Biocultural Diversity and Conservation around Mt Cameroon

Traditional knowledge, management and governance in the era of sustainable development

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Cover images, left to right: farms near Saxenhof tea estate, the forests of Mt Cameroon in the distance; Ndive Elias Litonga in his family home in Likombe village; a homegarden in Likombe village.

Abstract

This thesis explores different facets of the interface of traditional management systems around Mt Cameroon and national and global conservation policy and practice, including the way in which traditional management systems and 'non-timber forest products' have come to be studied and understood in the context of human-environment interactions and as a way of attempting to align economic development and conservation goals. Mt Cameroon has long been characterized by change and transformation - cultural, economic, ecological, political – all of which contribute to its extraordinary biological and cultural diversity. A global hotspot for biodiversity, in recent decades Mt Cameroon has attracted the attention of numerous conservation programs and donors. My research uses a range of intersecting questions, methods and approaches to capture the dynamics of social and environmental change at multiple scales, and over decades. It explores the way in which local-level knowledge and practices are shaped and mediated between households, communities, local and global markets and extra-local forces and agents, in particular those linked to livelihood and market-based conservation initiatives. I argue that a failure to identify the social and environmental dynamics of local groups' forest management practices, and an incongruously large emphasis on products sold in markets, can often legitimize the extractive activities that cause biodiversity and forest loss in the first place, while de-emphasizing locally-driven change and – ironically - glossing over diversity in cultures and ecosystems in pursuit of uniform, global prescriptions.

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Chapter 1

Biocultural Diversity and Conservation around Mt Cameroon: An Introduction to Works Submitted for PhD by Publication

Mt Cameroon has long been characterized by change and transformation - cultural, economic, ecological, political – all of which contribute to its extraordinary biological and cultural diversity. A global hotspot for biodiversity, in recent decades Mt Cameroon has attracted the attention of numerous conservation programs and donors. This thesis highlights the disjuncture that exists between how rural communities around Mt Cameroon and elsewhere engage with each other and their surrounding landscapes and resources, and the way that these relations are understood and represented at national and international levels, are subsequently translated into normative and regulatory interventions, which then in turn re-shape, often with unintended and unfortunate consequences, people's practices and relationships with their landscape and resources.

More specifically, I examine different facets of the interface of traditional management systems around Mt Cameroon and national and global conservation policy and practice, including the way in which 'non-timber forest products' have come to be studied and understood in the context of human-environment interactions and as a way of attempting to align economic development and conservation goals. In doing so I also explore broader patterns of forest product and traditional management governance systems, including the interface of customary and statutory law. I argue that an overemphasis on market-based conservation approaches can undervalue traditional knowledge and practices, and the role of cultural relationships with the environment in conservation.

Taken together, these chapters offer a view into the intersecting challenges raised by conservation approaches that fail to identify the social and environmental dynamics of local groups' forest management practices, and place incongruously large value and emphasis on products sold in markets. These challenges include an emphasis on 'win-win' partnerships with companies that can legitimize the extractive activities that cause biodiversity and forest loss in the first place (Alston, 2020; Reed et al, 2020; Larsen and Brockington, 2018; Sullivan 2018). Market-based approaches are also often linked to overly optimistic policies like "access and benefit sharing" under the Convention on Biological Diversity, which has proven difficult to implement in ways that support communities and conservation (Laird et al, 2020; Wynberg et al, 2015). A focus on marketed products has also led some conservation professionals and researchers to dismiss as marginal the significant, but understudied, subsistence values of traditional management systems (Belcher and Ruiz Perez, 2001; Shiel and Wunder, 2002; Levang et al, 2015; Alexiades and Shanley, 2005). Finally, a focus on corporations and consumers in conservation programs can de-emphasize locally-driven, grassroots change, and gloss over diversity in cultures and ecosystems in pursuit of uniform, globalized prescriptions (Sullivan, 2011; Hanspach et al, 2020).

This PhD is based on long-term field research, beginning in 1994 and continuing to the present, during which time I also worked professionally in conservation, including on the kind of market-based solutions of which I am now more skeptical. The thesis uses a range of intersecting questions, methods and approaches to capture the dynamics of social and environmental change at multiple scales, and over decades. It explores a number of ways in which local-level knowledge and practices are shaped and mediated between households, communities, local and global markets and extra-local forces and agents, in particular those linked to livelihood and market-based conservation initiatives. Methods include ethnobotanical and community-based research; studies of market tools like certification, sustainable harvesting and trade of NTFPs, and bioprospecting; and policy research on NTFP governance, emerging technologies, and access and benefit sharing under the Convention on Biological Diversity.

By working for an extended period of time in Cameroon and internationally on conservation projects and policy for local and global NGOs (including BINGOS), governments, intergovernmental organizations, research institutions, and Secretariats for UN treaties, I was able to both participate in and observe a wide range of conservation and governance approaches, and their impact on traditional knowledge and management systems. This long-term perspective, close working familiarity with the field of conservation and market-based approaches, and many years of ethnobiological research with communities around Mt Cameroon, which provided a deeper and more personal understanding of the dynamics of traditional management practices, allowed for an evolution in my understanding of conservation approaches and their effectiveness.

Mt Cameroon, a center of cultural and biological diversity

Mt Cameroon is an active volcano, the largest mountain in West Africa, and one of the most biologically diverse places on earth. Due to its extremely high species diversity and levels of endemism, and threats to its forests and biodiversity, Mt Cameroon is considered a national and global priority area for conservation, and the most diverse ecosystem in Cameroon (WWF, 2020; Ustjuzhanin et al, 2018; Fotso et al, 2007; Ndam et al, 2001; Cable and Cheek, 1998). As a result, a wide range of international donors and conservation agencies have run projects, and supported establishment of a Mt Cameroon National Park, in recent decades, including the donor arms of the former colonial governments of the UK and Germany.

Indigenous groups living around Mount Cameroon retain strong traditional resource management systems that reflect deep historical and cultural connections to place, and migrants to the region have adapted their traditional management practices to the local environment, and have learned from indigenous practices (Laird et al, 2011, *Chapter 1*; Ardener, 1996). Indigenous management systems around Mt. Cameroon, like those elsewhere, manage and maximize diversity as a way of reducing risk and maintaining a range of livelihood strategies in keeping with tradition, taste and personal preference. In this way, these systems support health, and provide a 'safety net' or 'natural insurance' during seasonal and cyclical food gaps, and during difficult years (Dounias, 2010; Alexiades, 1999; Arnold and Ruiz-Perez 2001, Neumann and Hirsch

2000, Shackleton *et al*. 2011a), while also promoting resilience in an area long characterized by change.

Indigenous groups around Mt Cameroon are not conservationists, nor a uniform community (Burnham 2000; Sharpe 1998). However, their traditional systems integrate a wide range of habitats, species and practices, adapt to and capitalize on seasonal change, and grow from local ecological processes and biological diversity. Rather than directed towards quick gain, they often place a premium on endurance, resilience, and well-being over time, accommodating many social needs, material as well as symbolic. As a result, they not only create the basis for community, health, and sustainable livelihoods, but reduce risk in a complex and uncertain environment, helping local groups adapt to change, including climate change, and more recently civil unrest (Laird et al, 2011; Laird et al, 2007; *Chapters 1 and 2*). Migrant livelihood strategies vary depending upon how long families have lived in the area, where they came from, the extent of contact with forests, and other factors; many have lived in the area for generations and have developed their own close relationships with the local environment (*Chapter 1;* Geschiere 2009; Konings and Nyamnjoh 2003; Jua 2001; Sharpe 1998). On the whole, however, migrant households maximize cash income to a greater extent, and use a far less diverse range of species and habitats, than indigenous households (Laird *et al.* 2007; 2011; *Chapters 1 and 2*).

The Mt Cameroon region, part of South West Province, is historically characterized by environmental, social and political change, and more recently climate change and civil unrest. Traditional management systems are inherently dynamic, but the pace and intensity of change is greater today than at any time since colonial governments forcibly relocated villages up the slopes of the mountain in the late 19th Century, and established vast tea, rubber, oil palm, cocoa and other plantations that remain to this day (Ardener 1996; Ardener et al, 1960; Kofele-Kale 2010).

Today, pressure on traditional knowledge, forests, and biodiversity comes from a range of sources, including expansion of commercial agriculture and associated land grabs driven by global and urban demand for food crops and oil palm. South West Cameroon has the largest area of plantations in the country, mainly oil palm (66.3%), followed by rubber (9.5%), and including fruits and other commodities (Global Forest Watch, Cameroon dashboard, accessed July 2020, https://www.globalforestwatch.org/dashboards/country/). Between 2000-2015, 67% of oil palm expansion in South West Province was cleared from forests, some to serve industrial mills but the majority associated with informal mills run by local individuals better able to navigate complex land tenure systems (Ordway et al, 2019). In recent decades, South West Province has been the site of on-going conflict around government allocation of large tracts of forest lands for logging, and oil palm and other industrial agriculture, often in biologically diverse areas managed by local communities (Achoubang et al, 2013; Linder 2013). Although 81% of Cameroon's land is held by "indigenous people and local communities" (IPLC), in only 9% of the country area are their land rights legally recognized (Rights and Resources Initiative, 2020).

Around Mt Cameroon, an area long characterized by plantations (Ardener et al, 1960; Ardener, 1996), forests and traditional farms and fallows continue to be replaced with industrial

monocultures, smaller scale oil palm, or crop farms for urban markets that use pesticides and herbicides and, unlike traditional farms, work against rather than promote diversity. Spikes in demand for forest products like medicinal plants (eg *Prunus africana*) (Cunningham et al, 2016) and bushmeat (Akem and Pemunta, 2020; Wilkie et al, 2011; Whytcock et al, 2016) across the region have led to their depletion, and oil exploration and logging continue in some of the most biologically diverse forests around Mt Cameroon and South West Province. The globalized economy, manifested in a range of commercial activities, is creating enormous pressure on the biological diversity of the region (Linder, 2013; Meyfroidt et al, 2014; Ordway et al, 2017).

Alongside biodiversity and forests, traditional knowledge and practices are under pressure from similar and related causes. As forest and fallow lands degrade or are reduced in size, traditional management strategies that rely on a range of habitats are compromised. At the same time, globalization draws the young to towns, which offer few opportunities; HIV and other health concerns can divide and drain communities; and knowledge is no longer easily passed down from one generation to the next (Kinge et al, 2011; Laird et al, 2011, *Chapter 1*). Most recently, massive civil unrest and violence in the Mt Cameroon region and broader South West and North West Provinces, has resulted in entire villages burned and residents fleeing to forests or local towns for safety (Amnesty International, 2019). Unrest and violence increased in the Mt Cameroon region in 2018, and arrived in the study villages that are part of this research, resulting in a further decline in community and cultural cohesion.

Traditional management systems can contribute to a patchwork of conservation strategies, and have been shown around the world to retain significant forest cover and biological diversity, and replicate structural and functional elements of the forest (e.g. Alcorn 1989; Alexiades and Shanley 2005; Puri, 2005; Gomez-Pompa 1990; Redford and Padoch 1992; Peters 2000; Posey and Balee 1989; Posey 1999; Dounias 1993). Studies have identified that they conserve soil, regulate temperature, and resist pests and diseases better than more intensive agricultural systems, while contributing to genetic and species conservation, carbon sequestration, watershed protection, and wildlife habitat (Eyzaguirre and Linares 2004; Leakey and Tchoundjeu 2001; Sonwa *et al.* 2001; Zapfack *et al.* 2002).

Traditional knowledge and management practices cannot address the primary causes of deforestation and biodiversity loss, however – extractive industries and economic pressures originating outside the region, and political, economic and social inequity and instability – and local communities can do little to reverse deterioration in government institutions, or directly address flaws in laws or policies (Transparency International, 2018; Assembe, 2009; Burnham and Sharp, 1997; Egbe, 2001; Cerutti and Lescuyer, 2011; Cerutti et al, 2013; Ndoye and Awono, 2010). The health of traditional management systems, as well as biodiversity, is closely linked to broader political, economic, social and other external forces, but traditional knowledge and practices can complement western scientific studies of species and ecosystems, and reveal and support approaches to conservation that embrace uncertainty, complexity, and change (e.g. Dove 1993; Fairhead and Leach 1996; Igoe and Brockington 2007; Parajuli 1999; Richards 1999). In addition, traditional management of farm, fallow, and forest relies upon and retains significantly more biological diversity than intensive agriculture or logging, while supporting

cultural connections to place and community (Laird et al, 2007; Laird et al, 2011, *Chapters 1 and 2*).

For conservation to succeed in a region characterized by change, densely populated, with fertile soil and rich in natural resources that bring outside groups, large and small, to the area, managed landscapes must be part of conservation planning. The managed landscapes of indigenous groups around Mt Cameroon cover only a small portion of the area today (Schmidt-Soltau, 2003), but are expressions of long-standing, diverse and dynamic relationships between people and place, culture and nature and, rather than threats, as they can be viewed by conservationists, they can significantly contribute to biodiversity and forest conservation in the region.

The global conservation orthodoxy in recent decades has often promoted alternative livelihood strategies, market-based solutions, and maximizing cash income as an incentive to conserve biodiversity, and projects work to "improve" indigenous management and trade systems, which are viewed as poverty traps. The Mt Cameroon region illustrates the blind spots in these approaches, which are often based on limited understanding of local practices, and overlook the diversity retained in traditional management systems and the formidable trading talents of individuals and communities in Cameroon. These interventions rarely interrogate why traditional management systems minimize risk rather than maximize gain, incorporate hundreds rather than a dozen species, and promote health, food security, and well-being alongside cash income. Ironically, conservation programs have worked for years to promote livelihoods that are often precarious, dependent upon fickle markets, and with more tenuous links to bio-cultural diversity and forests than the management systems they seek to replace.

How did we get here? The evolving conservation and sustainable development framework

The field of conservation has transformed over the last five decades, moving away from a preservationist approach to one intended to produce greater equity and sustainability, as well as responsiveness to indigenous and rural communities. In part, this shift resulted from the increasingly evident environmental and health costs of economic growth in developed countries, as well as growing awareness that the world's biodiversity, and intact natural environments, were often found in inverse proportion to technological and industrial wealth (Macilwain, 1998).

Global efforts to resolve the tension between economic growth and the environment were addressed through numerous instruments that created a new model of 'sustainable development'. They included The World Conservation Strategy (IUCN, 1980), The United Nations World Commission on Environment and Development's Brundtland report, *Our Common Future* (United Nations, 1987), and the various agreements that emerged from the 1992 UN Conference on the Environment and Development (UNCED) in Rio. The objectives of the 1992 Convention on Biological Diversity (CBD), for example, are biodiversity conservation, sustainable use, and the fair and equitable sharing of benefits (Article 1). The CBD has served as a policy home for

consideration of its linked objectives and the evolving "use it or lose it" or "if it pays, it stays" approach to conservation.

In overlapping and parallel processes, during the 1980s and 1990s there also occurred an expanding recognition of the links between cultural diversity and biological diversity (Posey, 1999); the fact that biodiversity is at its highest not only where nations are poorest but also, within nation states, where local populations are most economically and politically marginalized (Dove, 1996); and a growing movement to assert the cultural and environmental rights of indigenous peoples and local communities (Posey and Dutfield, 1996). International policy instruments addressed in increasingly clearer terms the rights of indigenous peoples and local communities to consult, consent, control, and benefit from the use of their land, resources, and knowledge (e.g. International Labor Organization Convention 169 Concerning Indigenous Peoples, 1989; Convention on Desertification and Drought, 1994; Agenda 21 and the Rio Declaration, 1992; UN Declaration on the Rights of Indigenous Peoples, draft 1994; adopted in 2007). The Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity (2004) provided a framework to support Parties of the CBD as they implemented sustainable use, and recommended, for example, consideration of customary law and traditions when drafting new legislation and regulations, and the need to respect the rights and stewardship of local communities (Principle 2).

Article 8j of the Convention on Biological Diversity committed Parties to "…respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices." Indigenous peoples' groups, sometimes in partnership with researchers and others, drafted declarations and other documents at this time demanding equitable conservation and research practices (eg Declaration of Belem, 1988; Kari-Oca Declaration and Indigenous Peoples Earth Charter, 1992; COICA/UNDP Santa Cruz Declaration, 1994; Mataatua Declaration, 1993; and International Alliance of Indigenous Tribal Peoples of the Tropical Forests, 1995).

Participatory approaches to conservation and resource management that began in the 1960s had full hold by the 1980s and 1990s as part of efforts to bring the experiences of local groups into conservation planning and management, and create more equitable conservation arrangements (Reed et al, 2016). Over the years, applied conservation projects have sought to link improved livelihoods and community management with conservation, including through integrated conservation and development projects (ICDPs), community based natural resource management (CBNRM), community forests, integrated landscape, inclusive value chain, and other approaches (Miller, 2014; Reed et al, 2020; Sunderland et al, 2008; Ros-Tonen et al, 2015).

In the field of forestry, non-timber (or non-wood) forest products (previously known as 'minor' or 'secondary' forest products) which, along with other values like watershed protection and recreation, had long been invisible to professional forestry and natural resource managers and

policy-makers, began to emerge from 'invisibility'. Studies demonstrated the economic and cultural value of these species to local groups (e.g. Peters et al, 1989; Peters, 1996; Cunningham, 2001; Shanley and Medina, 2005; *Chapter 4*), and from the late 1980's onward, international marketing and trade of NTFPs was viewed as a sustainable economic alternative to destructive activities and an incentive for conservation (e.g. Plotkin and Famolare, 1992; Clay, 1992; Nepstad and Schwartzman, 1992; *Chapter 4*). For species in international trade, certification and marketing programs, corporate social responsibility, and other voluntary approaches were employed to inform consumers about raw material sourcing conditions through product labelling, providing communities with access to markets for sustainable products, and in some cases premium prices (Shanley et al, 2002; *Chapter 6*). However, the uniform standards and global markets characteristic of certification fit poorly with ecologically and culturally diverse, geographically dispersed, and relatively low value NTFPs, and challenges continue today (Pierce and Laird, 2003; *Chapter 6*).

In the last ten years, often linked to the access and benefit sharing (ABS) policies of the CBD that promote the 'fair and equitable sharing of benefits' from the use of biodiversity, the non-timber forest product marketing programs of the late 1980s and 1990s have evolved into what today is termed "biotrade" (UEBT, 2020, ethicalbiotrade.org). In keeping with earlier efforts, these activities sometimes generate important benefits for local communities, and can regulate the use of traditional knowledge, but they can also re-enforce social inequities, allow elite capture by chiefs, local officials, and others, and in Cameroon have required significant sums from donors to bring companies into partnerships. The social, economic and conservation impacts of these partnerships also tend to be very localized, rarely creating systemic or lasting change, or addressing the drivers of inequity and environmental degradation.

What have these trends meant in practice for conservation and rural people?

As conservation shifted from a purely preservationist approach to incorporate sustainable development in the 1980s, traditional management systems and broader indigenous rights were initially considered a new but important part of conservation approaches, as was the trade in non-timber forest products. These new approaches sought to increase local participation, to better incorporate local priorities into conservation, and to provide communities with sustainable incomes that promoted biodiversity conservation. This was a time of growth and evolution, it seemed, in the fields of conservation and sustainable development.

Conservation becomes part of the political economy

Over the years, however, conservation practice largely moved away from approaches involving traditional management and NTFPs, which came to be viewed through the lens of their economic value and potential role in 'development'. Conservation became part of the political economy, moving increasingly towards neoliberal market-based approaches, and a view of nature as capital (Sullivan, 2006; Sullivan, 2018; Igoe and Brockington, 2007; Buscher and Fletcher, 2020). As the relatively small cash value of traditional management systems, and local and even global trade of NTFPs became evident, as did the difficulty of 'scaling up' and

measuring their 'impact', these various uses and relationships with forests and landscapes were largely dropped from the conservation agenda. In some conservation and policy circles, it became fashionable to view NTFPs as a 'poverty trap' rather than a 'golden egg', a livelihood of last resort (eg Belcher and Ruiz Perez, 2001; Shiel and Wunder 2002), and some researchers questioned communities' "perceived importance" of NTFPs rather than research methods that yielded conflicting results (e.g. Levang et al, 2015). Measuring the conservation and development gains from traditional management systems, or their 'impact', has always been difficult given their multidimensional nature and complexity (Arnold and Ruiz-Perez, 1996, 2001; Neumann and Hirsch, 2000; Alexiades and Shanley, 2005).

Despite falling out of favor within conservation, NTFPs remained a central part of the forest economy (Shanley et al, 2016; Shackleton et al, 2011a; 2011b). Many species have large international markets (e.g. Brazil nuts, rattan) or substantial local and regional markets immune to fads in the field of conservation or developed country consumerism (e.g. in Cameroon *Irvingia gabonensis* and *Gnetum africanum*; Awono and Levang, 2018; Awono et al, 2009). More importantly, as demonstrated in Laird et al 2011 and 2007 (*Chapters 1 and 2*) around Mt Cameroon, the subsistence use by local communities of a wide range of wild harvested and cultivated species, interwoven with biodiversity, remains significant in forest regions.

Given the catastrophic impact of global agriculture, logging, oil, and mining in recent decades, it was natural for conservation agencies to focus attention on these larger-scale activities. The revenues of extractive industries have increased 300% since 1970, but companies do not bear the estimated $5 trillion cost of their negative environmental impact (IPBES, 2019). Raw timber production has increased 45% since 1970 and 10-15% of this is illegal, and in some areas 50%. Half of the 100 million hectares of agricultural expansion in the tropics from 1980-2000 came at the expense of intact forests (IPBES, 2019). However, rather than confront and challenge extractive industries and industrial agriculture, most large conservation groups focused on establishing 'win-win' partnerships – corporations make money, workers are paid, and the environment is 'saved' – that did little to change existing corporate practices.

Researchers documented the tendency for these partnerships to often end as win-lose, or lose-lose, scenarios (e.g. Reed et al, 2020; Larsen and Brockington, 2018; MacDonald, 2018; Laird et al, 2020), and explicitly critiqued the move towards market-based, neoliberal approaches to conservation (e.g. Igoe and Brockington, 2007; Blanchard et al, 2018; Pawliczek and Sullivan, 2011; Larsen and Brockington, 2018). A multitude of researchers over the decades have identified the importance of gender, power, corruption, land tenure and resource rights, and the complexity and diversity of traditional management systems, as critical conservation issues, but they rarely crossed the 'science-practice-policy gap' (Reed et al, 2020; Toomey et al, 2017; Shanley and Lopez, 2009; Ros-Tonen et al, 2015; Shiel et al, 2016; Larson and Springer, 2016).

As a result, 'sustainable development' crept from a vision that included rural people living in biologically diverse regions, including versions of traditional management systems, to one in which rural people became part of a global economy and might labor on certified sustainable plantations, harvest and sell bulk raw forest products for fair trade or green markets, serve and

guide tourists, or might be removed from their land altogether (Homewood, 2004; Sullivan, 2006; Buscher and Fletcher, 2020). Rural people were 'consulted' but rarely controlled these systems, and benefits were primarily 'shared' with them – in the parlance of the CBD and other global initiatives. Consumers, governments and corporations were considered the levers of change necessary to conserve forests and biodiversity at scale.

Legitimizing forest degradation and marginalizing the rural poor

With a discourse that referenced participation, consultation, benefit sharing, and included cameos of local communities in all publicity, along with broader society in the 1990s and 2000s conservation agencies largely moved towards and re-enforced the power of corporations and captive governments. They often 'partnered' with the very forces that caused deforestation and biodiversity loss, accepting small crumbs of modified practices, and further marginalized rural groups living in biologically diverse regions. Important underlying drivers of deforestation like unresolved land and resource rights, and land grabs that accompanied much industrial use of forests, received attention mainly from smaller environmental organizations and human rights groups. In Cameroon, unclear land tenure and resource rights has enabled the government to cede vast community lands to extractive industries and industrial agriculture, has facilitated corruption, forced producers and traders to pay bribes, and undermined the domestication and sustainable harvesting of NTFPs (Laird et al, 2010; *Chapter 3*; Ingram, 2014, 2017; Awono and Levang, 2018; Rights and Resources Initiative, 2020).

For decades, governments in high biodiversity countries enthusiastically signed onto global conservation agreements, frameworks, strategies, plans and programs, but rarely implemented them. Global donors kept the spigot open for each new initiative, with the same results. Corporations enacted socially responsible business practices, set targets, and bought certified materials, they offset biodiversity and species damage, bought carbon credits, philanthropic donations were channeled to conservation, and corporate leaders received awards from environmental groups. But for most companies – whether timber, mining, commodity agriculture, oil and gas - these activities existed in parallel to their core, environmentally and socially destructive, business, and were often largely marketing efforts, or attempts to fend off more aggressive regulation or buy cover and critical time for unsustainable practices (Pawliczek and Sullivan, 2011; Barr et al, 2014; Barr et al, 2001; Wetlands International, 2016).

Governments reluctant to regulate dramatically destructive industries at the same time embrace access and benefit sharing (ABS) policy under the CBD. In part, this is because ABS promises economic benefits and addresses historical inequities, but ABS also asks very little of governments and companies profiting from biodiversity loss. As a market-based tool, ABS seeks funds for conservation from research and innovation based on biodiversity, rather than the profitable and powerful industries that destroy it. ABS under the Nagoya Protocol has grown increasingly disconnected from the innovations and scientific practices it seeks to regulate, however, and has proven difficult to understand and implement (Laird et al, 2020). This creates challenges for communities, producers, researchers and others who must navigate a well-intentioned but impenetrable bureaucracy (Laird and Wynberg, 2016; Wynberg et al, 2015).

