation and may encourage support for the conservation of the coastal forests. By incorporating all the multiple aspects associated with the conservation of the sites (both for culture and biodiversity) it will be possible to reach more people, and engage more stakeholders, which in turn will help to gain support and resources to conserve the sites. In addition, integrating cultural and indigenous knowledge into Kenyan schooling is argued for by groups such as O'Hern and Nozaki (2014) to enable a more complete education for children, which they believe will help to ensure more sustainable behaviours of future generations towards the natural environment in general.

2.1 Youth Groups

As noted in Chapters Four to Six and eight, younger members of the community are less likely to know about and/or follow the cultural traditions. In addition a number of Elders believe that the younger generations have less respect for their culture, and many of the youths feel that the Elders disapprove of them and their lifestyles (Shepheard-Walwyn, pers. obs., 2012). Youth groups aimed at teaching teenagers and young adults about their culture, conservation and the preservation of the SNS would help to address the perspectives that youths and Elders have of one another and build better relationships. In addition, it will help to pass on knowledge to the next generation and give them some control over how they gain

this knowledge, by developing more modern ways to record the traditions which are meaningful to them. If the youth groups focus on projects seeking to record the traditional knowledge, it will also give the younger generations ownership of this information. Elders will be better able to build relationships with members of their community who they may not normally interact with. Youth clubs are popular in the region (Shepheard-Walwyn, pers. obs., 2012), so it would be possible to run such workshops through these clubs. The younger generations are the ones who will be in charge of conserving the SNS in the future, therefore it is important to involve them in approaches now so that they value and understand why preservation of both their culture and the SNS is important. This will help to build more sustainable conservation projects in the future.

2.2 After School clubs and field trips

Due to the national curriculum, it is not possible at this stage to incorporate local culture and history into mainstream schooling. However, many schools run a number of extracurricular 'after-school clubs' (Shepheard-Walwyn, pers. obs. 2012). It would therefore be possible to create an after-school club which focuses on teaching local children about traditional culture, local indigenous knowledge, the Mijikenda SNS and environmental conservation. The sessions can be run by Elders, as is done by the Kuna people in Panama (Guidi, 2014), or it could be done jointly with individuals who have taken part in the youth group sessions. This could help to engage younger community members in the process of transmitting the cultural and ecological knowledge that they learn from the Elders. In addition to after-school groups, a number of people spoken to during the course of the research mentioned the possibility of children going on field-trips to the forest. School field trips to community sites and run by community leaders have been recommended to achieve combined education on the environment, indigenous knowledge, traditional medicine and local cultures (Aikenhead, 2001; Hewson *et al.*, 2009; Overmars, 2010). It would be possible to take school children to the Kayas at various stages of their education to learn about local history, culture, traditional medicine, the environment and conservation. Elders, medicine men/women, and community members could all be involved in the field trips, and children could be taught through a number of means such as educational walks through the forests and performances and stories whilst visiting the Kayas. Field trips could be short day trips, or more extended trips staying within the forests. After-school clubs and field trips would help to provide children with a more comprehensive education, and engage younger community members in the preservation of their culture and the natural environment.

3 Alternative resources and incomes

Nyamweru (1997) and Githitho (2003) note that extraction of resources from the Mijikenda SNS for subsistence and to generate income is not likely to be sustainable, even with monitored management approaches. Therefore alternatives to provide both resources and income in the region are needed. To date a number of projects have been trialled in the area in an attempt to provide alternative livelihood sources. These include culturally sensitive tourism, bee keeping activities and domestic plant farming (such as the growing of medicinal and plants within homesteads for use or sale); however, there has been varying, and often limited success to date (Githitho, 2003). Further avenues should be investigated and efforts made to ensure that they are appropriately set up, funded and supported to provide local communities with alternative resources and livelihoods.

3.1 Agroforestry and Medicinal plant nurseries

The main uses for plant materials from the forests are for consumption (food/drink), medicine, firewood and charcoal production, and building materials. There has been some success in Kenya with community agroforestry projects in areas such as Busia (Mugure and Oino, 2013), Siaya, Vihiga (Kiptot et al., 2006), and Embu (Kiptot and Franzel, 2012) and there are a number of organisations focusing on agroforestry projects including 'Better Place', 'NURU', and the 'World Agroforestry Centre' (Better Place, 2014; Nuru International, 2014; World Agroforestry Centre, 2014). Community agroforestry approaches could help to provide access to resources such as food products, timber and firewood, as well as potentially affording additional income through the sale of items such as charcoal and excess produce.

Medicinal plants were noted as being one of the main extracts from the Kayas (Chapter Seven). Medicinal plant nurseries have been established in a number of places across Kenya, for example, Kew's 'Useful Plants Project' currently has projects working with communities in Western Kenya where they have used knowledge from Elders and other members of the community, to identify which plants to grow. Their project aims to encourage sustainable use and the conservation of useful plants, ensuring that local communities have access to these resources, and the knowledge on how to grow and care for them. Community members are able to use the products themselves, and sell on additional plants to generate income (KEW, 2014).

While domestic plant farming has been attempted in the past (Githitho, 2003), due to the high levels of extraction by the local community of plant products alternative access needs to be provided to enable conservation. Therefore more focused efforts on community plant farming needs to be put into place to enable the use and sale of these resources without further damaging the SNS.