While market-based approaches to conservation have had some successes, and early on appeared a valuable part of a patchwork of strategies, over the decades they came to dominate the field, consuming bandwidth and drowning out different views and approaches. As if each new dire report on forest and biodiversity loss bore little relationship to their previous work, conservation groups, donors, and international agencies repeatedly doubled-down on the same ineffective approaches. Over the last 30 years, rather than asking for more and consistent improvements from their corporate partners and governments, conservation groups have instead often legitimized the very activities and forms of extraction and development that damage and degrade forests and biodiversity (Buscher and Fletcher, 2020; Kosoy and Corbera, 2010; Sullivan, 2018). Buscher and Fletcher (2020) argue that conservation, still dominated by the Global North, seeks to integrate conservation with capitalism – through eco-tourism, payment for environment services (PES), REDD+, natural capital approaches, etc. – without addressing the contradictions between them, and the need for an entirely new political and economic framework that recognizes humans as part of nature.

The UN Special Rapporteur on extreme poverty and human rights, Philip Alston (2020), recently noted that nowhere is a misplaced faith in the market and private sector to solve environmental and social ills more evident than in the UN's Sustainable Development Goals (SDGs): "The SDG framework places immense and mistaken faith in growth and the private sector, rather than envisioning states as the key agents of change and embracing policies that will redistribute wealth and address precarity". As he notes, the SDG "focus on economic growth without due consideration for its environmental impact or the extent to which it is currently tied to emissions and extraction is deeply problematic." Most international organizations continue to push the "simplistic orthodox formulation that 'growth is good for the poor'" and ignore that promised benefits either don't materialize or are not shared, natural resource extraction employs relatively few people, and commercial and other land intensive sectors displace rural communities, removing them from land that provides food, shelter and livelihoods (Alston, 2020).

As the 2019 global assessment from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services illustrates, the extent of biodiversity loss in recent decades has been devastating (IPBES, 2019). For all the meetings, strategies, targets, agreements, programs and projects, there is very little to show in the way of conservation. The argument can be made that the damage was less than it would have been otherwise, but with such catastrophic loss, it is difficult to imagine what this would look like.

The conservation-sustainable development model in Cameroon

Nowhere is the futility of most international interventions in conservation clearer than Cameroon. Cameroon, often referred to as "Africa in miniature" for its cultural and ecosystem diversity, is also a picture of 'conservation in miniature', having been a signatory and participant in a multitude of external, donor-driven efforts over decades. These include ICDPS, protected area expansion, Tropical Forest Action Plans, International Tropical Timber Organization commitments, the EU's Forest Law Enforcement, Governance and Trade (FLEGT) program to

reduce illegal logging, REDD+, the Nagoya Protocol and the CBD, and other efforts (Tchoungui et al, 1995; Ekoko, 2000).

However, since 1990, 3,300,000ha of forest has been cleared in Cameroon, an area the size of Belgium (WRI, 2020). In 2000, 67% of Cameroon was natural forest (31.4Mha) but by 2016 only 12% of tree cover was intact forest (3.56Mha) with 27Mha "other tree cover" (Global Forest Watch, Cameroon dashboard, accessed July 2020, https://www.globalforestwatch.org/dashboards/country/). From 1990 – 2016, land use change and forestry accounted for 122T CO2 per year, 61% of Cameroon's total greenhouse gas emissions over that period; from 2001-2019, 519Mt of CO2 were released in the atmosphere as a result of tree cover loss (Global Forest Watch, Cameroon dashboard, accessed July 2020, https://www.globalforestwatch.org/dashboards/country/).

The emergence of alternative biocultural and equity-based approaches

The scale of cultural and biological diversity loss has been overwhelming, and calls out for alternative approaches and solutions. One approach, developed during the years that market-based conservation came to dominate, counters what Hanspach et al (2020) describe as "the unidirectional utilitarian conceptualization of nature and narrow disciplinary solutions" in order to move "… towards more systemic and inclusive approaches that acknowledge a plurality of worldviews and human–nature interactions". 'Biocultural diversity' approaches integrate "biodiversity" - the variability among living organisms from all sources, including diversity within species, between species and of ecosystems (Convention on Biological Diversity 1992) and "culture", the shared, learned and symbolically expressed aspects of human experience and society. Cultural relationships with forests include traditional ecological knowledge on flora and fauna, edible versus inedible foods, plant medicines, and forest management systems, as well as shared notions of kinship, marriage, prohibitions, cosmology and ritual (Balee 1994), and 'cultural diversity' describes variability in these relationships.

"Biocultural diversity" has been defined as the interweave of biological and cultural diversity, people and place, and the continuing adaptation and co-evolution between natural landscapes and ways of life (Laird et al, 2011; *Chapter 1*; Cocks 2006b; Maffi 2005; Maffi and Woodley 2010; Wilson 2008). It is not a concept reserved for indigenous peoples, and describes a range of relationships between local people and biologically diverse environments (Cocks 2006a and 2006b).

Although biocultural approaches to conservation remain marginal, elements have been integrated into global slow and sustainable food movements, and in recent years, indigenous peoples' rights have come back into focus for the global community with the advent of widespread land grabs from indigenous peoples and local communities around the world for commodity agriculture, oil, gas, mining, and other extractive industries. As Sullivan (2011) notes, bioculturalism, by bringing varied cultural values into conservation, and reconnecting nature and

culture, provides an alternative to the "dominating creed of economic growth and its continuous commodification of life" which can overshadow other approaches and motivations for conservation.

Hanspach et al (2020) describe biocultural approaches as a bridge between diverse knowledge systems and policy that make them a potentially powerful tool for sustainability, bringing together practitioners, indigenous rights movements, and intergovernmental environmental bodies like the CBD and IPBES, although they note that most approaches to date do not adequately address issues of power and gender. Buscher and Fletcher (2020) propose a relative of biocultural approaches called 'convivial conservation', a combination of strategies that include de-growth, de-colonizing, a basic conservation income, and a view of humans as part of, not separate from, nature.

Biocultural approaches are not a panacea nor broad solution to the loss of forests and biodiversity, but they serve to highlight and strengthen alternative ways to view relationships between people, landscapes and biodiversity, the important role of rural people in conservation, the value of historical connections to place, and culturally and biologically unique management systems.

Biocultural Diversity and Conservation around Mt Cameroon: Research approaches and methodological framework

This PhD explores conservation paradigms popular over the last thirty years through the lens of my ethnobotanical and NTFP research on the cultures and environment of Mt Cameroon. It also grows from many years undertaking research, developing policies, and working on practical conservation programs with non-governmental organizations, governments, companies, and research institutions. Much of this work focused on market-based approaches to biodiversity conservation, including certification, sustainable and equitable commercialization of medicinal plants and other non-timber forest products, bioprospecting, and biodiversity research. Many of my research publications grow from the exploration of these and other economic alternatives to biodiversity and forest loss, and the provision of practical resources and analysis to support conservation practices and policies (e.g. Reid et al, 1993; Laird et al, 1996; ten Kate and Laird, 1999; Laird, 2002; Shanley et al, 2002; Pierce and Laird, 2003; Laird et al, 2005; Laird and Wynberg, 2016).

In the 1990s, my research also focused on sustainability and equity in the cocoa sector, as well as global botanical medicine, pharmaceutical and other industries reliant upon non-timber forest products, biological and genetic diversity, and in some cases traditional knowledge. It included research in Cameroon and Nigeria on smallholder cocoa farms, resulting in publication of a handbook on cocoa certification (Laird et al, 1996); studies in Cameroon on economically

important botanicals (eg *Prunus africana*), and potential leads for pharmaceuticals (eg *Ancistrocladus korupensis*) (Laird and Lisigne, 1998; Laird et al, 2000).

It also included research on certification of non-timber forest products (eg Shanley et al, 2002; Pierce and Laird, 2003; *Chapter 6*), and sustainability and equity issues associated with medicinal plants in trade (eg Laird et al 2005). A great deal of my research has also been undertaken in connection with the Convention on Biological Diversity policy process, either through the Convention's Secretariat, international donors, governments, or NGOs. It has primarily focused on traditional knowledge and resource rights, the commercial use of biodiversity, and ways to build equity into research and trade in genetic and biological resources (eg ten Kate and Laird, 1999; Laird, 2002). A more recent emphasis in my research is the equity and sustainability of emerging technologies, including under the CBD (Laird et al, 2020; Laird and Wynberg, 2018; Wynberg and Laird, 2017; Laird and Wynberg, 2016).

During this time, my work also focused on the rise of interest in indigenous rights within the conservation community, the 'ethical envelope' of research and conservation, and the relationship between cultural and biological diversity (eg Laird, 1999; Laird, 2002; Laird et al, 2007; Laird et al, 2011). This PhD brings publications on traditional resource management and links between cultural and biological diversity from the Mt Cameroon region (*Chapters 1 and 2*) together with those exploring market-based tools for conservation and equity in conservation policy and practice (*Chapters 4, 5, 6)*.

In the mid- 2000's it became increasingly clear how various policy and legal interventions, many with the best intentions, had created challenges for NTFP producers, rural communities, and small enterprises in biologically-diverse regions, and in many cases worked against their interests and traditional management systems. Although getting the legal framework 'right' is a basic pre-requisite for sustainability and equity, and therefore conservation, laws governing non-timber forest products and traditional management systems had received limited attention. As a result, some of my research began to focus on regulatory frameworks, including both customary and statutory laws that govern NTFPs and 'wild products" (*Chapters 3 and 4*; Laird et al, 2010; 2011; Wynberg and Laird, 2007; Wynberg et al, 2015), including within Cameroon (*Chapter 3*; Laird et al, 2010). Throughout Cameroon, customary laws address who owns resources, who can harvest them, where, and in what quantity, and who benefits and in what ways - all with greater specificity and legitimacy than weak government regulations (*Chapter 3*; Laird et al, 2010).

A steady thread of research interest over the last 25 years, which has grown to overshadow the other areas, has been the extraordinary cultural relationships between people living around Mt Cameroon and their environment. Early in my conservation career, I was involved in studies documenting 'useful plants' in the Limbe Botanic Garden and the region (eg Laird et al, 1996), and more generally examining cultural relationships with forests (eg Laird, 1999). With time and more intensive field work my understanding and appreciation of the enormous diversity and sophistication of traditional management systems, and their role in conserving biodiversity, only increased.

In the late 1990s, my research began to focus on the enormous, and previously undocumented, subsistence use of species found in farms, fallow and forest around Mt Cameroon. My research included a study on the retention of biological and cultural diversity within cocoa farms (*Chapter 2*; Laird et al, 2007), and grew to encompass a wide range of uses and management practices, in both migrant and indigenous communities (*Chapter 1*; eg Laird et al, 2011). Much of the data I collected over the last 20 years has yet to be published, but both published and unpublished data demonstrate a surprising resilience in traditional knowledge and management in an area that is under pressure from a myriad of forces, as well as strong links between biological and cultural diversity of relevance for conservation planning and programs in the area. This body of work, informed by earlier and related areas of study, forms the core of my PhD based on published works.

The methodology employed in this PhD integrated different approaches and disciplines in order to better understand the interweave of biological and cultural diversity, markets and laws, and conservation and development. Cultural diversity and biological diversity have generally been the subjects of distinct areas of study, with the exception of multi-disciplinary – and as a result often marginalized – fields like ethnobiology (eg Alexiades 1996; Alexiades 1999; Alcorn 1989; Balee 1994; Gadgil 1993; Gomez-Pompa 1990; Martin 1995; Posey 1999). However, the richness and diversity of indigenous livelihood systems and peoples' relationships with nature cannot be understood or productively examined as independent domains (Pretty *et al*. 2009). Conservation, livelihoods, health and well-being are linked and interdependent parts of a whole (Colfer 2008; Cunningham *et al.* 2008; Dounias and Colfer 2008; Hladik *et al*. 1990; Hladik *et al*. 1993; Karjalainen *et al*. 2010; Posey 1999).

Methodologies included quantitative and qualitative ethnobiological methods in five villages around Mt Cameroon (Likombe, Ekonjo, Upper Buando, Etome and Bova Bomboko), taking place over the course of 20 years and continuing today. These included a census in each village, and daily household surveys undertaken in 118 households over the course of a year. Surveys documented resources gathered from farm, compound, fallow and forest for subsistence use and sale, as well as purchased items. The household survey allows comparison of differences in resource use between ethnic and age groups, individuals with different occupations, and study villages of different size, geography, and proximity to forest, markets and urban centers. The daily household survey recorded all things collected and consumed, or sold, by households, and allowed us to move beyond identifying and listing what is generally reported as 'useful', to quantifying the nature of use. The products recorded include agricultural crops, wild foods (fruits, greens, mushrooms, spices, etc.), construction materials, fuelwood, medicines, protection and cultural species, and others.

In addition, in order to calculate a monetary value for products harvested for subsistence, market surveys were undertaken. For each village, a study in the main local market was undertaken to account for variations in prices between markets. Markets vary enormously in size and specialization, from under fifty sellers to more than one thousand (e.g. Limbe).

Additional research included development of a "checklist" of more than 400 useful plant species,

which was fed by all aspects of the field research over many years, and included collections of voucher specimens with staff from the Limbe Botanic Garden, and mushroom specimens with IRAD experts. Recording Bakweri names of species had been a recurring problem for species lists in the Mt Cameroon area and to address this we made "linguistic vouchers", or tape recordings of names. We also worked with older members of the community (all now deceased) who as children were trained by churches to read and write the Duala language, and so could transcribe Bakweri, which is part of the Duala language group. By the 1950s, English replaced Duala in local schools, and during my research only older individuals knew how to write plant and other names in Duala. The checklist also includes information on 18 categories of use, species management (cultivated, protected, enrichment planting in forest, wild-harvested), and ecological and conservation information.

Early in the research process, a free listing exercise and group discussions provided guidance to the species most valued, and important categories of use, and this was a helpful starting point (in the researchers' education). This was not, however, a sufficient basis for understanding resource use, perspectives, and values, and reviewing these results a few years into the research process revealed their preliminary nature. A methodological lesson repeatedly emphasized during the research is the importance of spending long periods of time with people, and in a place. Many of our early assumptions and conclusions were upended as the years passed, and my understanding and results transformed.

A range of additional formal and informal interviews, generating quantitative as well as qualitative data, were undertaken in subsequent years. These included resource-specific surveys and field collections that addressed important species and categories of use emerging from the daily household survey. For example, common medicinal plants found in compounds featured regularly in household survey results, but specialist medicinal plant use emerged only through direct discussions and walks with healers. Similarly, species used by basket-weavers, NTFP harvesters, and hunters were understood through informal discussions and dozens of walks in the forest, over many years, with individuals. Other categories of widely consumed, gathered, and sometimes traded resources - e.g. wrapper leaves, forest ropes, vegetables/greens, yams, and mushrooms - leant themselves to additional quantitative surveys, as well as dozens of informal interviews and discussions on farms and in the forest. The research also expanded to focus on disappearing traditional dance, music, and games, and artifacts like household products, musical instruments, and traditional game pieces.

Additional studies undertaken with both indigenous and migrant households include surveys and mapping of useful species found in compounds (home gardens) and farms, which provided finer detail on species use and management practices, and a "tree trail" exercise that helped to identify differences in plant knowledge across age, gender, occupation, ethnic group, and village. A study of cocoa farms included surveys in 66 cocoa producer households, and mapping 26.1 hectares of cocoa farms to identify useful species planted or retained in conjunction with cocoa production. I also analyzed the effectiveness of different ethnobiological and community-based research methods, and their strengths and weaknesses.

In addition to ethnobiological research, policy research in Cameroon has included surveys in the five villages around Mt Cameroon on customary law and resource rights, including access and ownership of a range of forest resources, and lands, and tree ownership on farms.
Policy and market research also included surveys of government officials, researchers, traders (local, as well as exporters) and industry representatives. This research has taken place over the last 25 years, and continues today. Policy research subjects include: medicinal plants in export trade, and the impacts of different laws regulating NTFPs on sustainability and local livelihoods; the policy context for sustainable cocoa production and certification; the interface of customary and statutory law; and access and benefit sharing (ABS) measures and implementation of the CBD and Nagoya Protocol. In all cases, institutional capacity, as well as development and implementation of legal texts, were studied.

The Thesis Chapters

The first two chapters report on some of the, primarily quantitative, results from the years of ethnobiological research around Mt Cameroon, and provide a local-level lens through which to view the broader issues in conservation that this thesis addresses. Chapter 1 (Laird et al. 2011-*The interweave of people and place: biocultural diversity in migrant and indigenous livelihoods around Mt. Cameroon*) frames biocultural diversity within the context of people's deeply embedded sense of place and belonging, while linking data on household-level use and dependence on agrobiodiversity and forest resources and some of the key drivers for socio-environmental change in the region, including migration, the connection with larger networks of economic exchange and the emergence of an environmental service economy centered around the establishment of Mount Cameroon National Park. The analysis of the management and cultivation of cocoa as a particular agro-forest product (Chapter 2, Laird et al. 2007-*Cocoa farms in the Mt. Cameroon region: biological and cultural divers in local livelihoods*) provides a case study of how agro-biocultural diversity is leveraged against, though also complemented with, other sources of subsistence and income, highlighting some of the complexities that emerge in the process of interacting and mediating between markets and conservation areas, and differences between migrant and indigenous approaches to management of a crop introduced by colonial administrations. These papers have been well received and widely cited, including reference to Chapter 1 in the steadily expanding biocultural diversity literature, and Chapter 2, which has been part of a more quickly growing literature on sustainable cocoa production and retention of biodiversity on cocoa farms.

The next two chapters are extracted from an edited volume on forest product governance, edited by Sarah Laird, Rebecca McLain and Rachel Wynberg. These chapters explore the legal and policy context within which non-timber forest products (NTFPs) are managed, used, and traded, and the impact these laws and policies have on local groups and conservation. They include Chapter 3 (Laird et al. 2010, *Integrating customary and statutory systems: the struggle to develop a legal and policy framework for NTFPs in Cameroon*) on the unique layers of statutory and customary laws that converge on forest and agrobiodiversity management systems

in Cameroon. This chapter demonstrates the weakness of the statutory legal framework, which is often considered illegitimate by rural groups, and the primacy of customary laws that most commonly regulate the management, use and trade of forest and agricultural products in remote, high biodiversity areas. Chapter 4 (Laird et al. 2010- *The State of NTFP Law and Policy*), explores these issues at a broader scale, within the context of global patterns of forest product and traditional management governance systems. These systems rarely resemble an overall policy framework, nor do they result from a systematic and strategic approach, and are instead usually an *ad hoc* response to a crisis, or overly optimistic estimates of tax revenue should 'informal' activities be made more formal. Indigenous and local communities are rarely consulted, if at all, and the institutional capacity within government to effectively implement these laws is usually limited. The book, and these chapters, have made a significant impact on the field of wild product governance, providing invaluable case studies which yield remarkably similar lessons around the world, as well as an historical and conceptual framing of an area of law and policy that had received limited attention. Findings that have had the greatest impact include those on the effect of corruption on producers, traders, communities, and conservation; the importance of customary law and its interface with statutory law; the complex and confused mix of statutory laws that govern these resources; and the impact of poor NTFP governance on conservation and communities.

The final chapters examine two potentially promising market-based approaches to conservation, bioprospecting and certification of NTFPs, neither of which has yielded significant benefits for conservation or local groups to date. Chapter 5 (Laird et al. 2000- *One in ten thousand? The Cameroon Case of Ancistrocladus korupensis*), explores an early case of bioprospecting and benefit sharing associated with an endemic species collected from a national park in Cameroon, illustrating the challenges of implementing global concepts of consent, benefit-sharing, and equity at a local level, and difficulties incorporating the views and priorities of local groups into policy-making. The final chapter, Chapter 6 (Pierce and Laird 2003- *In search of comprehensive standards for non-timber forest products in the botanicals trade*), explores another market-based tool for conservation, the certification of non-timber forest products, and includes case studies, and a critique of an expensive and time-consuming approach to conservation and equity for products produced and managed by communities, with relatively low market value. These chapters were both written following practical engagement with conservation groups. Chapter 5 grows from work I did with WWF in Korup National Park in Cameroon, supporting park managers as they developed ABS partnerships with government, the US National Cancer Institute, local communities, and others. Chapter 6 grows from a project I worked on with the Rainforest Alliance, exploring expansion of their certification programs to include NTFPs. Both Chapters 5 and 6 emerged during a time of optimism about the contributions business and markets could make to social justice and conservation, but both reveal early concerns and skepticism, borne out by events in subsequent years.

These chapters offer a view into questions and problems raised by conservation approaches that fail to identify the social and environmental dynamics of local groups' forest management practices, place incongruously large value and emphasis on products sold in markets, and de-emphasize local groups' role in creating change. They cover a span of time during which market-

based approaches to conservation came to dominate, but biodiversity and forest loss accelerated, and many communities' land and resource rights remained unrecognized and their livelihoods precarious. The chapters also offer a view into a parallel biocultural approach to conservation that arose during this time, and which views people, culture and nature as interconnected.

Conclusion

Conservation approaches in recent decades have emphasized technocratic 'solutions' that tweak economic relations in order to achieve equity, inclusiveness, and conservation but rarely address systemic inequities, power relations, corruption, and underlying causes and drivers of environmental degradation and poverty like insecure land and resource rights, and predatory governments and companies. The search for 'scale' and 'impact' within the field of conservation has also led to a focus on national and global entities as agents of change, and de-emphasized the power of local actors and – ironically – diversity in biology and culture.

Many conservation programs assume an ignorance of forest ecology, sustainable management, and marketing on the part of local groups in Cameroon, and conservation projects are often designed to seek inappropriate outcomes like increased cash income from precarious sectors (eg tourism, global botanical and cosmetic markets) while overlooking important, stable local and regional markets for NTFPs and extensive subsistence use of forests. Traditional management systems work to reduce risk and enhance diversity, health, and well-being rather than maximize cash from a few products, but conservation programs – as part of global conservation orthodoxies - tend to focus on the latter, which can be subject to elite capture, while undermining customary law and traditional management practices tied to culture, place and biodiversity.

The strengths of traditional management systems (in their entirety, including ecological, legal, economic and symbolic aspects) for forest and biodiversity conservation, and as systems with inherent cultural value for communities, has fallen from conservation fashion in recent decades, to the detriment of biocultural diversity. Rural communities are not conservationists, but traditional systems that promote diversity can be an important part of conservation at the landscape level, and much of the world's remaining biodiversity is on lands held by indigenous peoples and local communities.

The staggering loss of biodiversity and forests in recent decades argues for reconsideration of market-based strategies, and partnerships that legitimize companies and extractive industries that cause environmental degradation. The time and sums spent on efforts to catalyze market-driven conservation in the last 30 years have failed to create momentum for conservation. More effective use of conservation funding in the coming years might include opposition and activism that avoid excessive compromise with destructive industries, political engagement to transform governments and policies, exploration of new ideas like basic conservation incomes, and a move away from interventions that push 'new and improved', but largely precarious and imported, livelihoods, and towards biocultural approaches.

Addendum: Publications approved for submission

(total 64,276 words, plus Introduction 8,927 words)

Chapter 2: The interweave of people and place: biocultural diversity in migrant and indigenous livelihoods around Mount Cameroon (10, 805 words).

Laird, S.A., G.L. Awung, R.J. Lysinge and L.E. Ndive. 2011. The interweave of people and place: biocultural diversity in migrant and indigenous livelihoods around Mount Cameroon. Special Issue: Forests, Biodiversity and Food Security, *International Forestry Review,* Vol. 13 (3), pp 275-293.

In order to further understanding of the links between biological and cultural diversity, this study examined the role of forest species and biodiversity in the livelihoods of indigenous Bakweri villagers and migrants to the Mount Cameroon region. Surveys of resources consumed and sold by 118 households were undertaken in five villages over the course of one year. The contributions of different habitats and management systems (compounds, farms, fallow, forest) and species (native and introduced; cultivated and wild-harvested) to local livelihoods were evaluated. The study showed that indigenous households depend to a much greater extent upon a range of habitats and species than migrant households, particularly for subsistence. Indigenous resource management systems grow from historical relationships between people and place, and promote resilience, well-being and adaptation in an area long characterized by environmental, social, political, and economic uncertainty. The managed landscapes of indigenous villages can contribute to broader conservation efforts in the region, including those associated with the newly established Mount Cameroon National Park.

Chapter 3. Cocoa farms in the Mt. Cameroon region: biological and cultural diversity in local livelihoods (11,667 words).

Laird, S.A., G.L. Awung, and R.J. Lysinge. 2007. Cocoa farms in the Mt. Cameroon region: biological and cultural diversity in local livelihoods. *Biodiversity Conservation*, Vol. 16, pp 2401-2427.

A study was undertaken around Mt Cameroon to examine the role of biological and cultural diversity in the livelihood strategies of indigenous villagers and migrants to the region. Surveys of resources consumed and sold by 118 households were undertaken in five villages over the course of 1 year, the perspectives and practices of cocoa farmers documented, and useful tree species retained or planted on six cocoa farms mapped. Cocoa farms in this region generate more significant benefits for biodiversity conservation and local livelihoods than commercial plantations, but also place pressure on forest reserves and require chemical inputs. Roughly 50 tree species are commonly retained or planted on cocoa farms, primarily for timber or food, with many of these having high conservation value. Average tree density of non-cocoa trees was 15 trees per hectare, with tree densities higher, and a larger percentage of species used, on indigenous Bomboko farms than migrant farms. Both migrant and indigenous households rely on forest as a complement to farm income, but indigenous households do this to a far greater

extent, while also making extensive use of fallow and home gardens. Indigenous households also derive roughly four times the income from wild and native species compared to migrants. While diversified cocoa farms contribute to conservation and livelihoods in the region, indigenous livelihoods grow from and require the conservation of a broader range of species and habitats, including natural forest.

Chapter 4. Integrating customary and statutory systems: the struggle to develop a legal and policy framework for NTFPs in Cameroon (7,648 words)

Laird, S.A., V. Ingram, A. Awono, O. Ndoye, T. Sunderland, E. Lisinge Fotabong, R. Nkuinkeu. 2010. Integrating customary and statutory systems: the struggle to develop a legal and policy framework for NTFPs in Cameroon. In: Laird, S.A., McLain, R., and Wynberg, R. (editors). 2010 *Wild Product Governance: Finding Policies that Work for Non-timber Forest Products.* Earthscan, London, pp. 53-70.

This chapter reports on a study of the major areas of law that impact communities' management, use and trade of non-timber forest products in Cameroon, including land tenure and resource rights; forestry and environment law; and finance and taxation. We examined the layers of statutory and customary laws that converge upon these resources. The statutory legal framework is weak, and often considered illegitimate, and customary law most often regulates the management, use and trade of NTFPs. However, when species are under strong commercial pressure in ways that are new to communities, customary law is generally incapable of regulating harvesting, use and trade. Additionally, at times statutory laws can intrude upon communities' traditional management practices, as in cases where the government exerts its claim to timber trees. Communities are often unaware of statutory law, and consider it illegitimate and serving a small elite at the expense of communities, and conflicts often erupt when statutory law intersects with customary law.

Chapter 5. Legal and policy context for community management of non-timber forest products (14,884 words)

Laird, S.A., McLain, R., and Wynberg, R. 2010. The State of NTFP Law and Policy, *in:* Laird, S.A., McLain, R., and Wynberg, R. (editors). *Wild Product Governance: Finding Policies that Work for Non-timber Forest Products.* Earthscan, London, pp 343-366.

The book, *Wild Product Governance: Finding Policies that Work for Non-timber Forest Products* and the chapter "Regulating complexity: the governance of non-timber forest products" review the history and nature of laws and policies regulating forest products other than timber. This includes their relative neglect compared to measures regulating timber, and the complex and often confusing mix of measures developed over time, with poor coherence or cohesion. Rarely do these policies resemble an overall policy framework, and result from a systematic and strategic approach; they are instead usually an *ad hoc* response to a crisis, or overly optimistic estimates of tax revenue should 'informal' activities be made more formal. Indigenous and local communities are rarely consulted, if at all, and the institutional capacity within government to

effectively implement these laws is usually limited. There are exceptions to this – including Namibia and Finland – but most countries, including Cameroon, fit the mold. The state of NTFP law and policy has enormous impacts on communities' land tenure, resource rights, traditional management practices, and local and regional trade.

Chapter 6. The rise of rights, equity, and benefit sharing within biodiversity conservation (around 12,000 words)

Laird, S.A., A.B. Cunningham, and E.Lisinge. 2000. One in ten thousand? The Cameroon Case of *Ancistrocladus korupensis*. *in*: C. Zerner (ed.) *People , Plants and Justice :The Politics of Nature Conservation*. Columbia University Press, New York, pp 345-373.

One in Ten Thousand is an early case of bioprospecting and benefit sharing associated with an endemic species from Cameroon showing promise as an anti-HIV pharmaceutical. It illustrates some of the challenges of developing partnerships between companies, government, and local communities, and ways that benefits might be shared between groups. It also illustrates some of the challenges to incorporating indigenous and local views into policy-making, and early thoughts on what constitutes effective benefit sharing, consent, and equity in an arena that has subsequently spawned a massive global policy process, including the Nagoya Protocol. This chapter might be seen as an exploration of a conservation paradigm that is now viewed by many as unlikely to generate real benefits for communities, or for biodiversity conservation, but which, like other approaches that sought to use markets and business demand to improve livelihoods and promote conservation, received a great deal of attention in the early days, which continues today.

Chapter 7. Certification as a Market-Based tool for Conservation (7,272 words)

Pierce, A.R. and S.A. Laird. 2003. In search of comprehensive standards for non-timber forest products in the botanicals trade. *International Forestry Review* 5(2). pp 138-147.

This publication explores the potential for the market-based tool of certification to provide economic incentives for sustainable management and harvesting of non-timber forest products (NTFPs), and the challenges of this approach. It includes a review of efforts to certify botanicals and other non-timber forest products, case studies, and a critique of this approach for relatively low-value products like NTFPs, particularly those produced and managed by communities.

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Chapter 2:
The interweave of people and place: biocultural diversity in migrant and indigenous livelihoods around Mount Cameroon

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The interweave of people and place: biocultural diversity in migrant and indigenous livelihoods around Mount Cameroon

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SUMMARY

In order to further understanding of the links between biological and cultural diversity, this study examined the role of forest species and biodiversity in the livelihoods of indigenous Bakweri villagers and migrants to the Mount Cameroon region. Surveys of resources consumed and sold by 118 households were undertaken in five villages over the course of one year. The contributions of different habitats and management systems (compounds, farms, fallow, forest) and species (native and introduced; cultivated and wild-harvested) to local livelihoods were evaluated. The study showed that indigenous households depend to a much greater extent upon a range of habitats and species than migrant households, particularly for subsistence. Indigenous resource management systems grow from historical relationships between people and place, and promote resilience, well-being and adaptation in an area long characterized by environmental, social, political, and economic uncertainty. The managed landscapes of indigenous villages can contribute to broader conservation efforts in the region, including those associated with the newly established Mount Cameroon National Park.

Keywords: biocultural diversity, traditional forest management, Mount Cameroon, Bakweri, non-timber forest products

Entremêlement humanité/location: diversités culturelles et biologiques dans les vies des indigènes Bakweri et des immigrants dans la région de Mount Cameroon , au Cameroun

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Afin de comprendre plus profondément les liens réunissant les diversités culturelles et biologiques, cette étude a examiné le rôle des espèces forestières et de la biodiversité sur les moyens d'existence des villageois indigènes Bakweri et des immigrants dans la région de Mount Cameroon. Une examination des ressources consommées et vendues par 118 foyers s'effectua dans cinq villages sur une durée d'une année. Les contributions des différents habitats et des systèmes de gestion (enceintes, fermes, jachères, forêts) des espèces (originaires de la région et introduites, cultivées et récoltées au naturel) jusqu'aux moyens d'existence locaux furent évalués. Cette étude montrait que les foyers indigènes dépendent beaucoup plus d'un assortiment d'habitats et d' espèces que les foyers d'immigrants, pour leur subsistence en particulier. Les systèmes de gestion indigène des ressources croissent à partir des relations historiques entre les peuplades et le site, et encouragent la persévérance, le bien-être et l'adaptation dans une zone depuis longtemps caractérisée par des fragilités environnementales, sociales, politiques et économiques. Les paysages gérés des villages indigènes peuvent contribuer aux efforts plus larges de conservation dans la région, ainsi qu'à ceux associés avec le Parc National de Mount Cameroon, récemment établi.

Un entramado de personas y lugares: diversidad biológica y cultural en la vida de la población indígena Bakweri y la de inmigrantes en la región del Monte Camerún

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Para poder entender más profundamente los vínculos entre la diversidad biológica y la cultural, este estudio examinó el papel de las especies forestales y la biodiversidad en los medios de subsistencia de los habitantes de las comunidades Bakweri y de los inmigrantes en la región del Monte Camerún. Durante un periodo de un año se realizaron encuestas en cinco localidades a fin de contabilizar los recursos consumidos y vendidos por 118 hogares. Se evaluó la contribución individual de los diferentes hábitats y sistemas de uso del suelo (mixtos, agrícolas y ganaderos, barbechos, bosques) y especies (nativas e introducidas; cultivadas o silvestres) a los medios de subsistencia locales. El estudio mostró que los hogares indígenas dependen en mucha mayor medida de una variedad de hábitats y especies que los hogares de los inmigrantes,

especialmente en cuanto a su subsistencia. Los sistemas indígenas de gestión de recursos provienen de las relaciones históricas entre las personas y el lugar, y fomentan la resiliencia, el bienestar y la adaptación a una región que se ha caracterizado desde hace mucho por la incertidumbre medioambiental, social, política y económica. Los paisajes bajo el uso de las localidades indígenas pueden contribuir a los esfuerzos de conservación del resto de la región, como los relacionados con el recientemente establecido Parque Nacional del Monte Camerún.

INTRODUCTION

Forests and biodiversity are central to indigenous livelihoods, health and well-being around Mount Cameroon. They are an integral part of complex and dynamic cultural systems that have adapted to enormous change over hundreds of years, including the forced removal of indigenous villages onto marginal lands to make room for German colonial plantations in the late 19th century (Ardener 1996, Kofele-Kale 2010). Despite this, more recent pressures on land and resources, and the forces of globalization, indigenous groups have nonetheless maintained sophisticated, multi-dimensional management and livelihood systems (Laird in press).

These systems integrate a range of habitats, species, and practices, accommodate and capitalize on seasonal change, and grow from local ecological processes. Similar management systems have been shown to retain significant forest cover and biological diversity, and replicate structural and functional elements of the forest (e.g. Alcorn 1989, Alexiades and Shanley 2005, Gomez-Pompa 1990, Redford and Padoch 1992, Peters 2000, Posey and Balee 1989, Posey 1999). They also conserve soil, regulate temperature, and resist pests and diseases better than more intensive agricultural systems, while contributing to genetic and species conservation, carbon sequestration, watershed protection, and wildlife habitat (Eyzaguirre and Linares 2004, Leakey and Tchoundjeu 2001, Sonwa *et al.* 2001, Zapfack *et al.* 2002).

Indigenous management systems around Mt. Cameroon do not primarily maximize the cash income possible from a given area, and instead aim to manage and maximize diversity as a way of reducing risk and maintaining a range of livelihood strategies in keeping with tradition, taste and personal preference. In this way, these systems provide a 'safety net' or 'natural insurance' during seasonal and cyclical food gaps, and during difficult years (Arnold and Ruiz-Perez 2001, Neumann and Hirsch 2000, Shackleton *et al*. 2011a), while also promoting resilience in an area long characterized by environmental, economic, political, social, and more recently accelerated climate, change. Migrant livelihood strategies vary depending upon how long families have lived in the area, where they came from, the extent of contact with forests, and other factors. On the whole, however, migrant households maximize gain to a greater extent, and use a far less diverse range of species and habitats, than indigenous households (Laird *et al.* 2007).

Indigenous people around Mount Cameroon are not 'noble' conservationists, nor are they a homogenous "community", however (Sharpe 1998, Burnham 2000). There is a great deal of variation in livelihood strategies and relationships to the forest within and between villages in the area. Many individuals will mine species when commercial opportunity presents itself, as in the case of bushmeat, timber or the medicinal bark of *Prunus africana* (Cunningham and Mbenkum 1993, Ingram 2008). Others will rent or sell land to migrants for farms although this is socially frowned upon, and some local elites clear forests for plantations. Despite this, being a "son of the soil" or indigenous to the area has been used in recent decades by some to further political or economic ends in ways that alienate and disempower migrants, many of whom have resided in the area for generations and have developed their own close relationships with the local environment (Geschiere 2009, Konings and Nyamnjoh 2003, Jua 2001, Sharpe 1998).

As a whole, however, and within the context of a region undergoing dramatic and persistent change, indigenous knowledge and practices reflect uniquely deep historical and cultural connections to particular places and species. This paper examines these connections, and what is increasingly termed "biocultural diversity". "Biodiversity" is the variability among living organisms from all sources, including diversity within species, between species and of ecosystems (Convention on Biological Diversity 1992). "Culture" refers to the shared, learned and symbolically expressed aspects of human experience and society. Cultural relationships with forests include traditional ecological knowledge on flora and fauna, edible versus inedible foods, plant medicines, and forest management systems, as well as shared notions of kinship, marriage, prohibitions, cosmology and ritual (Balee 1994), and 'cultural diversity' describes variability in these relationships. "Biocultural diversity" is the interweave of biological and cultural diversity, people and place, and the continuing adaptation and co-evolution between natural landscapes and ways of life (Cocks 2006b, Maffi 2005, Maffi and Woodley 2010, Wilson 2008). It is not a concept reserved for indigenous peoples, and describes a range of relationships between local people and biologically diverse environments (Cocks 2006a and 2006b).

Cultural diversity and biological diversity have long been the subjects of distinct areas of study, with the exception of multi-disciplinary – and so often marginalized – fields like ethnobiology (eg Alexiades 1996, Alexiades 1999, Alcorn 1989, Balee 1994, Gadgil 1993, Gomez-Pompa 1990, Martin 1995, Posey 1999). It is increasingly more widely accepted, however, that the richness and diversity of indigenous livelihood systems and peoples' relationships with nature cannot be understood or productively examined as independent domains (Pretty *et al*. 2009). Conservation, livelihoods, health and well-being are linked and interdependent parts of a whole (Colfer 2008, Cunningham *et al.* 2008, Dounias and Colfer 2008, Hladik *et al*. 1990, Hladik *et al*. 1993, Karjalainen *et al*. 2010, Posey 1999).

This paper reports on an ethnobiological study that integrated different approaches and disciplines in order to

examine the role of species from different habitats and management systems in the livelihoods of indigenous villagers and migrants to the Mt Cameroon region. The objective was to better understand the interweave of biological and cultural diversity, but the limits of any one study or approach in addressing such a complex and wide-ranging topic are acknowledged. Specifically, the study sought to answer the following questions: To what extent are indigenous livelihoods dependent upon a range of species and habitats (and so biodiversity)? How do indigenous livelihood systems compare to those of people new to the area without traditional and historical ties to the forest, species, and landscapes in which they live? Are there important relationships between cultural and biological diversity around Mt Cameroon that can inform and contribute to plans for a new national park and conservation goals in the region?

THE MOUNT CAMEROON REGION

The Mt Cameroon region is characterized by environmental, social and political change, and the lives of indigenous groups by adaptation and resilience. The largest mountain in West Africa, Mt Cameroon rises 4095 m from the Atlantic Ocean's Gulf of Guinea, on the southwest coast of Cameroon, to the summit 20 km inland. At 9.1 degrees east and 4.5 degrees north, it is the last active member of a range of volcanoes that extend from the island of Principe, around 100 km to the southwest, through Fernando Po of Equatorial Guinea (2850 m) to the highlands of Adamoua in Cameroon and Obudu in Nigeria. The Mt Cameroon region consists of two distinct peaks, Mt Cameroon (locally known as Fako) to the north-east, and the older Mt Etinde (1715 m) to the south-west (Letouzey 1968, Fraser *et al.* 1998).

Mt Cameroon comprises lowland and lower montane rainforest, upper montane and sub-alpine rainforest, and montane and sub-alpine grasslands (Ndam 1998; Cable and Cheek 1998). It is one of the most biologically diverse sites in Africa, with great altitudinal range, varied aspect and climate, and regular volcanic eruptions (including most recently in 1982, 1999 and 2000), producing a diversity of vegetation types and unusual levels of species endemism and richness (WWF 2001). This includes roughly 2500 indigenous and naturalized plant species (Cable and Cheek 1998), a recorded 370 species of birds including numerous endemics (Fotso *et al*, 2007), and important populations of large mammals, including forest elephants and chimpanzees, drills and other primates (Forboseh *et al.* 2007, Gadsby and Jenkins 1992). Mt Cameroon is part of what is known within the conservation community as the 'Guinean Forests of West Africa Biodiversity Hotspot'[1] (Conservation International 2011) and is an 'Important Bird Area' for Africa (Birdlife International 2011). Due to its extremely high species diversity and levels of endemism, and threats to its forests and biodiversity, Mt Cameroon is considered a global and national priority area for conservation (Birdlife International 2011, Conservation International 2011, Myers *et al.* 2000, Oates *et al*. 2004, WWF 2001).

The indigenous groups living around Mount Cameroon include the Bakweri, Bomboko, Bakolle, Balong, Isubu, and Wovea. All have a long history of interaction with external groups. For hundreds of years, African and European traders, explorers, scientists, missionaries, German and British colonial administrations, and others have been drawn to the dramatic landscape, fertile soils, and natural wealth of the region. Portuguese traders first arrived in 1472, and gave the country its name, and in 1884 the Germans established a colony in Cameroon (Ardener 2002, LeVine 1971). Following a series of battles, in 1901 the Germans established their headquarters in Buea, at the heart of Bakweri territory. Bakweri villages were forcibly relocated, usually up the slopes of the mountain, and their lands taken in order to establish the tea, rubber, oil palm, banana and other plantations that remain to this day, managed in recent decades by the Cameroon Development Corporation (CDC) (Kofele-Kale 1981, Ardener 1996). Boundaries between villages and plantations continue to be negotiated as part of what is called the "Bakweri land question", and in the last decade some villages have re-acquired marginal lands taken from them more than 100 years ago. Privatization of the parastatal CDC brought the Bakweri land problem to the forefront, and in 2002 the Bakweri Land Claims Committee (BLCC) brought their case to the African Human Rights Commission (Kofele-Kale 2010, BLCC 2011). The case was returned to Cameroon in order to exhaust domestic remedies, but the government has yet to enter into negotiations with the Bakweri (Kofele-Kale pers. comm. 2011).

Workers on the plantations have long been drawn from other parts of Cameroon, including francophone Cameroon, Nigeria, the Bamenda highlands and other parts of Southwest Province (Ardener *et al.* 1960, Ardener 1996, Konings and Nyamnjoh 2003). Many migrants have resided in the area for generations, and others continue to settle in local towns and to farm. Regardless of one's personal or family history, however, all non-indigenes are known as "strangers", or "came-no-goes" in pidjin English, by indigenous groups that have resented the influx of migrants since the 1920s (Geschiere 2009). This in-migration meant that by 1960 indigenous groups made up only 30% of the population of what was then known as Victoria Division, on the southern slopes of Mount Cameroon (Ardener 1996). A more recent study estimated that the indigenous population now makes up less than a quarter of the roughly 250,000 people in the Mount Cameroon region (Schmidt-Soltau 2003), and that percentage is falling as the population increases. In more remote and

[1] The Guinean Forests hotspot includes an estimated 9,000 vascular plant species, about 20% of which are thought to be endemic; 785 bird species of which 75 species and 7 genera are thought to be endemic; and 320 species of mammals, representing a quarter of the roughly 1100 mammal species found on the entire continent of Africa, with 60 of these endemic to the region, including 18 species of primates (Conservation International 2011).

rural areas, however, and with the exception of the cocoa-growing frontier around the Bomboko Forest Reserve, many villages remain entirely indigenous.

In December 2009, the Cameroon government established a national park on Mt Cameroon covering 58,178 hectares. The objectives of the park include protection of biodiversity, wildlife and 'non-consumptive' natural resources, as well as 'reducing pressure on the use of natural resources by introducing and promoting alternative sources of income to the local population' (WWF 2010). This is a complex region, with a highly dynamic and diverse population, environment, politics and economy. Conservation programs will be most effective when they grow from significant understanding of this complexity and the natural resource management strategies that have grown up in its midst over hundreds of years. This paper is an effort to shed light on one part of the interface between culture and nature – the dependence of indigenous and migrant households on forests and biodiversity for food, medicine, construction and other needs.

The study villages

The study was undertaken in five villages around Mount Cameroon – Ekonjo, Etome, Likombe, Upper Buando and Bova Bomboko (Figure 1). The first four villages are entirely indigenous Bakweri villages found on the southern slopes of Mount Cameroon. The study also included migrant farmers from other parts of Cameroon and Nigeria that rent or buy farm land in the vicinity of these villages but live elsewhere, including Cameroon Development Corporation plantation camps (Saxenhof Tea Estate camp) and in mixed indigenous and migrant villages closer to towns (Batoke and Wututu). By incorporating migrants farming on village lands, we could study differences in resource use and management in the same environments.

The fifth village, Bova Bomboko, is located at the north-eastern foot of Mount Cameroon. Originally an indigenous Bomboko village, it is now populated primarily by cocoa farmers from other regions of Cameroon (primarily North-west, Southwest, West and Centre Provinces) and Nigeria. Bomboko make up less than 10% of the village population (Table 1). Bova Bomboko abuts the roughly 26,667 ha Bomboko Forest Reserve created in 1939 as the Bomboko Native Authority Forest Reserve, and now absorbed into the new Mount Cameroon National Park. The potential to farm cocoa, including in the Reserve, has attracted individuals from other regions of Cameroon and Nigeria with scarce land and greater poverty. It is unclear whether significant in-migration

FIGURE 1 *Study area*

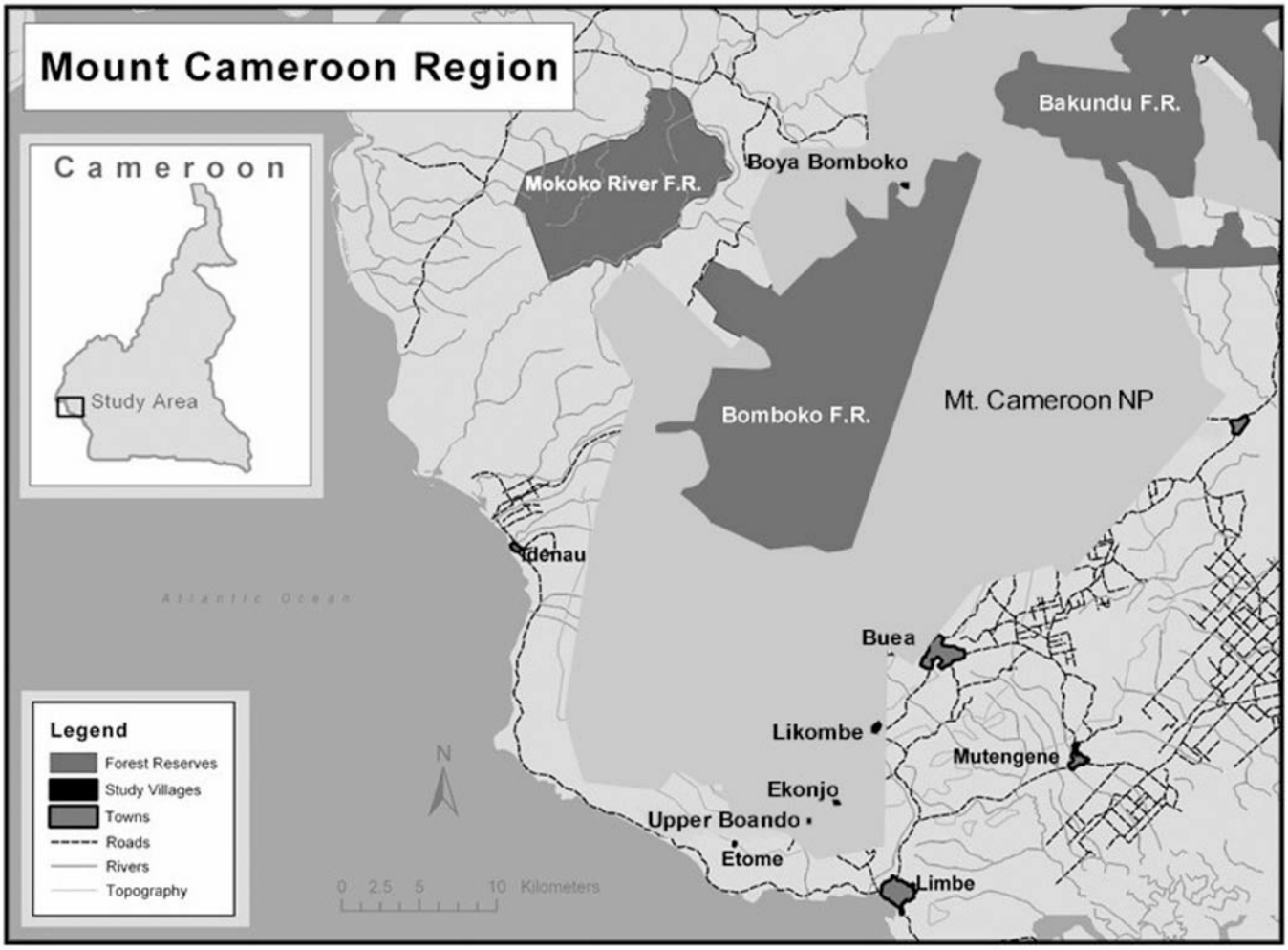

TABLE 1 *Population, structures and households in five study villages in the Mount Cameroon region in 2000*

Villages	Community type	Number of permanent residents	Number of separate structures or houses	Number of households living in village	Number of households in the household survey (# of individuals in these households)
Bova Bomboko	< 10% indigenous; remaining migrant	1151	129	212	48 (268)
Etome	Indigenous	67	18	10	10 (67)
Ekonjo	Indigenous	61	25	19	19 (61)
Likombe	Indigenous	265	79	61	23 (119)
Upper Buando	Indigenous	66	25	15	15 (66)

Source: village census

will continue if the new national park boundaries are more aggressively patrolled than were those of the Reserve.

Populations of the four indigenous Bakweri villages range in size from 61 to 265, with the mixed ethnicity Bova Bomboko being much larger at 1151 (Table 1). Bova Bomboko also has the youngest population of any village studied, with 89% of individuals under age 40 and 30% under the age of 10. Only 11% of the population is over the age of 40 (2% over the age of 60), compared with more than 30% of residents in Bakweri villages over the age of 40, and 11% over the age of 60. Some Bakweri villages have high proportions of older people, and smaller household sizes, and younger members of the community move in and out of the village, using it as a base of last resort when jobs fall through in local towns. Other villages with a more even spread of ages have more opportunities to earn a living while based in the village, and on average are more affluent.

METHODS

The project employed a wide range of qualitative and quantitative ethnobiological methods including a village census, daily household surveys, market surveys, and a range of resource use and management studies.

Village census

The initial phase of research included a village census, village mapping and household surveys of resource use. The census was undertaken in 2000 in the five study villages – Likombe, Etome, Ekonjo, Upper Buando, and Bova Bomboko – in a total of 317 households. Every household in each village was visited, and information collected on all members of the household and family, including: gender, age, ethnic group, relationship to household head, education level, residency (permanent, temporary, outside village), occupations, and relatives in village. For each household, sources of income were initially evaluated using pie charts (and at times stones, seeds, or other representations). Free-listing of species most widely used, valued, and most significant for household income, were undertaken. The total number of buildings in each village, as well as the total number of active households, was recorded (Table 1). In addition, demographic surveys were undertaken of migrant farmer households farming lands rented by and in proximity to the four Bakweri villages, but living outside in Batoke and Wututu villages, and Saxenhof Tea Estate camp.