3.2 Butterfly Farming

Currently there is an existing community based project 'Kipepeo' which provides additional incomes for rural communities living around the Arabuko-Sokoke forest through the sale of butterfly and moth larvae (Kipepeo, 2014). The project works with local communities to provide additional income through the breeding and selling of eggs. Communities have Producer Associations, which participate in the management of the projects. The local people are taught how to collect adults who are at the stage of laying eggs, and to build breeding cages where they can then breed moths and butterflies to sell on. As the forest is vital to their projects and therefore their livelihoods, the local communities are actively involved in the conservation of the forest. Those involved in the programme have on average doubled their income compared to before they joined (Kipepeo, 2006).

It is possible that a similar such project could be set up for the communities surrounding the Mijikenda SNS, either independently or as an extension of the Kipepeo project. If successful it is likely that such a project would help to increase livelihoods and generate additional support for the conservation of the SNS as it has done for the communities surrounding the Arabuko-Sokoke forest. However, in order for this to be effective the collection of butterflies and moths must be done in a sustainable manner.

3.3 Ecotourism

A number of ecotourism projects have been established at Mijikenda SNS on both the north and south coast. At Kaya Ribe there is a visitor's centre, there is an information centre, campsite and tours at Kaya Muhaka on the south coast, and guided tours at Kaya Kinondo. In addition, the community surrounding Kaya Tsolokero are looking into setting up a tourist centre and conducting walks through a patch of coastal forest on the outskirts of the Kaya. These examples show that eco-tourism is possible for a number of the SNS. However, it is important that the activities do not compromise the religious and cultural values of the sites,

or cause further damage to the biodiversity. It is unrealistic to think that it will be possible to have large numbers of tourists visiting the sites without causing damage. The projects must ensure the retention of the integrity of the sites and their values in addition to the aim of providing education and alternative livelihood resources. It is possible that tours could be organised which include visiting information centres, seeing different sites, and meeting members of the community and learning about some of the traditional cultures. If the domestic plant farming activities are in place it could be possible to sell products to tourists, as well as any crafts made by the local communities. If communities worked together to provide a broader experience for tourists, profits could be shared amongst the communities so that as many communities as possible can benefit from the projects. However, although eco-tourism is likely to be feasible, to date it has had limited success. In addition, the effects can be both negative and positive for the communities and their environment (Duffy, 2002), and therefore it is not appropriate to view eco-tourism as a panacea for the SNS.

4 Management approaches for the sites

4.1 Joint management approaches

As highlighted in Chapter Eight, the local communities want to be in charge of the conservation of their culture and the SNS. However, they are unable to do so without the physical and financial support from other groups. Staff from NMK work alongside the communities and this partnership is vitally important. Governmental protection, although in some cases can cause tension and problems, can also help to support traditional systems, as the influence and control of local Elders is not as effective as it used to be. By creating partnerships with external bodies, local communities should be able to get the support and additional resources that they need to compensate for the decrease in effectiveness of traditional approaches. Therefore, finding a balance between local people, NGOs and state control is important for the preservation of these SNS. One key aspect of partnerships will be funding. At present the local people receive no financial aid for the protection of the SNS, and those from NMK who are responsible for ensuring the protection of the SNS are severely underfunded and lack necessary resources (such as adequate transportation). Therefore, it is important that more funds are put towards the conservation of the Kayas. In addition, although a number of organisations have tried to help with the conservation of the Mijikenda SNS, such as WWF, when they leave and the money runs out, all implemented plans cease. It is essential to ensure that the protection of the forests is adequately funded and will be so even after partner organisations leave.

4.2 Training

As well as funding, it is vital that local people gain training in the skills that will be required for the management and protection of the sites in the changing times. Training of local community members can also extend to research skills, which will allow the effective monitoring of the sites by people with greater knowledge and access to the sites. It is also equally important that members of cooperating organisations are trained to understand the local knowledge, customs and values.

4.3 Combined Perspectives

The current conservation management of the Mijikenda SNS based solely on the traditional customs is no longer effective in protecting the sites, the associated culture and biodiversity. New management approaches are needed which take into account the diverse attitudes and values found amongst local populations, in a way that does not undermine the sanctity of the sites. In addition, management needs to engage with members of the communities that no longer value the sites for cultural/spiritual values. The sites are valuable to the community for resource use as well as for regulating/supporting services such as aiding soil retention and bringing rain. Therefore it is possible for outreach work and management plans to be used which tie into these values of the local communities. By incorporating the range of perceptions and values of the local community, it is likely that more people will support the conservation of the sites. Therefore, the management of the sites needs to account for the combination of cultural, provisioning and regulating/supporting values of the sites in new management plans and outreach work.

4.4 Site-by-site adaptive management

Due to the differences in the SNS and amongst the communities that live around them, it is important that each site has an individual management plan, which caters to the specific requirements of that location. Those in charge of the protection of each site must monitor and respond to changes, challenges and threats that face each site. While there are a number of similarities between the sites, no single methodology would be appropriate for the conservation of all the SNS. Therefore all stakeholders must be consulted at each site and a collaborative management plan designed that meets the needs of the community while ensuring the protection of the site's cultural and biological heritage.