Daily household surveys

Following the village census, intensive daily household surveys were undertaken to document resources gathered from farm, compound, fallow and forest for subsistence use and sale, as well as purchased items. The household survey allowed comparison of differences in resource use between ethnic and age groups, individuals with different occupations, and study villages of different size, geography, and proximity to forest, markets and urban centers. The daily household survey recorded all things collected and consumed, or sold, by households, and allowed us to move beyond identifying and listing what is generally reported as 'useful', to quantifying the nature of use. The products recorded include agricultural crops, wild foods (fruits, greens, mushrooms, spices, etc.), construction materials, fuelwood, medicines, protection and cultural species, and others.

In the larger villages, a sample of households was selected, stratified according to gender of household head, age of head, relative wealth, kinship, education level, source of income, and extent of reliance on forest (hunters, herbalists, weavers, and NTFP collectors, for example, depend more on the forest than those that primarily farm). In Likombe, 23 households were included in the household survey (29%), and in Bova Bomboko, 48 households (37%). In Etome, Ekonjo, and Upper Buando, household numbers are small enough that all households were included in the daily surveys. In each village, households were interviewed for five consecutive days, every other month, over the course of a year. With a total of 118 households included in the study, multiplied by 30 days across the year, a total of 3540 day surveys were administered. A total of 8779 entries for products (species) harvested and bought in local markets were recorded for all villages combined across the year (Table 2).

TABLE 2 *Number of plant products harvested from compounds (home gardens), farms, fallow and forest and bought by households in each study village in the Mount Cameroon region over the course of one year*[a]

Village	Products harvested	Products bought	Household type
Bova Bomboko	1226	944	<10% indigenous Bomboko; remaining migrant
Etome	519	232	indigenous
Ekonjo	690	455	indigenous
Likombe	1473	835	indigenous
Upper Buando	903	368	indigenous
Batoke	143	302	only migrant households surveyed
Saxenhof	225	197	only migrant households surveyed
Wututu	127	140	only migrant households surveyed

[a]Plant uses include food, medicine, spice, construction, fuelwood, symbolic or protective, and other uses.
Source: daily household survey

Market surveys and valuing products

In order to calculate a monetary value for products harvested for subsistence, market surveys were undertaken. For each village, a study in the main local market was undertaken to account for variations in prices between markets. Markets vary enormously in size and specialization, from under fifty sellers to more than one thousand (e.g. Limbe)[2].

Market surveys recording prices for products in both the rainy and dry seasons were undertaken because there can be significant seasonal variations in price. Fuelwood is not widely traded, but prices in local markets were obtained, and individuals in villages were asked how much they would be willing to pay for fuelwood. For plant medicines, wild greens and fruits, forest ropes, and other products that are not commonly sold, we selected a low figure (e.g. 100 CFA per bundle for medicines), or used a substitute product value. This approach undoubtedly undervalued these resources, but nonetheless allowed for their incorporation in the analysis (Campbell and Luckert 2002).

Broader resource use and management studies

This paper reports on the results of household and farm surveys, but the discussion is informed by a larger qualitative and quantitative research project undertaken over a period of eight years with a primary emphasis on indigenous biocultural diversity and relationships to the environment. Additional research with indigenous villages included a range of free-listing exercises; resource-specific surveys and field collections (wrapper leaves, forest ropes, fish, greens/vegetables, yams, mushrooms, medicinal plants); village income, artifact (household products, musical instruments, game pieces), and resource rights surveys; and dozens of 'walks in the woods', or interviews, with healers, basket-makers, hunters, NTFP gatherers, and others. Additional studies undertaken with both indigenous and migrant households include surveys and mapping of useful species found in compounds (home gardens) and cocoa and other farms, which provided finer detail on species use and management practices, and a "tree trail" exercise that helped to identify differences in plant knowledge across age, gender, occupation, ethnic group, and village.

RESULTS AND DISCUSSION

Brief overview of resource use and management systems

Drawing upon the larger study mentioned above, below we briefly review primarily Bakweri, and to a lesser extent Bomboko and migrant, resource use and management systems in order to provide a context for the quantitative data presented in subsequent sections.

Farm management and establishment

Bakweri management systems integrate a range of habitats, species and practices that vary by season. Households have on average between 3–4 farms, often in different locations around the village, in different stages of succession and management, and with varying crops depending upon soil fertility, altitude, and other factors. Individual farms tend to be 0.5–1 hectare in size, with the total area farmed by a single family usually between 2–5 hectares, although there is considerable variation. Most farms are cleared from fallow of around 6 years (fewer years than previously), and are farmed for roughly 5 years, depending upon the crop, before reverting to fallow

[2] Ekonjo sells and buys products mainly in Bonjongo and Limbe; Etome mainly in Batoke followed by Limbe; Likombe in Bokwango, Buea, Mile 4, and Wututu markets (and in the village to buyers coming from Douala to purchase wholesale bitterleaf and pepper, plantain and banana); Upper Buando residents sell and buy products in Limbe and Bobende; and Bova Bomboko is oriented towards Muyenge market.

again. Clearing farms from fallow takes place in the dry season, usually between December – March.

The vast majority of farms are inherited from parents or grandparents, with only a small number cleared from village land in the "black bush" (late secondary or mature forest). A few young men still clear new farms from black bush, since it allows them to claim land and the soil is fertile, but this practice remains an exception. Older individuals no longer have the strength to clear black bush, and others report a lack of time and the associated hardships: trees are large, black bush is often far from the village and uphill, and so transporting crops back is difficult, farms are exposed to animal predation, and tuber crops – central to Bakweri farming – do not do well in the first year due to tree roots in the soil.

Pressure on forest habitats for an expansion of "slash and burn" agriculture by Bakweri villagers is limited. Most households support their members with existing farms and fallow, and land held by the family. However, sale of land to migrant farmers living elsewhere or to local elites for plantations appears to be on the rise, and these result in both increased and often permanent forest clearance, and can involve the use of chemical inputs that reduce species diversity on farms. In the village of Bova Bomboko, the benefits for young migrants of clearing black bush for cocoa farms and to claim land far outweigh the costs. The result is farming systems that place significant pressure on the forest (Laird *et al*. 2007).

Farm and compound products

Cocoyam (*Colocasia esculenta*) and plantains (*Musa paradisiaca* varieties) are the main crops produced in all villages, complemented by dozens of others, most introduced to the region like banana (*Musa sapientum* varieties), cassava (*Manihot exculenta*), maize (*Zea mays*), and pepper (*Capsicum annuum*). In many Bakweri and Bomboko households indigenous crops like yams[3] and a wide range of cultivated and semi-domesticated native greens[4] are still important for both subsistence and to some extent sale (eg bitterleaf and sweet bitterleaf), but the bulk of agricultural crops farmed for subsistence and sale today – by both Bakweri and migrant households – are introduced to the region (Laird *et al*. in press).

As we discuss below, farms produce the vast majority of food for all villages and all ethnic groups, but indigenous households also rely extensively on species harvested from compounds (home gardens), fallow and forest. Compounds incorporate medicinal and food species collected from the forest, fallow and farm, given by friends or neighbors, and planted at home for easy access, including during the extreme rainy season when moving beyond one's compound can be difficult. They also include species intended to protect the home and its inhabitants.[5] Indigenous compounds symbolically may contain dozens of species collected from a range of sources over time, with healers' compounds proving the most diverse. Migrants' compounds tend to be extremely simple with one or two popular medicinal species, and perhaps a few crops (Laird *et al.* in press).

Fallow and forest products

Products harvested from fallows vary depending upon fallow age but include domesticated and semi-domesticated food, fruit, spice, fuelwood, medicinal, 'protection', and construction species like banana, plantain, pear (*Persea americana*), orange and lime (*Citrus* spp.), oil palm (*Elaeis guineensis*), raphia (*Raphia hookeri* – for 'mbanja' rope, thatches, palm wine), 'plum' (*Dacryodes edulis*) and other tree crops. Fallows are also home to a range of useful forest species that are not usually planted but might be nonetheless managed (e.g. retained, protected, and weeded). These include the spice and medicinal climber bush pepper, 'veove' (*Piper guineense*), and the spice trees 'njangsang' (*Ricinodendron heudelotii*) and bush mango, 'maiva' (*Irvingia gabonensis*). Some tree species planted or retained on farms generations ago are still found in fallows, which can reflect layers of use and management across generations.[6] As we will discuss below, fallow is not extensively used by migrants, however the more widely-known and used species found in indigenous fallows are often planted or retained on migrants' cocoa farms around Bova Bomboko (Laird *et al*., 2007).

Other useful products found in fallow and forest, and harvested primarily by indigenous households, include mushrooms (e.g. *Pleurotus* spp*., Polyporous* sp*., Marasmius* spp.; and *Letinus* sp.); wild greens like 'eru' for sale, and more commonly those consumed for subsistence (e.g. 'ngole', 'kalavanje', and 'wosango', *Solanum nigrum*); and 'wrapper leaves' from the Marantaceae family used to wrap food.[7] Some species collected from forest or very old fallow are widely known and used, including wrapper leaves; wild fruits like 'bwembi' and 'kaso' (*Tetracarpidium conophorum*);

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[3] Cultivated and wild-harvested yams include 'yono', *Dioscorea rotundata*; 'evie', *D. alata*; 'lisua', *D. dometurum*; 'liwoko', *D. bulbifera*; 'kumbu', *D. mummularia* (Laird in press). See the discussion in Dounias 1993 of Baka 'paracultivation' of yams in southern Cameroon, taking place at the interface of the domesticated and the wild.

[4] Cultivated native greens include bitterleaf, *Vernonia amygdalina*, sweet bitterleaf, *V. hymenolepsis*, and fluted pumpkin or 'mojojo', *Telfaria occidentalis,* and wild and semi-domesticated native greens include 'eru' *Gnetum africanum,* 'kalavanje' *Solanecio biafrae,* and 'ngole' *Celosia pseudovirgata* (Laird in press).

[5] Dounias 2010 describes the important role of homegardens in the "symbolic control of supernatural forces" in the lives of five ethnic groups in southern Cameroon; homegardens contribute in complex, multi-dimensional ways – ecological, spatial, social, historical, linguistic and symbolic – to household health and well-being.

[6] Examples include very old individuals of 'wulule' (*Kigelia africana*) on a cocoa farm in Bova Bomboko, and bush pineapple, 'wokeku', (*Myrianthus arboreus*), monkey cola, 'mombwesi' (*Cola argentea*) and 'bwembi' (*Treculia africana*) in Likombe fallow and farm margins.

[7] The main wrapper leaf species used in this region are 'vendomba', *Marantochloa ramosissima*, 'esongo', *Hypselodelphys scandens*, 'eteve', *Thaumatococcus danielii*,and 'ngongo', *Megaphrynium macrostachyum* (Laird in press).

spices like bush mango, 'njangsang', and bush onion (*Afrostyrax kamerunensis* and *A. lepidophyllus*); forest ropes like 'meveve' (*Cercestis mirabilis*); and timber species like iroko, 'momangi' (*Milicia excelsa*), camwood, 'ibwua' (*Pterocarpus soyauxii*) and mahogany, 'bou' (*Entandophragma cylindricum* and *E. angolense*). Other forest species are known and harvested primarily by individuals who spend a lot of time in the forest like operators and hunters (e.g. the subsistence foods monkey cola, 'mombwesi' *Cola* spp., and bush carrot, 'wonjonji' *Lavigeria macrocarpa*), or specialists like basket-makers and healers.[8]

This discussion is intended to broadly illustrate the range of species found in the four categories of 'habitat' used in the household survey and presented in the quantitative results below – compounds, farms, fallow, and forest. These distinctions are drawn sharply to identify and analyze broad patterns of habitat use, but are necessarily simplified and species are found and harvested from different sources – they are not only 'compound', 'farm', 'fallow', or 'forest' species[9]. Likewise, many species are not only 'wild' or "cultivated", and management often takes many intermediate forms. As found in similar studies around the world, habitats and management practices exist along a continuum rather than as distinct categories, and there is much nuance it was not possible to incorporate in the quantitative survey (e.g. fallow and forest of varying ages, different types and locations of farms, species that are not planted, but are retained and weeded on farms).

Activities that generate cash income

Subsistence farming and wild-harvesting dominate indigenous livelihoods. However, households also need cash to pay school fees, buy medicines, construction materials, kerosene, and various foodstuffs. In order to generate cash, most households grow and sell crops[10], and many harvest forest products, hunt, or work as laborers outside the village. Others work as petty traders or in various trades (carpentry, plumbing, basket-making, healing), or undertake small-scale logging.

Forest (and fallow) product collection for sale in markets, primarily by women, also brings in cash income, and varies by village depending upon species availability, proximity to forest and markets, and tradition. The main species collected for sale include 'mbanja' (*Raphia hookeri*) rope used to tie food, eru (*Gnetum africanum*) and wrapper leaves. 'Mbanja' ropes can be cleaned, coiled, and bagged, and wrapper leaves heated, stacked and packed during the evenings at home by women, with the children often helping. 'Mbanja' is produced by most households in Etome, and roughly a quarter of households elsewhere, and is collected mainly from fallow and farms, with 97% of collections sold and 3% for household use.[11] In Ekonjo and Upper Buando eru (*Gnetum africanum*) is more common in the forest than in other villages, and is more widely harvested and sold. Other NTFPs sold from these villages include 'bush pepper' (*Piper guineense*), 'kucha' (*Momordica cabraei*), and 'wrapper leaves'. In all villages, women also harvest and sell leaves from plantain and banana.

Basket-makers, mat-makers, hunters and healers also earn cash from their work, which is highly dependent upon a diversity of habitats and on biodiversity. For example, six men in Likombe village are healers of various kinds, with three earning a substantial part of their income this way (women also use medicinal plants and heal, but primarily for their families). Two older women are basket makers, and four men are active hunters, with three earning a significant income from hunting. One hunter is also a healer and an operator, as well as a farmer (typically, a range of activities contribute to household income, with some – like this household – more dependent upon biodiversity than others). In addition to generating cash, hunting contributes food for subsistence, with more than half of all bushmeat consumed in villages.[12]

In Bova Bomboko, livelihoods are oriented more towards generating cash income than to subsistence. The vast majority of individuals are primarily cocoa and food crop farmers, with more than 50% of all income coming from cocoa sales, and 40% from crops like cocoyams, plantains, and cassava. Ten percent of households are also petty traders or have jobs or a trade (eg electricians, plumbers, or carpenters). A small percentage (around 15%) of households harvest non-timber forest products (NTFPs) and earn roughly 5% of their income from about a half dozen NTFPs.[13] Subsistence use of NTFPs by migrants in Bova Bomboko is significantly less than

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[8] Scores of medicinal species – for example 'kwave' (*Strychnos* sp.), 'liembemba (*Palisota hirsute*), and 'mosongosongo' (*Clerodendron* spp.) – are collected almost exclusively by highly specialized healers.

[9] Household surveys documented the location of a product's harvest on a given day, and this might vary over time. In one day a household could also harvest the same product from two sources – e.g. plantains from the farm and compound – and the amounts harvested would be recorded separately under each habitat category.

[10] The main food crops grown for sale in all villages include plantain (*Musa paradisiaca* varieties) and banana (*Musa sapientum* varieties), cassava (*Manihot esculenta*), bitterleaf (*Vernonia amygdalina*), sweet bitterleaf (*Vernonia hymenolepsis*), pepper (*Capsicum annuum*), maize (*Zea mays*), palm nuts (*Eleais guineensis*), plum (*Dacryodes edulis*), mango (*Mangifera indica*), *Citrus* spp. and other fruits. Species produced vary by village, and depend upon altitude, climate and markets.

[11] In Etome, 'vendomba' *(Marantochloa ramosissima*), and to a much smaller extent 'esongo' (*Hypselodelphys scandens*) are the main wrapper leaves harvested, with more than 90% collected for sale.

[12] Bushmeat species reported most regularly in household surveys include flotambo, monkey, deer, rat mole, porcupine, bushcat and, on two occasions, chimpanzee.

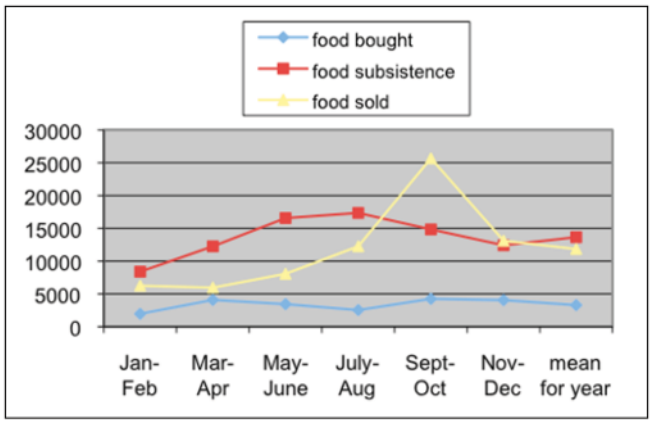
[13] The main NTFPs harvested in Bova Bomboko for sale in local markets include *Ricinodendron heudelotti* (njangsang), *Irvingia gabonensis* (bush mango), *Gnetum africanum* (eru), *Piper guineense* (bush pepper), *Cola lepidota* (monkey cola), *Garcinia kola* (bitter cola), and bushmeat.

TABLE 3 *Variation by Seasons: The Average Value (CFA) per Household of Food Bought, Consumed for Subsistence, or Sold in the Villages of Etome, Ekonjo, Likombe, Upper Buando*

	Food bought (CFA)	Food consumed for subsistence (CFA)	Food sold in local markets (CFA)
January – February	1,743	8,975	4,767
March – April	2,795	13,315	5,934
May – June	2,071	16,882	6,937
July – August	888	18,674	9,304
September – October	2,844	16,438	6,575
November – December	3,370	12,460	7,069
Mean for year	2,285	14,449	6,773

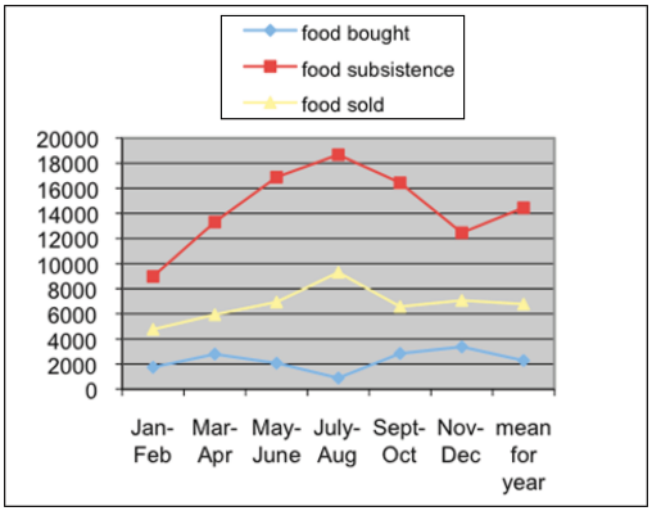
Source: household surveys

FIGURE 2 *Seasonal Average Value (CFA) per Household of Food Sold, Bought, for Subsistence (Bova Bomboko, Etome, Ekonjo, Likombe, Upper Buando, and Migrant Farmers)*



* The peak in food harvested for sale in September–October reflects the sale of cocoa in Bova Bomboko.
** 500 CFA = approximately $1

FIGURE 3 *Seasonal Average Value (CFA) per Household of Food Sold, Bought, for Subsistence (Bakweri Villages – Etome, Ekonjo, Likombe, Upper Buando)*



500 CFA = $1

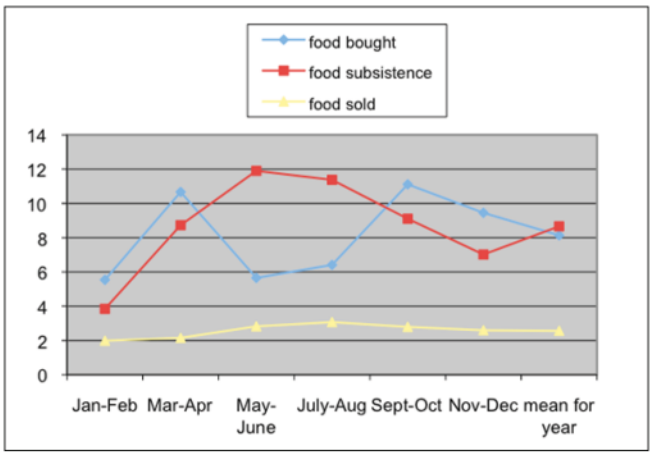
for Bomboko or Bakweri households, and species harvested for both subsistence and sale are those widely known and consumed throughout the forest zone of Cameroon (Laird *et al*. 2007).

Food harvested for subsistence, sale, and bought for household consumption

All villages included in this study produce more food for subsistence than they do for sale, or than they buy in local markets. The exception to this is Bova Bomboko in September-October, during the cocoa harvests (Figure 2). During this time, sale of cocoa surpasses the harvest of all other products combined in that village. In all villages, wild, semi-domesticated and cultivated food production peaks with the rainy season, between May and October. In the Bakweri villages of Etome, Ekonjo, Likombe and Upper Buando, the relationship between the harvest of food for subsistence and sale is more or less constant, with more than twice as much harvested for subsistence than for sale year round (Figure 3; Table 3). Food bought by households is consistently and significantly lower in value and number of items purchased than that harvested for sale or subsistence. Items bought by households drop significantly at the same time production from farms, and wild harvests from all habitats, increases, and so the need to buy food decreases[14]. (Table 3).

[14] The relationships between increased food harvested for subsistence and sale, and decreased purchase of food are significant. The quadratic component for 6 villages, value of products harvested (CFA): F (1) = 10.882, p = .003. The quadratic component for 6 villages, number of different products harvested: F(1) = 28.476, p = .000.

FIGURE 4 *Average Number of Food Items Sold, Bought, Consumed for Subsistence by Households (Bova Bomboko, Etome, Ekonjo, Likombe, Upper Buando, and Migrant Farmers)*



A much larger number (meaning diversity) of products are harvested for subsistence than for sale throughout the year. A core group of products like plantain and banana are sold consistently, but this group is far less diverse than those consumed for subsistence. The diversity of products harvested for subsistence is most apparent during the rainier half of the year, when wild fruits, greens, mushrooms, spices and other products become available (Figure 4).

Because many of these products are not sold in markets, and do not have high CFA values, numbers of items brought into households each day were compared, along with the value of those items. If a household sells 5,000 CFA of plantains, and consumes approximately a 100 CFA bundle of wild greens, and a 100 CFA handful of mushrooms, the importance of the latter two would be lost if only the CFA value were measured. Measuring the number of items brought into a household captures – albeit crudely – some of the biological diversity integral to peoples' lives, and the importance of cultural as well as economic values that drive many seasonal subsistence practices, including taste, nutrition, tradition, health and well-being.

The role of different habitats in livelihoods

Villages around Mt Cameroon depend upon a range of different habitats and species. Farms dominate the livelihoods of both indigenous and migrant households, but natural forest, fallow and compounds also contribute significantly to subsistence and the generation of cash income, particularly for indigenous households (Table 4). The vast majority of all species harvested from compounds, fallow, and forest are consumed for subsistence; from all four sources more than three times as much of all food, medicine, construction, and fuelwood is harvested for subsistence than for sale.

As Table 4 demonstrates, combined indigenous household income (subsistence and products sold) from compounds,

TABLE 4 *Annual mean CFA[1] contribution and number of items harvested per household from compound, farm, fallow and forest by indigenous and migrant farmer households in five villages in the Mount Cameroon region*

	Number of households in survey	Compound (CFA)	Farm (CFA)	Fallow (CFA)	Forest (CFA)	TOTAL (CFA)	Compound (No.)	Farm (No.)	Fallow (No.)	Forest (No.)	TOTAL (No.)
Bakweri/Bomboko – indigenous households	72	104,016 a	799,491	89,924 a	313,832	1,307,263	123 a	354	116 a	56 a	649
Migrants – SouthWest[2]	11	19,179 b	1,730,565	63,487 a	115,030	1,901,261	45 b	380	22 b	24 b	471
Migrants – NorthWest (30), other parts of Cameroon (2), Nigeria (3)	35	16,564 b	1,225,237	27,078 b	72,548	1,341,427	36 b	325	26 b	29 b	416
All households surveyed	118	70,169	1,012,567	67,162	223,733	1,516,650	90	348	80	45	563
Significance (*P*)		<0.001	0.093	<0.001	0.463		<0.001	0.647	<0.001	0.029	

Source: household survey, in 5 study villages; Laird *et al*, 2007.
Means in the same column that do not share a superscript are significantly different from each other by Tukey hsd.
[1]500 CFA = approximately $1US
[2]Farmers from the South West Province share many species and traditions with indigenous households around Mount Cameroon and have greater knowledge of species names and uses than other migrants.

TABLE 5 *Seasonal Average Household Food Harvested (CFA) from Compound, Farm, Fallow, and Forest (Bakweri Villages – Etome, Ekonjo, Likombe, Upper Buando)*

	Compound	Farm	Fallow	Forest
January – February	910	12,109	507	216
March – April	2,435	15,623	738	456
May – June	3,313	18,333	491	1,676
July – August	3,694	21,477	313	2,500
September – October	2,749	17,644	1,200	1,362
November – December	1,269	16,343	297	1,627
mean for year	2,395	16,921	591	1,306

Source: household surveys in 5 study villages

FIGURE 5 *Seasonal Average Value (CFA) per Household of Food Harvested from Compound, Fallow, Forest (Bakweri Villages – Etome, Ekonjo, Likombe, Upper Buando)*

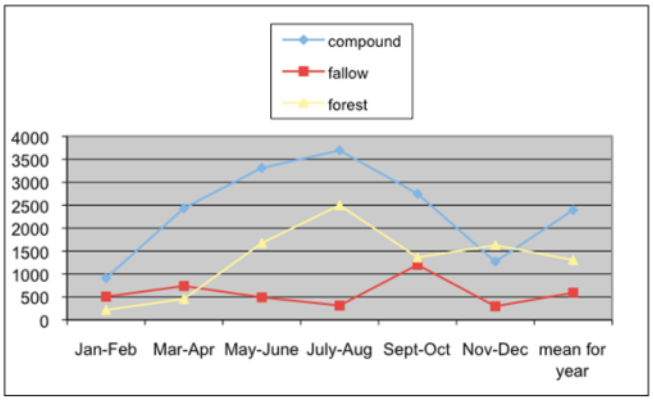
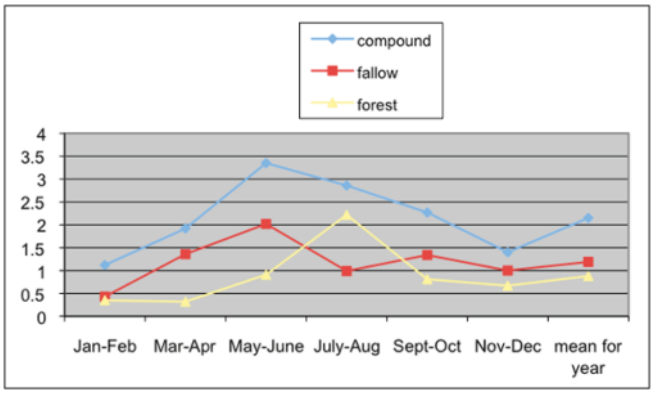


FIGURE 6 *Seasonal Average Number of Items per Household of Food Harvested from Compound, Fallow, Forest (Bakweri Villages – Etome, Ekonjo, Likombe, Upper Buando)*



fallow, and forest makes up almost 40% of the value of products harvested from all sources, compared with roughly 10% for migrant households. Indigenous households also collect at least twice as many items in a year from the forest and five times as many from fallow than migrants to the region, with the exception of migrants who have come from neighboring areas in South West Province. These groups integrate more diversity into their livelihood strategies than other migrants, although still less than indigenous groups.

There are seasonal variations in the role different habitats play in local livelihoods. Farms provide the vast majority of food in all villages, across all seasons, and there is a very significant difference between the amounts of food produced from farms compared with other habitats.[15] For indigenous Bakweri villages, compounds follow farms in importance as a food source, then forest and fallow (Table 5). As noted above, compounds are an important source of food during the heavy rains in July and August, but all sources of food peak during the rainy months of May–October, and forests become an important wild food source (Figures 5 and 6). As the rains begin in May and June, fallow also shows an increase in numbers of items harvested, likely due to wild green (vegetable) and mushroom harvesting, and spice and fruit trees, which account for a large number of collections in Bakweri villages, but are of relatively small cash value.

Actual values for species harvested by Bakweri households from forest and fallow are likely higher than those reported in our study. This is because high-value products like timber and bushmeat are often illegally harvested, and thus generally under-reported, and hundreds of species are difficult to adequately capture and value properly in household surveys because they are consumed inconsistently, seasonally, or for subsistence as medicine, spice, wild foods, and other purposes. Even given this likely under-valuing of these species, it is clear from both the value and number (diversity) of products harvested from different sources that indigenous livelihoods depend upon the active use and management of a broader range of habitats than do those of migrants to the region.

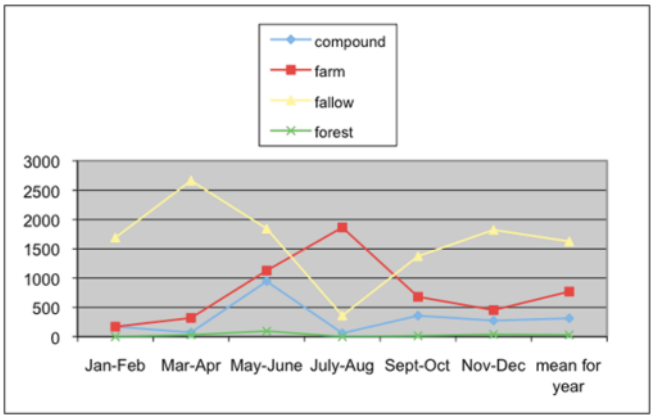
[15] The linear and quadratic components were both significant, suggesting real differences between farms and other sources of products: F (1) = 30.10, p = .000.

TABLE 6 *Seasonal Average Value (CFA) of Fuelwood Harvested from Compound, Farm, Fallow, and Forest (Bakweri Villages – Etome, Ekonjo, Likombe, Upper Buando)*

	Compound	Farm	Fallow	Forest
January – February	172	170	1691	0
March – April	71	320	2664	32
May – June	945	1129	1845	95
July – Aug	59	1865	361	0
Sept-Oct	359	681	1374	16
Nov-Dec	275	454	1824	39
mean for year	314	770	1626	30

Source: household surveys in 5 study villages

FIGURE 7 *Seasonal Average Value (CFA) per Household of Fuelwood Harvested from Compound, Farm, Fallow, and Forest (Bakweri Villages – Etome, Ekonjo, Likombe, Upper Buando)*



Fuelwood and the role of different habitats

Fuelwood has been identified as a cause of forest degradation in the area by some conservation agencies, but in the Bakweri study villages the harvest of fuelwood for subsistence use in cooking is largely from fallows, followed by farms. Commercial fuelwood harvests (eg for the tea estate's driers) would appear to put pressure on forests (although this was not studied as part of this research), but subsistence fuelwood consumption in Bakweri villages does not depend upon the forest (Table 6, Figure 7)[16]. Fuelwood harvests in Bova Bomboko, on the other hand, are part of a land clearance and farming system that does cause forest loss and degradation. In this area, forest is available in what was the Bomboko Forest Reserve, forest abuts many cocoa farms and so is accessible to farmers as a source of fuelwood, and farms continue to be cleared from forest (Laird *et al.* 2007).

Total fuelwood harvesting in all villages remains fairly consistent throughout the year with a peak between March–June, and some variation in sources depending upon the season (Table 6). In December and January, fallow is cleared and fuelwood collected as part of clearing. In addition, large trees are burned at this time, and by April –May they are ready for felling and fuelwood is stockpiled for the rainy season, accounting for the peak in fuelwood harvests. In the rainy season fuelwood collection from fallow declines due to difficulties collecting and carrying fuelwood in rainy conditions, and fuelwood is harvested, if still needed, alongside crops from farms. Analysis of variance between sources of fuelwood indicated that differences between them are significant[17].

The use of native and wild species

Indigenous households use a significantly larger number of species, for a wider range of purposes, than migrants to the region. Bakweri villages use hundreds of species (more than 400 plant species are included in the checklist from this study alone), in order to meet almost every imaginable need, and these are sourced from a wide range of habitats and subject to varying degrees of management. In contrast, most migrant households in this study make regular use of only about 30 species. Migrants will harvest high-value non-timber forest products (NTFPs) like 'eru' (*Gnetum africanum*), 'bush mango' (*Irvingia gabonensis*), 'njangsang' (*Ricinodendron heudelotii*), 'bush pepper' (*Piper guineense*) and other species, as noted above, that are widely traded and consumed throughout the region, and those that are best studied to date (e.g. Awono *et al.* 2002, Awono *et al.* 2009, Ewane *et al.* 2009, Fuashi *et al.* 2010, Ndoye *et al.* 1997, Ndumbe 2010, Sunderland and Ndoye 2004, Sunderland *et al.* 1999,). Migrants are, however, unfamiliar with the full range and diversity of useful species in their adopted home. This is not surprising given that many grew up in extremely different environments (e.g. grasslands of the North West Province), lack historical and cultural ties to species and the landscapes in which they farm, may not have access to many resources, and usually direct their livelihood strategies to maximize cash income, which supports large families and is returned in part to home villages.

Close to 100 of the more than 400 species used by indigenous households were introduced to the region, and agriculture is dominated by introduced species. However, the contribution of native species (cultivated, semi-domesticated, and wild-harvested) to indigenous household income is not far behind that of introduced species (Table 7), which is striking given the dominance of farm income, and the difficulties

[16] Preferred fuelwood species vary by village, but some of the most commonly collected from farm and fallow include 'bwangu' (*Bridelia micrantha*), 'yumbaenge' (*Allophyllus africanus*), 'mbava' (*Anthonotha fragrans*), 'ebwebwe' (*Neoboutonia mannii*), 'ewowo' (*Macaranga occidentalis*), and 'mosenge' (*Macaranga monandra*).

[17] The quadratic component was significant, indicating significant differences between compound, farm, fallow and forest as sources of fuelwood: F (1) = 33.92, p = .000.

TABLE 7 *Annual mean income in CFA[1] and annual mean number of items collected by indigenous and migrant households that were: 1. cultivated or wild, and 2. native or introduced species, in five villages in the Mount Cameroon region*

Household type	Number of households in survey	Income from cultivated species (CFA)	Income from wild species (CFA)	Income from native species (CFA)	Income from introduced species (CFA)	Number of collections of cultivated species	Number of collections of wild species	Number of collections of native species	Number of collections of introduced species
Bakweri/Bomboko (indigenous households)	72	820,231 a	563,141	637,659	775,657 a	178	157 a	195 a	138
Migrants – SouthWest[2]	11	1,817,832 b	156,585	194,323	1,779,762 b	184	46 b	85 b	144
Migrants – NorthWest (30), other parts of Cameroon (2), Nigeria (3)	35	1,195,490 ab	127,993	145,115	1,176,682 ab	184	51 b	81 b	154
All households combined	118	1,024,533	399,580	450,237	988,208	180	115	151	143
Significance (*P*)		0.020	0.780	0.705	0.018	0.213	<0.001	<0.001	0.28

Source: household survey, in 5 study villages; Laird *et al*, 2007.

Means within the same column that do not share a superscript are significantly different from each other by Tukey hsd.

[1]500 CFA = approximately $1US

[2]Farmers from the South West Province share many species and traditions with indigenous households around Mount Cameroon and have greater knowledge of species names and uses than other migrants.

associated with adequately valuing native and wild harvested species in this study. Indigenous households also collect larger numbers of native and wild species over the course of a year than cultivated and introduced species, further illustrating the role of biological diversity in their livelihoods. When compared with migrant households, Bakweri households derive roughly 4 times the annual income from native and wild species, and bring 2–3 times as many wild and native items into the home (Table 7).

Bakweri households vary in their practices, with some making greater use of a mix of habitats, and native and wild species, than others. In some cases this can be explained by occupation (eg hunters and healers use a wider range of species and habitats), age (older individuals tend to know about and use more species, although they have a harder time accessing them), and other factors. But in many cases heavy reliance on biodiversity does not follow from community-wide trends as much as the internal workings of households, including personal taste and interests, and family tradition.

Biocultural diversity and conservation around Mt Cameroon

The cosmopolitanism of indigenous groups around Mt Cameroon – their incorporation of introduced weeds and crops, plastics and zinc, their clothes, proximity to towns, their long contact and engagement with outsiders, and the participation by some in selling land and resource 'mining' to serve urban and overseas markets – is sometimes viewed as evidence of a lack of real connection with land, species, and place. After a brief spell during which the Germans saw the Bakweri as fierce warriors, colonial regimes viewed the Bakweri (now removed from their lands) as 'indolent" or apathetic and in decline (Geschiere 2009). The biological diversity of Mt Cameroon is widely remarked upon, but the cultural diversity and traditional practices interwoven with biological diversity remain poorly understood. Indigenous resource management is often assumed to negatively impact forests, albeit in vague and unquantified ways, and to be at the same time somehow inefficient and under-developed. As elsewhere in Africa (eg Fairhead and Leach 1996, Homewood 2004, Igoe and Brockington 2007, Sullivan 2002), some conservation programs in recent decades have sought to promote natural resource-based "alternatives" that increase income from the forest and "improve" forest management, while overlooking sophisticated traditional practices that instead minimize risk and enhance resilience and quality of life in an area characterized by uncertainty and change.

At the same time, traditional knowledge with deep roots in the local environment, including that associated with wild foods, medicinal plants, games, dance, musical instruments, secret societies, and weaving, is under pressure alongside biodiversity, and as a result of many similar causes. Growing local towns and increasing access to global media through cell phones and the internet make villages a last resort for young people. The blight of HIV and other health problems weakens indigenous societies and requires the purchase of expensive medicines. Extreme social and economic inequity resulting from a broken and predatory government, liberalization of markets and the attendant uncertainties for commodity producers, and a breakdown of civil society mean that many local people struggle to make ends meet. Whether to pay school fees, buy food and medicine, purchase kerosene, cement, zinc or cooking pots, the pressure to generate cash is enormous.

Spikes in demand for forest products driven by urban and overseas markets combine with the need for cash and advances in technology and transportation to accelerate the depletion of bushmeat, medicinal plants, timber, and other forest resources. Migrants from poorer regions come to the Mt Cameroon area because it is relatively better off and has fertile soils, further taxing the forest. And centuries old demand from overseas for the natural resources of the area continues with a new suite of actors eyeing the fertile agricultural soils, timber and recently oil of the region. At the same time, traditional institutional structures and norms that control short-term exploitation at the expense of long-term health have weakened. Traditional knowledge and practices have adapted and accommodated external claims on forests, land and resources for hundreds of years, but the intensity of cultural and social change has perhaps never been greater.

Distinct from these pressures and the changes they have wrought in indigenous lives are elements of resource management systems and relationships to place that have adapted and evolved, but were handed down to current generations from parents and grandparents. Rather than directed towards quick gains, these systems place a premium on endurance, resilience and well-being over time. This is consistent with reports from tropical forest ecosystems from around the world. In environments so inherently complex and uncertain, traditional forest management commonly relies on strategies that minimize risk by incorporating diversity, accommodate uncertainty, and make use of mosaics of vegetation in different stages of succession to produce a range of products and services across seasons and years (e.g. Alcorn 1989, Balee 1994, Dove 1993, Falconer 1992, Parajuli 1999, Posey 1999, Redford and Padoch 1992, Richards 1999). In many areas, these systems have been shown to actually enhance rather than reduce biological diversity, and although it was not the subject of this study, seasonal and highly varied diets and traditional medicinal plant use would also appear to support local health and nutrition (Cunningham *et al.* 2008, Dounias *et al*. 2007, Shanley and Luz 2003, Sills *et al*. 2011, McGarry and Shackleton 2009).

There is a danger in extolling the virtues of indigenous resource management systems in an area with a long and recently highly active politics of identity that excludes migrants – many having lived in the region for generations – from access to economic and political resources based on criteria for belonging (Gerchiere 2009, Konings and Nyanmjoh 2003, Sharpe 1998). As Geschiere (2009) argues, despite its apparent naturalness and self-evidence, the concept of autochthony, and having "come first", is uncertain and pliable and has been used in Cameroon to not only marginalize migrants but also divide the opposition and bolster a corrupt regime. Around the world, the valorization of some forest

actors has served to undermine the legitimacy of others. In Brazil, for example, international and national conservation agencies have come to support indigenous peoples' and rubber tappers' claims to forest but remain cool on migrants and peasants (Campos 2006, Campos and Nepstad 2006). In South Africa, non-traditional groups living in peri-urban or urban environments consume wild resources but are often not considered part of the biocultural diversity of that country (Cocks 2006a). The point of this paper is not to contribute to a divisive dialogue but to instead build understanding of the biocultural diversity of Mt. Cameroon, which has been poorly studied to date. Even modified, and diminished in many households in recent decades, traditional resource management continues to form the backbone of rural indigenous livelihoods around Mt. Cameroon, and these practices and knowledge are tightly woven into the local landscape and its biological diversity.

Whatever its strengths, traditional knowledge and practices cannot address the primary causes of deforestation and biodiversity loss – poverty, political, economic and social inequity, and natural resource 'mining' – and local communities can do little to reverse the deterioration in government institutions over the last few decades, and the rise of corruption that contributes to forest and biodiversity loss (Assembe 2009, Burnham and Sharpe 1997, Egbe 2001, Laird *et al*. 2010, Pye-Smith 2010, Cerutti and Lescuyer 2011, Ndoye and Awono 2010, Transparency International 2010). In fact, indigenous resource management accounts for only a small part of the total Mt Cameroon area today. But traditional knowledge and practices can complement western scientific studies of species and ecosystems, and reveal and support approaches to conservation that embrace uncertainty, complexity, and change (eg Dove 1993, Fairhead and Leach 1996, Igoe and Brockington 2007, Parajuli 1999, Richards 1999). In a region as densely populated as Mt Cameroon, with enormous pressure on remaining forests, managed landscapes – including those of indigenous communities – will be integral to broader conservation efforts around the Mt Cameroon National Park.

CONCLUSION

At first glance, the livelihood systems of indigenous and migrant households seem alike. With variations in emphasis, they rely on a similar suite of crops for cash income and subsistence, and collect similar high-value forest products known throughout the region. Upon closer inspection, however, it becomes apparent that Bakweri households use a much larger number and variety of species – native and introduced, wild and cultivated – and actively manage and use a range of habitats. The diversity inherent in these systems is greatest, but most invisible to the outside eye, as manifested in subsistence use. Products sold in markets for cash – whether crops or forest products – are drawn from a pool of resources that is small compared with those used for subsistence, and their harvest responds to external demand. Subsistence, on the other hand, reflects long cultural ties to place, to the landscape, species, seasons, and history.

The arrival of mushrooms and wild greens at the start of the rains, visiting a favourite fruit tree planted by a relative when it bears briefly, or a healer's mixture of dozens of medicinal species, many collected from very particular locations at particular times – all speak to a system that not only generates cash, but also accommodates many other social needs, material as well as symbolic. For conservation to succeed in a region so densely populated, with fertile soil and rich in natural resources that bring outside groups, large and small, to the area, managed landscapes must be part of conservation planning. The managed landscapes of indigenous groups around Mt Cameroon cover only a small portion of the area today, but are expressions of long-standing, diverse and dynamic relationships between people and place, culture and nature and, rather than threats, can significantly contribute to biodiversity and forest conservation in the region.

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Chapter 3.
Cocoa farms in the Mt. Cameroon region: biological and cultural diversity in local livelihoods

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ORIGINAL PAPER

Cocoa farms in the Mount Cameroon region: biological and cultural diversity in local livelihoods

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Abstract A study was undertaken around Mt Cameroon to examine the role of biological and cultural diversity in the livelihood strategies of indigenous villagers and migrants to the region. Surveys of resources consumed and sold by 118 households were undertaken in five villages over the course of 1 year, the perspectives and practices of cocoa farmers documented, and useful tree species retained or planted on six cocoa farms mapped. Cocoa farms in this region generate more significant benefits for biodiversity conservation and local livelihoods than commercial plantations, but also place pressure on forest reserves and require chemical inputs. Roughly 50 tree species are commonly retained or planted on cocoa farms, primarily for timber or food, with many of these having high conservation value. Average tree density of non-cocoa trees was 15 trees per hectare, with tree densities higher, and a larger percentage of species used, on indigenous Bomboko farms than migrant farms. Both migrant and indigenous households rely on forest as a complement to farm income, but indigenous households do this to a far greater extent, while also making extensive use of fallow and home gardens. Indigenous households also derive roughly four times the income from wild and native species compared to migrants. While diversified cocoa farms contribute to conservation and livelihoods in the region, indigenous

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livelihoods grow from and require the conservation of a broader range of species and habitats, including natural forest.

Keywords Biodiversity · Cameroon · Cocoa · Cultural diversity · Livelihoods · Non-timber forest products

Introduction

The conservation of biological diversity by necessity integrates managed landscapes outside of protected areas, and involves strategies to maximize the retention of biodiversity and improve livelihoods (CBD 1992). Cocoa farms, often a threat to forests and biodiversity in the tropics, can also provide environmental and livelihood benefits that outweigh those of other agricultural systems, particularly when cocoa is grown in agroforests like those of southern Cameroon, Bahia in Brazil, and eastern Ghana (Ruf and Schroth 2004; Gockowski et al. in press). Cocoa farms that retain significant numbers of indigenous shade trees, as well as planted fruit and other trees, replicate structural and functional elements of the forest: they contribute to soil conservation, thermal regulation, genetic and species conservation, carbon sequestration, and watershed protection, and provide habitat for wildlife while serving as reservoirs for seeds from the forest (Kotto-Same et al. 1997; Leakey and Tchoundjeu 2001; Sonwa et al. 2001; Zapfack et al. 2003; Gockowski et al. in press).

In addition to these environmental services, non-cocoa trees on farms provide useful products consumed for subsistence and sold in local markets (Sonwa et al. this issue). Non-cocoa trees contribute across seasons to household livelihoods, and provide supplemental income when cocoa prices fall or disease strikes. Cocoa farms also hold in reserve timber species that can be harvested for home construction, to provide cash for farm improvement or household use, and which would otherwise be harvested from forests (Ruf and Schroth 2004; Gockowski et al. in press).

Cocoa was introduced to Cameroon by the German colonial administration in the western coastal areas, including around Mount Cameroon, in 1886 (Ardener 1996). During this time, the Germans introduced a range of plantation crops from around the world into Cameroon through the Victoria (now Limbe) Botanic Garden, at the foot of Mount Cameroon. The Trinitario variety of cocoa they introduced was from Venezuelan and West Indian planting material, with distinctive red-podded trees. The result is cocoa with unusually high fat content and a red-colored powder (Wood 1991). The Trinitario variety, called "German", is still planted around Mount Cameroon today. In South and East Cameroon, Trinitario trees were mixed with Amelonado from Fernando Po, Equatorial Guinea. Amelonado cocoa was first introduced to the Central and West African region through Principe (1822), Sao Tome (1830) and Fernando Po (1854). Cocoa plantations on Fernando Po relied on imported labor from West Africa, and—with the exception of Cameroon—Amelonado cocoa spread throughout the region when cocoa laborers returned home (Wood 1991).

Unlike the commodity crops rubber, tea, banana and oil palm, cocoa is grown largely on small-holdings in Cameroon. Farm size averages roughly 3 ha, with variations by region, wealth, cultural practices of the individual farmer, and farming intensity (Gockowski 2000). Both women and men play a role in the cycle of cocoa production, although cocoa is

primarily viewed as a "men's crop" (Guyer 1984; Malleson 2000; Gockowski et al. in press).

Cocoa farms in southern Cameroon tend to have a higher density of shade trees than cocoa grown in West Africa (Zapfack et al. 2002; Sonwa et al. 2003; Ruf and Schroth 2004; Gockowski et al. in press). Gockowski et al. (in press) report that when viewed using satellite imagery, the vast majority of indigenous Beti cocoa agroforests in Southern Cameroon are indistinguishable from closed canopy forest. The cocoa agroforests of southern Cameroon, managed by the same groups for close to 100 years, have integrated and become part of complex traditional management systems (Guyer 1984; Sonwa et al. 2000; Carriere 2002; Ruf and Schroth 2004; Gockowski et al. in press). For example, the Beti use 254 species found on cocoa farms, for 392 purposes, and retain an average density of 162 non-cocoa trees per hectare (Gockowski et al. in press).

As we will see, the cocoa farms around Mount Cameroon fall on a continuum between those with little or no shade in West Africa and the complex cocoa agroforests of southern Cameroon (Sonwa et al. this issue; Oke and Odebiyi in press). The Mount Cameroon region is characterized by relatively high population densities, and significant pressure on land and resources. Some old, diverse cocoa farms persist, managed by the offspring of original indigenous farmers, but the bulk of cocoa farming in the region is undertaken by migrant farmers, and the trend on indigenous cocoa farms is towards simplification. Even in these simplified systems, however, the retention and planting of non-cocoa useful species provide important environmental services and livelihood benefits. This is particularly the case when cocoa farms are compared to the commercial oil palm, tea, banana and other plantations owned by the Cameroon Development Corporation (CDC) and, increasingly, local and urban elites around Mount Cameroon.

This paper explores the relationship between cocoa farms, livelihoods and biological and cultural diversity in the Mount Cameroon region. We examine the retention and planting of useful species, some with high conservation value, on cocoa farms, and then look more broadly at the role of biodiversity in the land use strategies and livelihoods of indigenous and migrant farmers. Indigenous and migrant farmers' dependence upon biodiversity is viewed through the contribution of native and wild species, and of diverse habitats including forest, to local livelihoods. The implications for biodiversity conservation of cocoa farm management and the value of biodiversity to indigenous and migrant households are also explored.

Methods

The Mount Cameroon region

Mount Cameroon is on the southwest coast of Cameroon, on the Gulf of Guinea. At 9.1° east and 4.5° north, it is the last active member of a range of volcanoes that extend from the island of Principe, around 100 km to the southwest, through Fernando Po of Equatorial Guinea (2,850 m) to the highlands of Adamoua in Cameroon and Obudu in Nigeria (Letouzey 1985). It is the highest mountain in West Africa, at 4095 m, rising rapidly from the Atlantic Ocean to the summit 20 km inland, with two distinct peaks, Mount Cameroon (locally known as Fako) at the north-east, and the older Mount Etinde (1715 m) at the south-west (Letouzey 1985; Fraser et al. 1998). Mount Cameroon is one of the most biologically diverse sites in Africa, with roughly 2500 indigenous and naturalized plant species (Cable and Cheek 1998). Located in the Guinean Forests of West Africa, it is part

of a 'biodiversity hotspot' (Conservation International 2007), and comprises lowland and lower montane rainforest, upper montane and sub-alpine rainforest, and montane and sub-alpine grasslands (Ndam 1998).

Mount Cameroon harbors a patchwork of habitats, land uses and people. The indigenous groups living around Mount Cameroon include the Bakweri, Bomboko, Bakolle, Balong, Isubu, and Wovea. All have a long history of interaction with external groups, including European traders, missionaries, and German and English colonial administrations. In the last decades of the 1800s, following a series of battles, Bakweri villages were relocated by the Germans in order to establish the plantations that remain today, and are currently managed by the CDC (Kofele-Kale 1981; Ardener 1996; Sharpe 1996). Boundaries between villages and plantations continue to be negotiated as part of what is called the "Bakweri land question", and in the last decade some villages have re-acquired marginal lands taken from them more than 100 years ago. The Bakweri have also brought their case to the African Human Rights Commission (BLCC 2006).

Workers on the plantations have long been drawn from other parts of Cameroon, in particular the Bamenda highlands, and other parts of Southwest Province (Ardener et al. 1960; Ardener 1996). Migrants from other parts of Cameroon and Nigeria also live as settlers and farm in the area. In 1960, indigenous groups made up 30% of the population of Victoria Division (Ardener 1996). A recent study estimated that the indigenous Bakweri population makes up less than a quarter of the roughly 250,000 people in the Mount Cameroon region (Schmidt-Soltau 2003). There are significant differences between villages, however, with many remaining almost entirely indigenous, and others—like the Bomboko village included in this study—having less than 10% indigenous residents.

Study villages

This study was undertaken in five villages around Mount Cameroon—Ekonjo, Etome, Upper Buando, Likombe and Bova Bomboko (Fig. 1). The first four villages are indigenous Bakweri villages found on the southern slopes of Mount Cameroon. Migrant, or "stranger" as they are locally known, farmers rent or buy land in the vicinity of these indigenous villages, but do not reside within the village, living instead in plantation camps and villages closer to towns. The population of the indigenous Bakweri villages range in size from 61 to 265 (Table 1). All villagers earn the majority of their living from farming, and some are only farmers, but most indigenous households also collect non-timber forest products (NTFPs), include hunters, healers, traders, or support themselves in other ways in addition to farming.

The fifth village, Bova Bomboko, is located at the northeastern foot of Mount Cameroon and was originally an indigenous Bomboko village but is now dominated by migrant farmers. Bova Bomboko abuts the roughly 26,667 ha Bomboko Forest Reserve, created in 1939 as the Bomboko Native Authority Forest Reserve. Bova Bomboko is now populated primarily by cocoa farmers from other regions of Cameroon (primarily Northwest, Southwest, West, and Centre Provinces) and Nigeria. Less than 10% of the population today is indigenous Bomboko. The population of Bova Bomboko is significantly larger than that of the other study villages, totaling 1151 individuals in 212 households (Table 1). As found in the village census, Bova Bomboko also has a younger population, with the majority under age 40. Only 11% of the population is over the age of 40 (2% over the age of 60), compared with more than 30% of the population of indigenous villages over the age of 40, and 11% over the age of 60. The vast majority of the inhabitants of Bova Bomboko

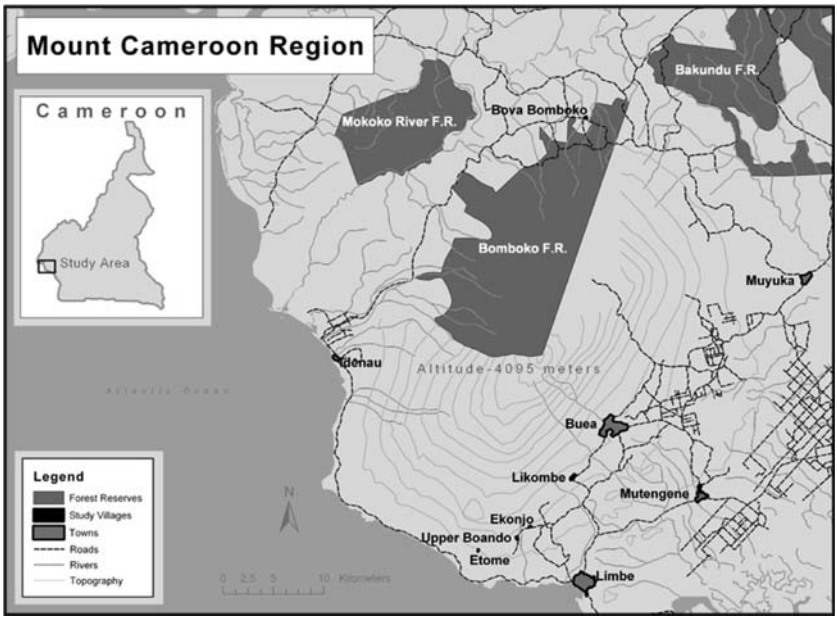

Fig. 1 Study region around Mount Cameroon showing the Forest Reserves (F.R.)

Table 1 Population, structures and households in five study villages in the Mount Cameroon region in 2000

Villages	Community type	Number of permanent residents	Number of separate structures or houses	Number of households living in village	Number of households in the household survey (# of individuals in these households)
Bova	Bomboko	<10%			indigenous; remaining migrant
1151	129	212	36 (268)		
Etome	Indigenous	67	18	10	10 (67)
Ekonjo	Indigenous	61	25	19	19 (61)
Likombe	Indigenous	265	79	61	23 (119)
Upper Buando	Indigenous	66	25	15	15 (66)

Source: village census

are farmers and earn the bulk of their income from farming, particularly from cocoa. Cocoa farmers report, and the household surveys demonstrate, that cocoa accounts for well over 50% of most households' income in Bova Bomboko; an additional 40% of income comes from other crops like plantains, cocoyams, and cassava. Less than half of all households harvest NTFPs and these earn around 5% of their income from about a half dozen NTFPs (e.g. *Ricinodendron heudelotti* (njangsang), *Irvingia gabonensis* (bush mango), *Gnetum africanum* (eru), *Piper guineense* (bush pepper), *Cola lepidota* (monkey cola), *Garcinia cola* (bitter cola), and bushmeat).

Survey methodology

The research on cocoa farms reported in this paper was part of a larger research project, undertaken around Mount Cameroon between 1998 and 2004. The project addressed a broader range of research questions than the cocoa study, and was focused on diversity and change in indigenous and migrant relationships to the environment. The project also employed a wider range of ethnobiological methods, including free-listing, additional household surveys, resource-specific surveys, tree trails, and others. This broader project informed the cocoa research, but will not be reviewed here (see Laird in press).

The initial phase of research included a village census and household surveys of resource use. The census was undertaken in the five study villages—Likombe, Etome, Ekonjo, Upper Buando, and Bova Bomboko—in a total of 317 households. Every household in each village was visited, and information collected on all members of the household and family, including: gender, age, relationship to household head, education level, residency (permanent, temporary, outside village), occupations, and relatives in village. For each household, sources of income were initially evaluated using pie charts (and at times stones, seeds, or other representations). The total number of structures in each village, as well as the total number of active households, were recorded (Table 1). In addition, demographic surveys were undertaken of migrant farmer households living outside of, but farming in proximity to, indigenous Bakweri villages included in the study—in Batoke, Saxenhof, and Wututu.

Following the village census, we undertook more intensive daily household surveys to document resources gathered for subsistence use and sale. In the larger villages, a sample of households was selected, stratified according to gender of household head, age, relative wealth, education level, and source of income (including extent of reliance on forest—e.g., hunters, herbalists, weavers, and NTFP collectors depend more on the forest than those that primarily farm). In Likombe, 23 households were included in the household survey, and in Bova Bomboko, 36 households. In Etome, Ekonjo, and Upper Buando, household numbers are small enough that all households were included in the daily surveys.

In order to examine the broader role of biological and cultural diversity in indigenous and migrant livelihood strategies, we measured the contributions of different habitats, management systems, and species. Broken down crudely for the purpose of analysis, these are the habitats of home gardens (compounds), farm (including cocoa farms), fallow, and forest; cultivated and "wild" species ("wild" incorporating all things not intensively cultivated, including those semi-domesticated); and native and introduced species (Tables 5, 6). The daily household survey recorded all things collected and consumed, or sold by households in order to move beyond identifying and listing what is generally reported as 'useful', to quantifying the nature of use. The household survey allowed comparison of differences in resource use and management between ethnic groups, and study villages of different size, geography, proximity to forest, markets, and urban centers, and other factors. In each village, households were interviewed for five consecutive days, every other month, over the course of a year (2000–2001). With a total of 118 households included in the study, multiplied by 30 days across the year, a total of 3540 day surveys were administered. A total of 8779 entries for food harvested and bought in local markets were recorded for all villages combined across the year (Table 2).

In order to calculate a monetary value for products harvested from cocoa farms and other areas for subsistence, we undertook market surveys. For each village, a study in the main local market was undertaken. Prices for products in the rainy and dry season were recorded. For medicines, wild greens and fruits, forest ropes, and other products that are

Table 2 Number of plant products harvested from home gardens, farms, fallow and forest and bought by households in each study village in the Mount Cameroon region over the course of one year[a]

Village	Household type	Products harvested	Products bought
Bova Bomboko	<10% indigenous; remaining migrant	1226	944
Etome	Indigenous	519	232
Ekonjo	Indigenous	690	455
Likombe	Indigenous	1473	835
Upper Buando	Indigenous	903	368
Batoke	Only migrant households surveyed	143	302
Saxenhof	Only migrant households surveyed	225	197
Wututu	Only migrant households surveyed	127	140

[a] Plant uses include food, medicine, household use, construction, fuelwood, cultural use

Source: Daily household survey

not widely sold, we selected a low figure (e.g., 100 CFA per bundle for medicines), or used a substitute product value. This approach undoubtedly undervalued these resources, but allowed for their incorporation in the analysis (Campbell and Luckert 2002). In any case, in contrast to staple foods and fuelwood, household surveys are a poor way to capture the use of medicinal plants, many wild foods such as mushrooms or bushmeat, and other products that are used inconsistently, collected sporadically, or often under-reported in household surveys (Laird in press).

Cocoa-specific surveys

Building upon the village census and household surveys described above, research was undertaken to look specifically at cocoa farming in Bova Bomboko, the only study village to intensively farm cocoa. This research sought to evaluate: 1. the extent of farmer dependence on chemical inputs; 2. the multiple products (non-timber and timber) found on cocoa farms, and by extension the retention of biological diversity on farms; and 3. reasons for pressure on the Bomboko Forest Reserve from new cocoa farms. In part this research was undertaken in collaboration with staff from the Mount Cameroon Project, as part of their efforts to explore the potential for certification to promote ecologically and socially sound cocoa production.

Cocoa farmer surveys were undertaken with 66 households—all households included in the daily household survey (36), and an additional 30 cocoa farmers selected according to the same criteria as the first 36 households. The bulk of these farmers originate outside the area, primarily in Northwest Province, followed by Southwest Province, and other parts of Cameroon and Nigeria. A small number of cocoa farmers are indigenous Bomboko. Migrants from the South West Province were distinguished as a group in this survey because they share many species and traditions with indigenous households around Mount Cameroon, and—as other parts of the larger study demonstrated—have greater knowledge of species names and uses than other migrants (Laird in press). The "cocoa farmer survey" explored current management practices (varieties, schedule, use of pesticides, yields, etc.); existing incentives to clear farms from forest; basic marketing structures; land tenure and resource rights; and the socioeconomic profile of the planting, harvesting, processing, transporting and marketing of cocoa. Households were also asked which trees, shrubs and other useful products are found on cocoa farms: tree name; use; whether retained or planted;

estimated number per farm; average years on a farm; and who retained or planted it (some species derive from the time when parents or grandparents managed the farms). Households were also asked to rank different habitats in importance as a source of NTFPs—village/compound; "chop" (food crop) farm; fallow; cocoa farm; secondary forest; primary forest or "black bush"—and to list the types of NTFPs found in each habitat.

Following these household-based surveys, and a series of walks on farms and in forest to 'ground-truth' the household survey results, we surveyed six cocoa farms (total area of 26.1 ha) in order to identify and map the distribution of useful NTFP and timber species retained or planted. The mapping exercise was intended only to provide an illustration of reported practices of retaining or planting a more diverse suite of species on farms; the sample size of six farms is too small to draw broader conclusions from the maps alone. Farmers included in the cocoa farm surveys represented different ethnic groups, farmer age, size and age of farm, and proximity of farm to the Reserve. Four farmers are migrants from the north-west (Nkambe, Widikum, Ngie, and Noni) and two are indigenous Bomboko. Farm sizes range from 3.8 to 7.2 ha. Two farms abut the Bomboko Forest Reserve. Due to the sensitivity of farming within the Reserve, none of the large number of cocoa farms inside the Reserve was included in the mapping (although these farms were represented in the household survey portion of the research). Two of the cocoa farms, those owned by Bomboko, are old and well-developed and were passed down through many generations.

The research team included this paper's authors, two village research assistants, and a field botanist and tree spotter from the Limbe Botanic Garden. Voucher specimens were collected when species were not easily identified in the field, and specimens lodged at the Limbe Botanic Garden. A GIS specialist created maps of each farm, and plotted the location of useful non-cocoa trees on the farm, and agricultural extension and community development staff from the local conservation project, The Mount Cameroon Project, also participated in the household level cocoa surveys.

Results and discussion

The most significant result from this study is that indigenous households depend to a much greater extent upon local biodiversity than migrant households. This is manifested in the retention or planting of a higher density and diversity of non-cocoa trees on cocoa farms, and the use of a wider range of non-tree species on those farms, as well as livelihoods reliant not only on farms, but a wider range of habitats and both native and wild species. In this section we present and discuss these and other results from this study, and examine their impact on biodiversity conservation, beginning with an overview of cocoa farming practices in Bova Bomboko, including the use of chemical inputs. We then discuss cocoa farm establishment in the rich lowland forest of the Bomboko Forest Reserve; the retention and planting of useful species, many with high conservation value, on cocoa farms; the broader role of biological and cultural diversity in the livelihoods of indigenous and migrant households; and the impact of land tenure and resource rights on farm establishment and tree retention on cocoa farms.

Cocoa farming in Bova Bomboko

As reported in the cocoa farmer survey, cocoa farms in the Bova Bomboko region average between 3 ha and 4 ha, with indigenous Bomboko farms tending to be of greater size than

those of migrants. Most cocoa farmers in Bova Bomboko are migrants to the region who learned cocoa farming from friends or neighbors when they arrived (43%), from parents who had been cocoa farmers (37%), or from agricultural extension or other services following employment in local forest reserves or plantations (20%). In contrast, all indigenous Bomboko farmers learned cocoa farming from their parents, but many were also taught it in school.

The main cocoa varieties planted in this region are "German", the Trinitario variety introduced by the Germans, and the Amelonado varieties "Amazon" and "Barombi Kang". "German" cocoa takes longer to produce, but is also longer lived and more resistant to pests and diseases—an important consideration in this region. Cocoa farmers face a range of pests and diseases, with the main problems reported in the cocoa farmer survey being insects like mirids (capsid) and ants, and fungal diseases like black pod (*Phytophthora* spp.) and "yellow" or "wilt" (*Ceratocytis fimbriata*). Black pod is particularly prevalent in areas like Mount Cameroon without a pronounced dry season and with long periods of high humidity (Wood and Lass 1987). It can cause 80% yield loss when farms are left untreated with fungicides (Tondje 2000). Some farmers cut lower branches on shade trees and weed around cocoa to reduce the humidity, and all cut out shade trees that are considered to promote black pod or excessive dampness within farms (e.g., those with big leaves like the 'umbrella stick', *Musanga cecropiodes*). All farmers use a cocktail of chemicals (e.g., Gamaline, Nodox, Redomile, Kocide) to control pests and diseases; fertilizer use is minimal due to the fertility of the volcanic soils. Chemicals are the largest investment made by farmers, and one considered prohibitive but necessary. Their widespread use clearly undermines some of the environmental benefits gained from cocoa farms relative to other agricultural systems (e.g., food crops) in the region.

With liberalization of the cocoa sector in the 1990s, farmers were freed from the often dysfunctional and corrupt marketing board system, but became vulnerable to predatory intermediate sellers of chemicals and buyers of cocoa, and the whims of international markets for the prices they are paid. They have yet to resolve the resulting institutional and marketing problems (Tchoungui et al. 1995; Wirsiy and Lysinge 2003). Most farmers in Bova Bomboko purchase chemicals from agents who come to the village from the regional cities Kumba and Douala, and who often sell at inflated prices and advance funds against future sales. In addition to chemicals, farmers pay for laborers to harvest, prune, spray and clear—all jobs primarily done by men—and break and join/heap cocoa (primarily women). Chemicals and hired labor consume half of all earnings. Farmers must also pay for fuelwood and ovens to dry the cocoa (jobs performed by men), and for the cost of transporting cocoa (performed by women, men and sometimes children). Cocoa growing is difficult and labor-intensive work, but it generates more cash income than other crops for farmers, and—as reported in the cocoa farmer survey—is used to pay for critical living costs, with school fees topping the list, followed by medical expenses, food, and improvements to home or farm.

Cocoa farm establishment in forest

The majority of cocoa farms in the Bova Bomboko region are found outside the Bomboko Forest Reserve. The forest reserves in this area have been contentious from the start (Sharpe 1996), however pressure on the Bomboko Forest Reserve has increased significantly in recent decades. Today, much of the Reserve abutting the road and villages is already logged, and a significant portion is under cocoa and "chop" (food crop) farms

(Etuge 1999; Mount Cameroon Project 1997; Tchouto 1999). Migrants are responsible for the majority of forest clearance in the area, after buying or leasing the land from indigenous communities. What remains intact in the Reserve is lowland evergreen forest, which is the richest in rare endemic species and of the highest priority for conservation in the Mount Cameroon area (Cable and Cheek 1998).

In part, pressure on the Reserve is due to the limited availability of land, absence of controls and respect for Reserve boundaries, and the needs of migrants from regions with little available land and few employment opportunities. But undisturbed forest, or "black bush", is also considered a good place in which to clear a farm by more than 80% of the 66 households participating in the cocoa farmer survey. The reasons include soil fertility, with cocoa growing faster, bearing earlier, and producing higher yields; fewer pests and diseases, so less money spent on chemicals; higher inter-crop yields in the early stages (e.g., plantain and cocoyam); and greater availability of water in the dry season. Ruf and Schroth (2004) refer to these advantages as a "forest rent": throughout the world, planting cocoa after clearing primary forest results in lower investment and production costs than planting on previously used crop or fallow land.

The drawbacks of clearing a farm in the 'black bush', as reported in the cocoa farmer survey, are primarily the high labor involved in felling and clearing the farm, and the distance from the village. Squirrels and other animals are also likely to attack cocoa pods, and some said that over time—in 4–5 years—the humidity of the forest made pest and disease problems worse. Furthermore, as one penetrates the Reserve the altitude increases, and cocoa is considered to bear poorly at higher altitudes. Given the scarcity of land available around villages, and the continuing needs of the many households facing economic hardship in the region, however, pressure on the unique forest of the Reserve is likely to continue. The extent of this pressure was not quantified as part of this study, but the combination of chemical inputs and forest clearance associated with cocoa farms is clearly a threat to biodiversity conservation in the region. Although the broader economic and social problems that drive forest clearance in the area are difficult for most conservation programs to tackle successfully, certification schemes that integrate ecological, organic, and fair trade criteria might provide incentives to reduce both chemical use and forest clearance in the region.

Useful species retained or planted on cocoa farms

Outside the Bomboko Forest Reserve, cocoa farms can play a positive role in biodiversity conservation as part of a patchwork of managed landscapes. Retention or planting of useful trees during farm establishment or in subsequent years can contribute to both diversified livelihoods and biodiversity conservation. These non-cocoa trees provide shade for cocoa and are used for timber, food (fruit or spice), and to a lesser extent for fuelwood (Table 4). Many useful food and fuelwood trees are also found on "chop" (food crop) farms, but the bulk of species used for timber are found on cocoa farms, held in 'reserve' for future use.

The cocoa farmer survey found that farmers retain roughly 15 non-cocoa tree stems per hectare, with older Bomboko farms having higher numbers, with an average of 20 trees per hectare. For illustration, in Fig. 2 the four migrant-owned farms average 11.3 trees per ha compared with 22 trees per ha for the two Bomboko farms. In Côte d'Ivoire migrant farmers also tend to use less shade than indigenous farmers; there, indigenous farmers averaged 37 non-cocoa trees per ha, while migrants averaged 21 trees per ha (Ruf and

Schroth 2004). Studies from southern Cameroon cocoa agroforests report far higher densities of non-cocoa trees per ha, often more than 150 trees per ha (Gockowski 2000).

Non-cocoa tree densities, and average number of tree species per hectare, are found throughout the country to vary according to cultural tradition and ethnic group, age of farms, proximity to markets, and intensity of farming (Sonwa et al., in press; Sonwa et al. 2000; Gockowski et al. in press; Carrier 2002). In Bova Bomboko, the cocoa farmer survey found the average number of non-cocoa tree species on farms was roughly five species per hectare. Indigenous Bomboko use a higher percentage of non-cocoa species on their farms than do migrant farmers (85% for Bomboko compared with 75% for Northwestern migrant farmers in Fig. 2; Table 3). Retained or protected forest trees, unlike planted fruit trees, are

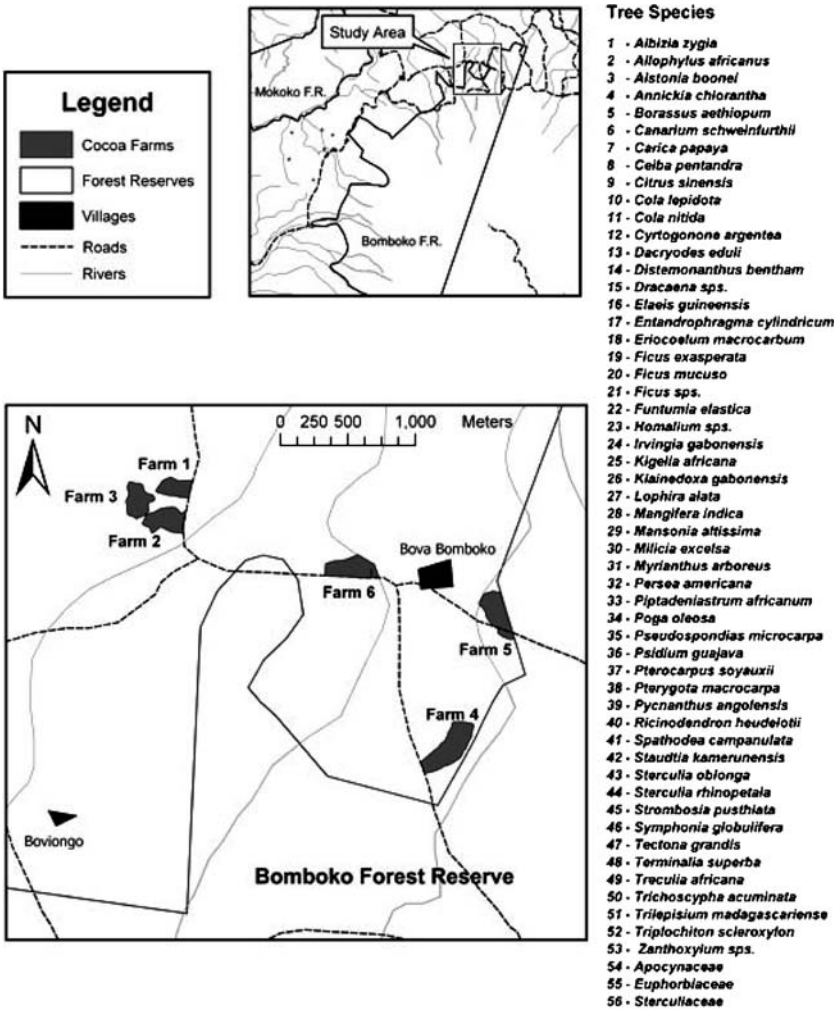

Fig. 2 Tree species retained or planted on six cocoa farms near Bova Bomboko, Mount Cameroon region. The numbers in the farm maps show the positions of individual trees as listed in the tree species list. Farms 1–4 are migrant farms, and farms 5 and 6 are indigenous cocoa farms

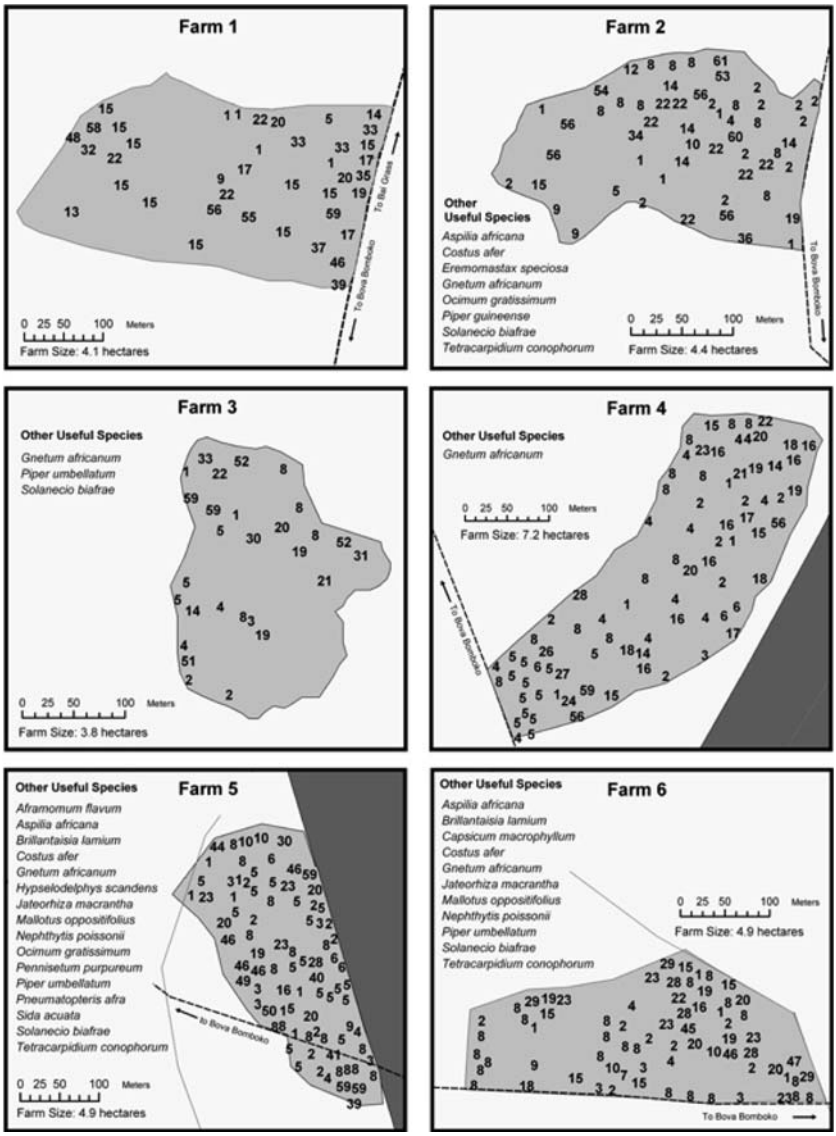

Fig. 2 continued

more or less evenly spread to provide shade to cocoa, and, in some cases, to increase soil fertility (Fig. 2).

As well as being useful, species retained on cocoa farms are often of conservation importance in the Mount Cameroon region. Of the 44 most commonly retained or planted species found on cocoa farms, 38 are native species, and of these many have high conservation value as threatened species, or support wildlife (Table 4). According to a ranking system for the conservation value of plant species in the Mount Cameroon region, examples of those with high conservation value retained on cocoa farms include *Cola lepidota*, *Cordia aurantiaca*, and *Milicia excelsa* (Cable and Cheek 1998; Table 4). The

Table 3 Farms surveyed for useful plant species in Bova Bomboko, and illustrated in Fig. 2

Farm	Farm size (ha)	Farmer's ethnic group (age)	# Non-cocoa tree stems on farm (# per ha)	# Non-cocoa species on farm (# per ha)	Species with largest number of stems (# of stems found on the farm)	% Non-cocoa species on farm which are used (beyond shade)	Primary use categories for retained or planted trees (# of species in category)
Farm 1	4.1	Nkambe (40)—migrant	42 (10.2)	21 (5.1)	*Sterculia rhinopetala* (10), *Ceiba pentandra* (5), *Lophira alata* (3), *Staudtia kamerunensis* (3)	67%	Timber (5), fuelwood (5)
Farm 2	4.4	Widikum (70)—migrant	56 (12.7)	21 (4.8)	*Dacryodes edulis* (10), *Elaeis guineensis* (10), *Staudtia kamerunensis* (7)	71%	Food (6), timber (5)
Farm 3	3.8	Ngie (40)—migrant	38 (10)	17 (4.5)	*Dacryodes edulis* (13), *Elaeis guineensis* (4), *Pterocarpus soyauxii* (2)	82%	Food (9), timber (6)
Farm 4	4	Noni (45)—migrant	88 (12.2)	23 (3.21)	*Persea americana* (12), *Elaeis guineensis* (12), *Triplochiton scleroxylon* (9), *Dacryodes edulis* (6)	78%	Timber (10), food (5), medicinal (2)
Farm 5	4.9	Bomboko (27)—indigenous	140 (28.6)	28 (5.7)	*Elaeis guineensis* (17), *Dracaena* sp. (8), *Ceiba pentandra* (8), *Dacryodes edulis* (7)	82%	Timber (12), food (10), medicinal (2)
Farm 6	4.9	Bomboko (65)—indigenous	77 (15.7)	23 (4.7)	*Elaeis guineensis* (17), *Dacryodes edulis* (7), *Sterculia rhinopetala* (5), *Terminalia superba* (5)	87%	Timber (10), food (8), medicinal (3)

IUCN Red List (2006) cites as "vulnerable" for Cameroon *Entandophragma cylindricum, Lophira alata*, and *Pterygota macrocarpa*, and as "near threatened" *Milicia excelsa* and *Triplochiton scleroxylon*.

Species planted on cocoa farms

Agricultural crops are planted on young cocoa farms, and around the edges of older farms. These include cocoyams (*Colocasia esculenta*), plantains (*Musa paradisiaca*), cassava (*Manihot esculenta*), maize (*Zea mays*), pineapple (*Ananas comosus*), banana (*Musa sapientum*), fluted pumpkin (*Telfairia occidentalis)*, and greens like bitterleaf (*Vernonia amygdalina*), waterleaf (*Talinum triangulare*), and huckleberry (*Solanum scabrum*). Most farmers also have "chop farms", which are the primary source of their food crops. Native food species like the woody climber 'kaso' (*Tetracarpidium conophorum*), and medicinals like the herbs 'majama jombe' (*Eremomastax speciosa*) and 'masefo' (*Ocimum gratissimum*) are also planted on some cocoa farms.

Exotic fruit trees are among the most common trees planted on cocoa farms. These include: orange (*Citrus sinensis*), mango (*Mangifera indica*), apple (*Eugenia malaccensis*), pawpaw (*Carica papaya)*, guava (*Psidium guajava*), and avocado (*Persea americana*). The leaves and bark, and sometimes fruit, from a number of these trees are also used as medicines. Common to every farm, and planted in the highest densities of all tree species, are the native plum (*Dacryodes edulis*) and oil palm (*Elaeis guineensis*). The native cola (*Cola nitida*) is also planted, as well as the raphia palm (*Raphia hookeri*). The highly popular spice trees njangsang (*Ricinodendron heudelotii*) and bush mango (*Irvingia gabonensis*) are occasionally planted, but more often are retained or protected when they arise in a farm (Table 4). On some farms planted tree species are distributed throughout the farm, while on others they are planted on the farm edges (e.g., oil palm, plum, and pawpaw on Farm 5; Fig. 2).

The suite of preferred planted and retained species appears to be roughly constant throughout the region, and across migrant and indigenous communities, with regional and cultural variations surfacing farther down the list of preference. Sonwa et al. (2001, 2003) found plum, oil palm, bush mango, milk stick (*Alstonia boonei*), mango, guava, avocado, and citrus species the most common on cocoa farms, with plum planted by 80% of farmers. Gockowski et al. (in press) report bush plum, avocado, and mango as the top trees planted on Beti farms. Malleson (2000) remarks on the range of fruit trees planted with cocoa around the Korup National Park, in particular avocado and cola nut. In a synthesis of literature from Cameroon, Asare (2005) lists the following as the preferred species in cocoa farms: bush plum, bush mango, avocado, njangsang, orange, and mango; following this list are a mix of timber species, as well as oil palm, and colas. Oke and Odebiyi (in press) report oil palm, cola, orange, mango, guava, avocado, and njangsang in the top 10 non-cocoa tree species retained on farms studied in Ondo State, Nigeria.

Species retained or protected on cocoa farms

Roughly 20 species are regularly retained on cocoa farms for use as timber and construction (Table 4). These include iroko (*Milicia excelsa*), akom (*Terminalia superba*), mahogany (*Entandrophragma cylindricum*), obeche (*Triplochiton scleroxylon*), and kandang (*Sterculia rhinopetala)*. A third of all cocoa farmers interviewed had retained these species on their farms. A number of timber species also provide popular seeds or fruits, consumed by people as well as wildlife, including *Canarium schweinfurthii* (which

Table 4 Most commonly retained or planted tree species on indigenous and migrant cocoa farms, and most commonly cited uses, in Bova Bomboko, Mount Cameroon region, organized alphabetically by species

Species	Family	Conservation star*	Native/ exotic	Retained/ planted	Timber/ construction	Food/spice	Medicine	Fuelwood	Other
Albizia zygia (DC) J.F. Macbr.	Leguminosae-Mimosoideae	Pink	Native	Retained				X	
Alstonia boonei De Wild.	Apocynaceae	Green	Native	Retained	X		X (fever, breast milk)	X	
Annickia chlorantha (Oliv.) Setten & P.J. Maas	Annonaceae	Pink	Native	Retained			X (fever)		
Borassus aethiopium Mart.	Palmae	X	Native	Retained					Bomboko use for pinning poles; difficult to fell
Canarium schweinfurthii Engl.	Burseraceae	Red	Native	Retained	X	X (fruit)			Resin for protection
Carica papaya L.	Caricaceae	X	Exotic	Planted		X (fruit)	X (fever)		
Ceiba pentandra Gaertn.	Bombaceae	Pink	Native	Retained					Difficult to fell
Citrus sinensis (L.) Osbeck	Rutaceae	X	Exotic	Planted		X (fruit)			
Cola lepidota K. Schum.	Sterculiaceae	Gold	Native	Retained		X (fruit)			
Cola nitida (Vent.) Schott & Endl.	Sterculiaceae	Pink	Native	Retained and planted		X (stimulant)			
Cordia aurantiaca Baker	Boraginaceae	Blue	Native	Retained	X				Carving drums; gum
Dacryodes edulis (G.Don) H.J. Lam	Burseraceae	Green	Native	Planted, some retained		X (fruit)			

Table 4 continued

Species	Family	Conservation star*	Native/ exotic	Retained/ planted	Timber/ construction	Food/spice	Medicine	Fuelwood	Other
Distemonanthus benthamianus Baill.	Leguminosae-Caesalpinaceae	Pink	Native	Retained	X				
Elaeis guineensis Jacq.	Palmae	X	Native	Planted		X (oil,wine)			Thatches
Entandrophragma cylindricum (Sprague) Sprague	Meliaceae	Red	Native	Retained	X				
Eugenia malaccensis L.	Myrtaceae	X	Exotic	Planted		X (fruit)			
Ficus exasperata Vahl.	Moraceae	X	Native	Retained				X	X (scrub pots with leaves)
Irvingia gabonensis (Aubry-Lecomte ex O'Rorke) Baill.	Irvingiaceae	Pink	Native	Retained and planted		X (spice)			
Lophira alata Banks ex Gaertn. F	Ochnaceae	Red	Native	Retained	X				
Mangifera indica L.	Anacardiaceae	X	Exotic	Planted and retained		X (fruit)	X		
Mansonia altissima A. Chev.	Sterculiaceae	Gold	Native	Retained	X				
Milicia excelsa (Welw.) C.C. Berg	Leguminosae-Papilionoideae	Scarlet	Native	Retained	X				
Myrianthus arboreus P. Beauv.	Cecropiaceae	Green	Native	Retained		X (fruit)	X		
Persea americana Miller	Lauraceae	X	Exotic	Planted		X (pear/ avocado)			

Table 4 continued

Species	Family	Conservation star*	Native/ exotic	Retained/ planted	Timber/ construction	Food/spice	Medicine	Fuelwood	Other
Piptadeniastrum africanum (Hook f.) Brenan	Mimosaceae	Red	Native	Retained	X				
Poga oleosa Pierre	Anisophylleaceae	X	Native	Retained	X				
Pseudospondias microcarpa (A. Rich.) Engl. Var. *Microcarpa*	Anacardiaceae	X	Native	Retained	X	X (fruit)			
Psidium guajava L.	Myrtaceae	X	Exotic	Planted		X (fruit)	X		
Pterocarpus soyauxii Taub.	Leguminosae-Papilionoideae	Red	Native	Retained	X				Carving, personal care
Pterygota macrocarpa K. Schum.	Sterculiaceae	Red	Native	Retained	X				
Pycnanthus angolensis (Welw.) Warb.	Myristicaceae	Pink	Native	Retained	X				
Raphia hookerii G. Mann & H. Wendl.	Palmae	Pink	Native	Planted		X (wine)			
Ricinodendron heudelotii Mull. Arg.	Euphorbiaceae	Green	Native	Retained and planted		X (spice)			

Table 4 continued

Species	Family	Conservation star*	Native/exotic	Retained/planted	Timber/construction	Food/spice	Medicine	Fuelwood	Other
Spathodea campanulata P. Beauv. subsp. *Campanulata*	Bignoniaceae	Green	Native	Retained				X	Carving
Staudtia kamerunensis Warb.	Myristicaceae	Pink	Native	Retained	X			X	
Sterculia oblonga Mast.	Sterculiaceae	Pink	Native	Retained	X			X	
Sterculia rhinopetala K. Schum	Sterculiaceae	Pink	Native	Retained	X				
Strombosia grandifolia Hook.f.ex. Benth.	Olaceae	Green	Native	Retained				X	
Strombosia pustulata Oliv.	Olaceae	Green	Native	Retained				X	
Terminalia superba Engl. & Diels	Combretaceae	Pink	Native	Retained	X				
Treculia africana Decne. subsp. Africana var. Africana	Moraceae	X	Native	Retained		X (seeds)			
Trichoscypha acuminate Engl.	Anacardiaceae	Green	Native	Retained		X (bush bonbon)			
Trilepisium madagascariense DC.	Moraceae	X	Native	Retained	X	X (seed)			
Triplochiton scleroxylon K. Schum.	Sterculiaceae	X	Native	Retained	X				

*Based on a system developed by W. Hawthorne in Ghana and modified for the Mount Cameroon region, as in Cable and Cheek (1998) and the Limbe Botanic Garden database, as created by Tchouto and Hawthorne (1997). In descending order of conservation importance: black, gold, blue, scarlet, red, pink, green

Source: Household cocoa farmer survey, farm visits, mapping of non-cocoa trees on 6 cocoa farms

also yields a resin burned for protection from evil spirits), *Pseudospondias microcarpa*, and *Trilepisium madagascariense*. Others, like tobacco stick or 'womba' (*Cordia aurantiaca*) and camwood (*Pterocarpus soyauxii*) are used for carving.

Fuelwood species (some also used for timber or construction) are used to dry cocoa or for household use. They include: makoba (*Staudtia kamerunensis)*, whitewood (*Strombosia pustulata*), redwood (*Strombosia grandifolia*), small leaf (*Albizia zygia*), and milk stick (*Alstonia boonei*), which is also widely used as a medicine (Table 4).

In addition to timber species, the spice tree species njangsang (*Ricinodendron heudelotii*) and bush mango (*Irvingia gabonensis*) are regularly retained on at least half of all cocoa farms, as well as "chop" farms. The native (and very important to most indigenous villages) *Myrianthus arboreus*, used for fruit and medicine, and the seed-producing *Treculia africana* are also retained on some farms. The only tree retained solely for its medicinal properties is *Annickia chlorantha*, the yellow bark of which is used widely to treat malaria and other fevers. Many cocoa farms have numerous boma (*Ceiba pentandra*) retained for shade, some say to fertilize the soil, and others because they are too difficult to fell; they were also previously the burial place for albino people.

In addition to trees, useful climbers and herbs are found on cocoa farms. The spice and medicinal climber bush pepper (*Piper guineense*) was reported as an important product from cocoa farms by a third of households. Monkey cola (*Cola lepidota* and *C. ficifolia*) are also retained, as are cola (*Cola nitida*) and bitter cola (*Garcinia cola*). Wild vegetables are harvested from some cocoa farms, with the most common and valuable—eru (*Gnetum africanum*)—harvested from a third of the farms, and 'kalavanje' (*Solenecio biafrae*) and to a lesser extent 'nyamambole' (*Brillantasia lamium*), from a smaller proportion, mainly indigenous Bomboko or migrant farmers who have been in the region for long periods of time.

Cocoa farmers also harvest medicinal herbs, with Bomboko using a more extensive range of species than migrants. On the farms mapped, for example, Bomboko make use of around 14 non-tree useful species on their farms, while most North-westerners used around 3–4 species (Fig. 2). These include *Aspilia africana*, *Costus afer*, *Piper umbellatum* and *Sida acuta*. Chewstick and medicinal shrubs like *Mallotus oppositifolius* and *Leea guineensis* are also used. Bomboko also make use of spice herbs (*Aframomum flavum*), species with wrapper leaves and mat or basket-making stems (e.g., *Hypselodelphys scandens*, *Megaphyrynium macrostachyum*) and forest ropes (*Nephthytis poissonii*) found on cocoa farms. Powerful "country fashion" (complex medicinal and healing practices unique to the area) medicines are also collected from cocoa farms, including 'limoni' (*Jateorhiza macrantha*) and the fern *Pneumatopteris afra*.

Biological and cultural diversity in indigenous and migrant livelihoods

Knowledge and use of non-cocoa species on farms

As demonstrated in the cocoa farmer and household surveys, Bomboko farmers know and use a wider range of species on their cocoa farms than migrant farmers; they also use them for a wider range of purposes (Table 5; Fig. 2). However, knowledge of the rich and diverse flora found on cocoa farms inherited from their elders appears to be fading in the young Bomboko who use fewer of the species found on their farms, and in most cases know a more limited range of uses for those they do use, than older Bomboko farmers. For example, on one farm, an old individual of *Kigelia africana* (an important medicine,

Table 5 Annual mean income in CFA[a] and annual mean number of items collected by indigenous and migrant households that were: 1. cultivated or wild, and 2. native or introduced species, in five villages in the Mount Cameroon region

Household type	Number of households in survey	Income from cultivated species (CFA)	Income from wild species (CFA)	Income from native species (CFA)	Income from introduced species (CFA)	Number of collections of cultivated species	Number of collections of wild species	Number of collections of native species	Number of collections of introduced species
Bakweri/Bomboko (indigenous households)	72	820,231 a	563,141	637,659	775,657 a	178	157 a	195 a	138
Migrants—SouthWest[b]	11	1,817,832 b	156,585	194,323	1,779,762 b	184	46 b	85 b	144
Migrants—NorthWest (30), other parts of Cameroon (2), Nigeria (3)	35	1,195,490 ab	127,993	145,115	1,176,682 ab	184	51 b	81 b	154
All households combined	118	1,024,533	399,580	450,237	988,208	180	115	151	143
Significance (*P*)		0.020	0.780	0.705	0.018	0.213	<0.001	<0.001	0.28

Source: Household survey, in five study villages

Means within the same column that do not share a superscript are significantly different from each other by Tukey hsd

[a] 500 CFA = approximately $1US

[b] Farmers from the South West Province share many species and traditions with indigenous households around Mount Cameroon and have greater knowledge of species names and uses than other migrants

protector, and component of "country fashion") was ring-barked by the young inheritor of the farm, who preferred to make room for exotic fruit trees. Indeed, the farms captured in the maps (Fig. 2) fold together historical and present views of usefulness and farm management. The older cocoa farms, for example, retain an overstory of *Ceiba pentandra* not found in younger farms, multiple *Dracaena* spp., once used in house building and for cultural purposes by Bomboko (and still used elsewhere as boundary markers), and *Borassus aethiopium*, which is also difficult to fell, but was previously used in house building. Many species used by other indigenous villages in the area, and the four Bakweri villages in this study, remain unused or unknown, even to many Bomboko, who are now far outnumbered and largely oriented towards the cash economy of cocoa and land sales.

It is important to note, however, that while Bomboko on average have far more knowledge of useful species than migrants, and that knowledge in this community is fading, there are significant variations by individual. For example, some of the younger Bomboko retain an interest in the knowledge of their parents and grandparents, and some migrant farmers have lived most or all of their lives in the area and have a strong interest in useful species. Farmers from South West Province, in particular, come from similar biological and cultural backgrounds as indigenous Bakweri and Bomboko. It is for this reason that SouthWest farmers were distinguished from migrants from other regions in the analysis of the household survey results (Tables 5, 6). However, even the North West migrant farmer on Farm 4 (Fig. 2, Table 3), knows multiple uses for many species found on his farm (e.g., he uses 'womba' (*Cordia aurantiaca*) for house construction and to carve drums, and *Pterocarpus soyauxii* to make xylophones, beehives, medicine, to rub on skin, and as a timber). On average, however, the trend at present is away from the biologically and culturally diverse cocoa farms of the indigenous Bomboko, which are dependent upon traditional knowledge and practices, towards a simpler cocoa farm that yields fewer environmental, livelihood and cultural benefits.

The role of different habitats in livelihoods

Indigenous and migrant livelihoods extend beyond the boundaries of cocoa farms, and incorporate a range of different habitats and species. Cocoa farms provide numerous useful products to households in Bova Bomboko, but as we have seen—with some important exceptions like bush plum, oil palm, njangsang and bush mango—the bulk of species found on cocoa farms are used for timber, or are exotic fruit trees. By far the most significant source of NTFPs reported in Bova Bomboko is the forest, usually secondary forest but also the "black bush" of the Reserve, in which many have farms. 70% of households in the cocoa farmer survey cited forest as the primary source of NTFPs, followed by cocoa farms. The main products harvested from both sites include: njangsang, bush mango, eru, bush pepper, monkey cola, bitter cola, and bushmeat. These are products well-known and valued by migrants as well as indigenous Bomboko, and are widely used throughout the region (Ndoye et al. 1997; Sunderland et al. 1999; Sunderland and Ndoye 2004).

For both migrant and indigenous households, despite the relative diversity of cocoa farms, and the overall dominance of farms in livelihoods, natural forest continues to provide a complement to farm income. This is the case to a much greater extent for indigenous cocoa farmers, and other indigenous farmers in the region than for migrants. In addition, compounds and fallow provide a wide range of primarily subsistence products for indigenous households, while most migrants have extremely simple compound plantings, and make limited use of fallow, with the exception of migrants from South West Province that make use of significantly more of value from fallow than those from other regions

Table 6 Annual mean CFA[1] contribution and number of items harvested per household from compound, farm, fallow and forest by indigenous and migrant farmer households in five villages in the Mount Cameroon region

	Number of households in survey	Compound (CFA)	Farm (CFA)	Fallow (CFA)	Forest (CFA)	Total (CFA)	Compound (no.)	Farm (no.)	Fallow (no.)	Forest (no.)	Total (no.)
Bakweri/Bomboko—indigenous households	72	104,016 a	799,491	89,924 a	313,832	1,307,263	123 a	354	116 a	56 a	649
Migrants—SouthWest[2]	11	19,179 b	1,730,565	63,487 a	115,030	1,901,261	45 b	380	22 b	24 b	471
Migrants—NorthWest (30), other parts of Cameroon (2), Nigeria (3)	35	16,564 b	1,225,237	27,078 b	72,548	1,341,427	36 b	325	26 b	29 b	416
All households surveyed	118	70,169	1,012,567	67,162	223,733	1,516,650	90	348	80	45	563
Significance(*P*)		<0.001	0.093	<0.001	0.463		<0.001	0.647	<0.001	0.029	

Source: household survey, in 5 study villages

Means in the same column that do not share a superscript are significantly different from each other by Tukey hsd.

[1] 500 CFA = approximately $1US

[2] Farmers from the South West Province share many species and traditions with indigenous households around Mount Cameroon and have greater knowledge of species names and uses than other migrants.

(Table 6). Migrants often source from cocoa farms, albeit fewer species in more limited quantities, many of the same products indigenous households collect from fallow, including fuelwood and construction materials.

As Table 6 demonstrates, combined indigenous household income from compounds, fallow, and forest makes up almost 40% of the value of products harvested, compared with roughly 10% for migrant households. Indigenous households also collect at least twice as many items in a year from the forest and five times as many from fallow. These include high value forest products like timber and bushmeat, as well as hundreds of species difficult to capture and value properly in household surveys and used, for example, as medicine, wild foods, and for cultural purposes.

The use of native and wild species

Indigenous households use a significantly larger number of species, for a wider range of purposes, than migrants to the region. They make use of hundreds of species (more than 400 plant species are included in the checklist from this study alone), while migrants make regular use of roughly 30 species. Migrants harvest high-value NTFPs like eru, bush mango, njangsang, and bush pepper, but are often unfamiliar with the full range of useful species in their adopted home. They lack historical and cultural connections to the species and landscapes in which they farm, may not have access to resources, and usually seek to maximize cash income (often returned to their original village). This is a common phenomenon across the country (e.g., Mbenkum 1993, on Kilim). As a result, migrant households tend to buy a larger portion of their food and other needs (Table 2; Ambrose-Oji 2003).

Both migrant and indigenous communities around Mount Cameroon incorporate species from around the world into their livelihoods. Close to 100 of the more than 400 species used by indigenous households were introduced to the region. However, indigenous households derive roughly four times the annual household income from native and wild species than migrant households, and bring 2–3 times as many wild and native items into the home (Table 5). Indigenous households also source more than five times as much food from the wild as non-indigenous households.

Biological and cultural diversity

It is important to emphasize that "indigenous" communities are diverse, both within and between villages, and display varied individual and cultural preferences. For example, indigenous Bomboko in the cocoa-growing region earn significantly more from cultivated and introduced sources than indigenous Bakweri from Likombe, Etome, Ekonjo, and Upper Buando (roughly 2,620,000 CFA per year for Bomboko compared with 690,000 CFA per year for Bakweri). Bakweri annual income from wild sources is, in turn, three times that of the Bomboko (roughly 600,000 CFA compared to 200,000 CFA), and the number of wild items collected in a year by Bakweri is 159 compared with 115 for the Bomboko. Bomboko livelihoods combine cocoa farming and traditional practices that involve a greater reliance on diverse habitats and species. But as traditional knowledge and practices are lost, the dependence of local people upon biodiversity within and outside cocoa farms has declined, and with it mechanisms that help to promote and conserve biodiversity in managed landscapes.

Concepts of 'indigenousness' have been used to further political ends in recent decades in Cameroon, and often result in little more than power or resource grabs, or conflict

(Konings and Nyamnjoh 2003; Jua 2001; Sharpe 1996). The indigenous people around Mount Cameroon are neither naïve, harmonious conservationists, nor a homogenous "community" (Sharpe 1996). Indigenous groups seek to maximize cash income, will mine species when commercial opportunity presents itself—as in the case of bushmeat, timber or valuable medicinal plants for export (e.g., *Prunus africana*)—and will sometimes sell land to migrants to farm, and to local elites for plantation development (although selling land to outsiders technically is forbidden under customary law). But traditional resource management practices, even those under pressure, also reflect deep historical and cultural connections to place and species, represent traditional as well as personal preference, and include a wider range of strategies to reduce risk and diversify livelihood options based on local plant and animal resources. These practices are dependent upon biodiversity, and are an important element of biodiversity conservation in the managed landscapes of Mount Cameroon. By far the most significant factors influencing biodiversity conservation in the Mount Cameroon region originate outside of local villages. These include economic hardships faced by communities in other regions that force migrants into the area in search of livelihoods, and expansion of commercial agriculture plantations, and to a lesser extent logging, under the control of government, corporations, or urban and local elites.

Land tenure and resource rights

Land tenure and resource rights play an important role in how cocoa farms are managed, including the retention and planting of non-cocoa tree species, and the management and use of biodiversity in migrant and indigenous livelihoods. As part of the cocoa farmer survey we examined farmer awareness of existing statutory and customary law. Cameroon law (Land Tenure and State Lands, Ordinance No 74/1, July 6, 1974) grants ownership of vacant land, without permanent cultivation, or any land without certificates of title, to the State. This grows from French colonial law, which replaced the British law granting "vacant" land to local communities, in the form of Native Authorities (Burnham and Sharpe 1997; Sikod et al. 2000). The 1994 Forestry Law, like the 1973 and 1981 forestry laws it repealed, puts all forest resources under the control of the State, in line with the State's long-standing practice of establishing hegemony over natural resources (Egbe 2001).

In practice, however, in Bova Bomboko land is administered by the Bomboko chief and traditional village council according to customary law. Of the migrants farming in the Bova Bomboko region, as reported in the cocoa farmer survey, some rent land from the Bomboko, but more than 60% have bought their land from the village chief and hold "native title" to the land. Most do not have a title deed from the government, and consider the chief's customary title adequate. This is common throughout Cameroon, where in 2001 only 3% of lands in rural areas were registered, compared with 80% in towns (Egbe 2001). Throughout Cameroon, planting perennial tree crops like cocoa has long been used to establish ownership over land, and this practice was supported by the Land Tenure Code of 1974; however, the 1994 Forestry Law requires that such planting follows acquisition of a certificate of title (Egbe 2001). The status of farms located within the Forest Reserve is unclear: some farmers claim to have purchased native title to lands within the Reserve, while others state that this is not possible.

In Bova Bomboko, all farmers consider the non-cocoa trees on their cocoa farms to be the property of the farmer, and most do not think they need permission from the chief or the government to fell them. None were aware that naturally growing trees on private land,

and all trees planted or naturally growing on land without a title deed (the vast majority), are considered the property of the State. Under the 1994 Forestry Law (section 8), communities retain customary rights, or *droit d'usage*, to collect "all forest, wildlife, and fisheries products freely for their personal use, except protected species", but only for subsistence use. A third of those surveyed were aware of the law requiring a permit to fell timber trees for sale (Besong 1995; Egbe 2001). In general, however, lack of awareness of their limited land and resource rights would suggest that composition of non-cocoa trees on farms is not significantly impacted by these concerns, and would help to explain the high percentage of timber trees found on farms. Land tenure and resource rights do not appear to be decisive factors in the extent of biodiversity retained on most cocoa farms.

Rights to access species not found on farms were less clear, however. Whereas indigenous villagers view forest as communal property, available to all in the village, migrants' access to the full range of habitats (e.g., fallow and forest in various stages of succession) and resources appears more limited outside of the farms they clear. In Tables 5 and 6, contributions of different habitats to livelihoods in Bova Bomboko were broken down for migrants from the North West Province (and other parts of Cameroon and Nigeria) and those from the South West Province. Farmers from the South West Province share many species and traditions with indigenous households around Mount Cameroon, and—as other parts of the larger study demonstrated—have greater knowledge of species names and uses than other migrants (Laird in press). However, as Tables 5 and 6 show, South Westerners use only moderately more native and wild species, and those from forest and fallow, than migrant households from other regions. This suggests that the use of local plant resources by migrants was not only limited by lack of local knowledge of their uses, but also by access rights to forest resources in an area that is not their traditional home, as well as their greater preoccupation with cocoa growing compared to the local farmers.

Conclusion

Cocoa farms around Mount Cameroon are not the complex cocoa agroforests of southern Cameroon, but are located in one of the most important areas for biodiversity conservation in West-Central Africa. Because this region is characterized by high population densities and intense pressure on land and natural resources, conservation strategies must include the retention of biological diversity in managed landscapes such as cocoa farms. All cocoa farmers in the region retain and plant useful non-cocoa trees, but within and outside of cocoa farms most indigenous households value biodiversity to a greater extent than migrants. Traditional knowledge and practices are in flux in many households, but indigenous livelihood and land use strategies dependent upon biodiversity continue to provide significant benefits for conservation. Biodiversity conservation in the Mount Cameroon region should recognize and bolster indigenous livelihood strategies that maximize biological and cultural diversity; seek to discourage species mining and land sales for commercial agriculture; and address the destructive pressures on forests and biodiversity originating outside the region.

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Chapter 4.
Integrating customary and statutory systems: the struggle to develop a legal and policy framework for NTFPs in Cameroon

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Chapter 2

Integrating Customary and Statutory Systems: The Struggle to Develop a Legal and Policy Framework for NTFPs in Cameroon

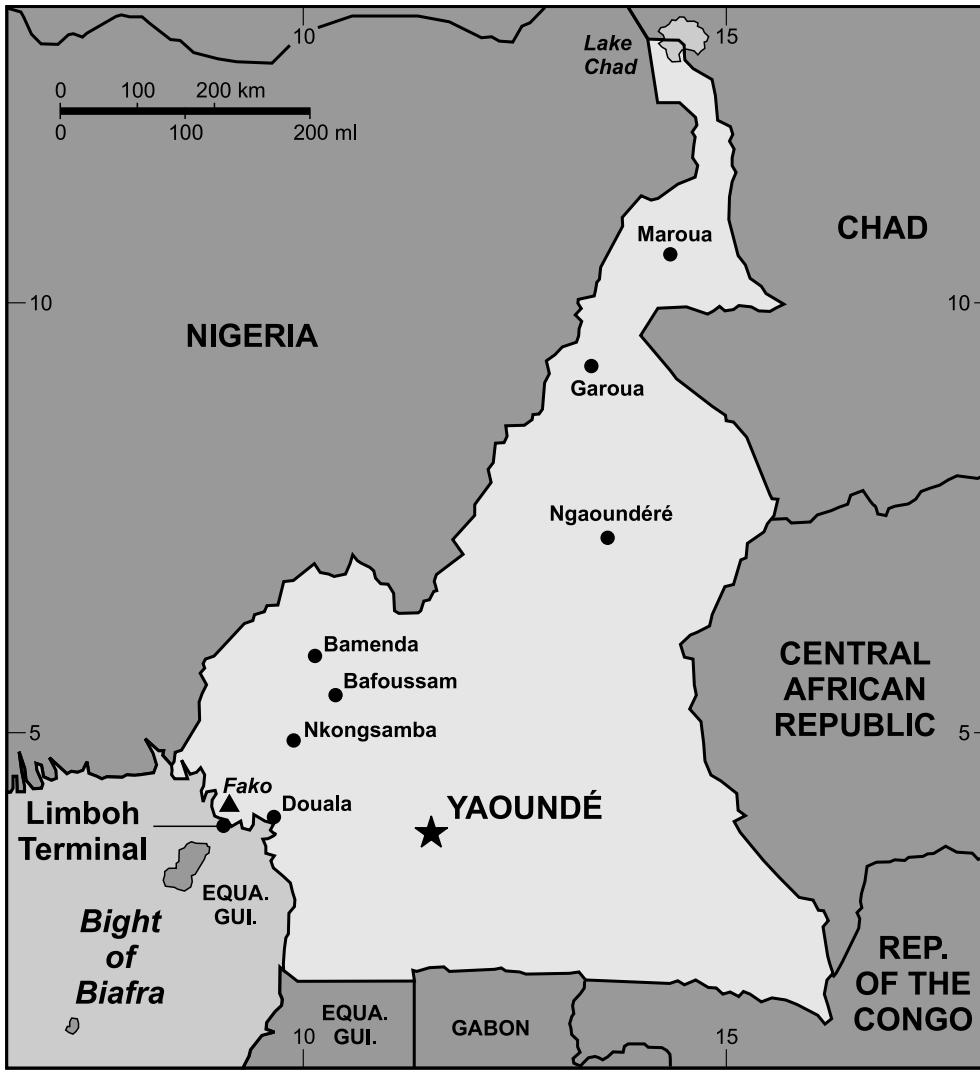
Sarah A. Laird, Verina Ingram, Abdon Awono, Ousseynou Ndoye, Terry Sunderland, Estherine Lisinge Fotabong, Robert Nkuinkeu

INTRODUCTION

Plants are used in complex and varied ways throughout Cameroon. Household compounds contain regularly used medicinal, food, ornamental and protective species, many brought from the forest. "Wrapping" leaves are harvested for use in almost every forest village, and forest spices distinct to a regional cuisine are consumed locally and traded widely, including to urban centres where demand for forest plant products and 'bushmeat' persists in the tastes and diet of city-dwellers. Medicinal bark from a few trees has found favour in international markets, and demand from people thousands of miles away for medicines to treat prostate problems (*Prunus africana*) or enhance sexual performance and provide energy (*Pausinystalia johimbe*) has created trade networks throughout the forest zone. Forest fruits, spices, wild greens, thatching and fuelwood species, medicines, protective plants and those with myriad other uses combine to form what are known as 'non-timber forest products'.

The difficulty of regulating such diverse products as a single group is evident. What can the objectives of such regulation be, and how is it possible for the government to, for example, promote the objectives of sustainability and equity in trade, without undermining layers of other important relationships between people and their environment? Indeed, the government of Cameroon has struggled with the regulation of NTFPs, beginning with the very definition of what they will regulate, and for what purpose. The will to do so has also been limited since the majority of NTFPs – unlike timber – do not have values that can easily be captured by government.

Since the 1990s, international agencies have pressured the government to pay attention to these products as part of a new approach to forest management that incorporates values beyond timber. Although NTFPs have received increased attention from



Source: CIFOR.

Figure 2.1 *Map of Cameroon and neighbouring countries in Africa*

researchers and policy-makers, this has yet to create real change in the policy framework, which is much as it has always been: the vast majority of NTFPs – those consumed on a subsistence basis or found in local trade – are regulated de facto by customary laws relating to land tenure and resource rights. On the other hand, most high-value species in national and regional trade, and internationally-traded medicinal and food plants, are subject to statutory laws that set quotas, permits and taxes, but these laws are inconsistent and confusing.

In this chapter we will review the major areas of law that impact NTFPs – land tenure and resource rights; forestry and environment law; and finance and taxation – and will discuss the institutions responsible for implementing these measures. We then offer conclusions and recommendations on ways policy-makers might address NTFP regulation more effectively.

LAND TENURE

Layers of customary and statutory laws regulate land and resource rights, reflecting the cultural, biological, political and economic diversity of the country. Statutory land rights grow from a mixed colonial heritage: Cameroon was once a German colony, subsequently divided into British and French Cameroons, and then united into a single republic. Under British colonial law, 'vacant' lands were considered the property of local communities, and were placed under the control of Native Authorities. Under French colonial law, however, all lands 'vacant and without master' belonged to the state. When the two colonial territories were unified into the Republic of Cameroon, and the legal systems subsequently merged in 1972, the British concept of communal land was replaced in favour of the French system (Burnham and Sharpe, 1997).

The 1974 Land Ordinance classified land into three major categories. *Public state land* consists of lands that prior to independence were held by foreigners, usually large plantations which after independence became state property. Some are managed by parastatal organizations such as the Cameroon Development Corporation (CDC), some have reverted to natural forest cover and others are used for public purposes. *Private land* comprises land registered by private individuals (actual persons or international organizations). *National domain land*, which is all land not registered, is divided into two categories: vacant land and land occupied and worked by indigenous populations.

Following the French model, in 1974 a large number of hitherto communally managed lands were transferred from customary control to state control. These areas include most secondary and primary forest areas, and the resources found in them. In addition, ownership over naturally growing (but not planted) trees on private land and all trees planted or naturally growing on land without a title deed are considered the property of the state. The vast majority of landholdings in rural areas, in some cases more than 90 per cent, do not have a formal title deed, largely because the process to register is expensive and bureaucratically complex (Tonye et al, 1993; Egbe, 1997; Ewane et al, 2009; Ndumbe et al, 2009). Under statutory law, therefore, the majority of NTFPs fall under government control, but in practice most NTFPs continue to be harvested and managed under better-known and respected customary laws.

RESOURCE RIGHTS

The 1994 Forestry Law addresses the issue of resource rights removed by the 1974 Land Ordinance by providing customary user rights, or *droit d'usage*, to forest communities. These allow communities to collect 'all forest, wildlife, fisheries products freely

for their personal use, except protected species' (section 8, Cameroon Forestry Law, 1994). This right can be exercised in all unprotected areas, and includes subsistence fuelwood and wood for construction needs. Timber sales are not included as a user right, and instead are regulated under systems of smallholder titles or through the community forestry process created by the 1994 law.

The right of local people to exploit forest resources falls into two broad categories: 'free' access and 'paid' access. *Free access* is the usufruct right first mentioned in section 8 of the 1994 law and defined by section 4 of the Wildlife Decree of application No. 95/466-PM. *Free access* may be exercised in communal and community forests. *Paid access* refers to the right to exploit an NTFP following receipt of an exploitation permit from the government (Ngwasiri et al, 2002) and covers an assortment of 13 types of 'Special Forest Products' of interest to the government (Box 2.1).

Despite the existence of a natural resource statutory framework increasingly refined over the past 15 years, in practice most communities are unaware of statutory laws. In addition, when they are known or – as is often the case – arbitrarily enforced, statutory laws are often viewed as illegitimate and in the service of a small elite (Assembe, 2009). For the most part, government capacity is weak, and its presence is manifested primarily when community lands are allocated to outsiders for logging, mining or commercial agriculture or are included in national parks. As a result, in rural communities customary law continues to be the dominant system of governance for land and resource rights associated with NTFPs, and conflicts often erupt when statutory law intersects with customary law (Barume, 2004; Assembe, 2009).

Customary laws address – with a level of legitimacy and specificity absent in most government regulation – who owns resources, who can harvest them, where harvesting may take place and in what quantity, and who benefits and in what ways. Although this differs across Cameroon, in general harvesting NTFPs on lands held by a family may take place only with the family's permission; on communal village lands any member of the community can harvest products for subsistence use, but for higher-value products intended for sale (particularly timber, but also including some high-value NTFPs) approval is required from the chief or village council. Outsiders always require permission to harvest resources and must often provide some form of compensation before entering village lands.

Although more widely followed than statutory law, the effectiveness of customary law varies significantly. It is often weak in areas with increasing populations close to urban centres, or those characterized by cultural and social change that has undermined traditional institutions. In these cases, well-crafted and implemented statutory law could play an important role. Statutory law could also support sustainable and equitable practices when commercial pressure on resources is great and traditional structures are undermined by this pressure. For example, village chiefs and councils often receive payments or gifts to grant permission for harvesting high-value resources, even when these activities are not supported by the wider community. This has been well-documented for the sale of timber rights (Cuny et al, 2007), but it is also the case for high-value NTFPs. In the case of *Prunus africana*, for example, internal conflicts have resulted when chiefs and village councils harvest bark themselves and do not share profits, or receive payment from outsiders to harvest, often unsustainably, in village forests. The wider community, which may also earn cash from bark harvests, benefits little from these activities, and in some cases this has led to a scramble for

limited resources as practices shift from the sustainable to the unsustainable, with the idea that 'if the fon [traditional ruler] can do it, so can we'.

Despite the dominance of customary law in rural communities, the legitimacy of traditional governing structures in Cameroon is often disputed. This includes chiefs, many of whom do not represent indigenous institutions, and instead were first installed by colonial governments in search of cooperative counterparts (Geschiere, 1993; Konings, 1999; Oyono, 2004, 2005). In many areas, local associations and community groups were established to improve the sustainability and equity of NTFP harvests and trade, and have lobbied for legal and institutional changes. Some have come into conflict with traditional institutions that are threatened by efforts to control these aspects of community life (WHINCONET, 2005; Cunningham, 2006; Ingram, 2008; Ingram et al, 2009).

FORESTRY AND ENVIRONMENT LAWS

Timber is the most valuable resource in Cameroon's forests and enjoys the lion's share of attention from policy-makers. However, in the 1990s international agencies, in particular the World Bank, promoted forestry laws that reflect a wider range of objectives and priorities, and emphasize sustainability and equity. In Cameroon, this resulted in the 1994 Forestry Law, which some refer to as a 'major interference of Bretton Woods experts' (Ekoko, 1999; Assembe, 2009). However well-intentioned, the 1994 law was developed without adequate or meaningful consultation with people living in the forest zone and important stakeholders such as NTFP traders and harvesters. As a result, the text is often deeply out of touch with local realities, and the law has proven largely ineffectual and in many cases undermines the very objectives it sought to achieve (Sharpe, 1998; Ekoko, 1999; Burnham, 2000; Njamnshi et al, 2008; Assembe, 2009). Revision of the 1994 law is currently under way in order to address many of its deficiencies, including the regulatory framework for NTFPs (FAO, 2009).

Box 2.1 Forestry laws in Cameroon

Since independence in 1960, Cameroon has enacted five pieces of legislation dealing with forest resources.

- Law No. 68/1/COR of 18 July 1968 regulated forest resources in the French-speaking areas of the country.
- Ordinance No. 73/18 of 22 May 1973 and its decree of application, No. 74/357 of 17 April 1974, apply to the whole of Cameroon.
- Law No. 81–13 of 27 November 1981 and three decrees of application, all issued on 12 April 1983, had a wider scope, dealing with forestry, wildlife and fisheries resources.
- Law No. 94/01 of 20 January 1994 has been followed to date by only two decrees of application (No. 95/466-PM of 20 July 1995 on wildlife and No. 95/531-PM of 23 August 1995 on forestry).
- Décision No 0336/D/MINFoF du 6 Juillet 2006 set the list of Special Forest Products.

Definitions and scope

As part of a newly expanded view of forest values, NTFPs are addressed in a number of sections of the 1994 law. However, none of the five forestry measures enacted over the last 50 years (Box 2.1) defines 'non-timber forest products'. Instead they provide lists of products referred to as 'minor forest products', 'secondary forestry products' or 'forest produce other than timber'. The 1994 law refers to 'Special Forest Products' as 'certain forest products, such as ebony, ivory, wild animals, as well as certain animal, plant and medicinal species or those which are of particular interest and shall be classified as special' (section 9(2)). The law does not give criteria or definitions of terms such as 'certain', 'interest' and 'special', and the extremely diverse collection of products included in the list of Special Forest Products elaborated more than ten years later in 2006, and each year after that, does little to clarify the wider intentions behind the law (Box 2.2; Décision No 0336/D/MINFoF du 6 Juillet 2006, fixant la liste des produits forestiers spéciaux présentant un intérêt particulier au Cameroun).

For example, the annual Special Forest Products lists include species that are native and introduced; widely cultivated and wild harvested; industrial (primarily exported) and consumed locally; and timber and non-timber. Numerous high-value NTFPs in trade – such as *Ricinodendron heudelottii* (njangsang) and *Dacryodes edulis* (bush plum) (Ndoye and Kaimowitz, 2000; Pérez et al, 2000; Awono et al, 2002b; Tajoacha, 2008) – are not mentioned in the 1994 law or the 2006 list of Special Forest Products. Some native forest species grown primarily on farms or in fallows – e.g. *Cola acuminata* and *Cola nitida* – are classified as agricultural crops and not Special Forest Products. However, introduced and cultivated Eucalyptus is included on the Special Forest Products list. According to the 2006 decision (Box 2.2), some species are included due to levels of threat or endangerment that make them 'special', but this group is also inconsistent: some species that are covered by the Convention on International Trade in Endangered Species (CITES), such as the medicinal tree *Prunus africana*, are found on the list, but others, such as the timber species *Pericopsis elata*, are not.

Article 12 of the 1994 law establishes national sovereignty over genetic resources and describes requirements for prior informed consent and benefit sharing with the government; articles 64 and 65 of the Environmental Framework Law of 1996 likewise lay down requirements for genetic resources. But here, too, definitional problems arise: distinctions between genetic resources supplied for bioprospecting and medicinal plants traded in bulk as commodities remain poorly elaborated, and these articles only add to regulatory confusion.

The 1994 law also includes fish and fauna in its scope, and provides three classes of protection that regulate the hunting and exploitation of different species through a system of permits and controls (article 78). These species are not included in the Special Forest Products list, which is focused on botanical resources. This is appropriate given the enormous role of bushmeat and fish in the country's economy and livelihoods, the different regulatory issues raised by mobile species, and the need for a distinct legal and policy framework for these resources.

A wide range of diverse and complex forest uses are covered by the 1994 law, but most are poorly elaborated. The NTFP elements are particularly inconsistent, in part

Box 2.2 Special Forest Products regulated by the 1994 Forestry Law

The list of permits for Special Forest Products is revised annually by the Cameroon Ministry of Forestry and Wildlife (MINFOF, 2009). The 2006 Decree listed 13 products as Special Forest Products:

- ébène (*Diospyros crassiflora*)
- eru (*Gnetum africanum, G. buchholzianum*)
- pygeum (*Prunus africana*)
- yohimbé (*Pausinystalia johimbe*)
- wild rubber (*Funtumia elastica*)
- rauvolfia (*Rauvolfia macrophylla*)
- rattan (*Eremospatha* spp.*, Laccosperma* spp.)
- gomme arabique (*Acacia senegal, A. seyal*)
- tooth sticks *Massularia* (syn. *Randia*) *acuminata, Garcinia mannii*
- candle stick (*Canarium schweinfurthii*)
- charbon de bois (23 species identified in Cameroon: *Albizia zygia*, *A. adianthifolia*, *Alstonia boonei*, *Bridelia micrantha*, *Dacryodes macrophylla*, *Entandrophragma utile*, *Ficus thonningii*, *Lannea welwitschii*, *Macaranga asas*, *Maesopsis eminii*, *Mangifera indica*, *Milicia excelsa*, *Morinda lucida*, *Piptadeniastrum africanum*, *Phyllanthus discoideus*, *Persea americana*, *Rauvolfia vomitoria*, *Theobroma cacao*, *Tetrapleura tetraptera*, *Voacanga africana*, *Xylopia aethiopica* (FAO, 1999))
- aniegré (*Aningeria robusta*)
- poteaux d'eucaltyptus (*Eucalyptus* spp. especially *E. robusta, E. globulus, E. grandis*)

The mix of French, English, local and scientific names found in the Special Forest Products lists contributes to confusion about this group of products. This leads to problems on many levels, beginning with uncertainty about which species fall under the law. It is also difficult to monitor and control trade when several species are known locally under the same name, or – as is often the case – a single species has multiple local names.

due to a lack of information and understanding of this category of products within government, and thus confusion about which products to regulate and why. The limited formal value of NTFPs compared with timber also means that few resources are allocated to understanding and monitoring the sector and building capacity, and even fewer to developing, drafting and implementing effective measures (Njamnshi et al, 2008). The result is that, in the end, NTFPs are regulated much as they always have been under statutory law – through a system of quotas, permits and taxes, allocated by the most powerful in government to the most powerful exploiters or brokers.

Quotas and permits

The NTFP quota and permitting system is bureaucratic and expensive (with both 'informal' and formal taxation), involving a number of different governmental bodies. It often takes

many months, or more than a year, to receive a permit, and one needs 'connections' in government to get this result. The system places enormous burdens on traders and exporters in ways that increase costs and discourage both trade and compliance with laws.

A positive feature of this system is that it regulates only species in trade, most with significant value, and does not focus on the majority of species traded locally or consumed for subsistence. More than 20 species are traded in high volumes nationally and close to 200 locally (Ndoye 1995; Ndoye et al, 1997/1998; Sunderland et al, 1999; Nkuinkeu, 2000; Awono et al, 2002b; Pérez et al, 2003; Sunderland and Ndoye, 2004). However, only 13 Special Forest Products were defined in 2006 (Box 2.2).

One set of permits – those for Special Forest Products – originate in the 1994 Forestry Law. The list of Special Forest Products changes annually, which creates confusion since products may move on and off the list. Quotas for Special Forest Products are granted for a year, from defined areas and for a set amount of material. Annual quotas are set by an interministerial committee headed by MINFOF, and in theory are based on surveys of species populations. In practice, however, quotas are determined by demand from exploiting companies, and quantities harvested regularly exceed the official quotas (Awono et al, 2009). Quotas are allocated primarily to private individuals who are rarely harvesters or exploiters themselves, but have political power of some kind, and are able to assemble the necessary paperwork to receive permits. This parallels allocation of permits in the timber sector, where political patronage is an art form (Assembe, 2009). Most holders of NTFP quotas act as brokers and sell them on to harvesters in the form of the waybills (*lettres de voiture*) used to monitor the transportation of Special Forest Products.

High-value NTFPs *not* included on the list of Special Forest Products are also regulated by the government through a system of quotas and permits, but in this case one which pre-dated the 1994 law. These permits are granted by the Minister of Forests through *gré à gré* (mutual agreement), while permits are issued for Special Forest Products after review by the interministerial committee. Examples of products granted exploitation permits by the government in the past four years include those on the 2006 Special Forest Product list such as rattans, charcoal and eru (*Gnetum* spp.), as well as others such as bush mango (*Irvingia* spp.) that are not included in most years' lists.

Special Forest Products destined for export require an additional permit issued by the Minister of Forests. In 2008, species receiving such permits included *Prunus africana*, *Diospyros egrettarum*, *Cinchona pubescens*, *Voacanga africana* and *Pausinystalia johimbe*. The myriad of bureaucratic and financial obligations associated with permitting for NTFPs traded as commodities has presented significant challenges to the economic viability of this sector. The requirement of annual permits for commercially traded NTFPs makes it impossible for businesses to plan a few years in advance, and the uncertainty associated with permitting means export companies cannot respond to overseas customers in a timely manner. Combined with the generally unsupportive business climate, these factors have discouraged a number of international investors from working in Cameroon (Transparency International, 2008; World Bank, 2009; Laird et al, in press).

Community forests

The 1994 Forestry Law also created 'community forests' (article 37), which provide new opportunities for the local control and management of resources, and enable local

communities to manage forest areas of less than 5000ha for commercial exploitation, as well as conservation and subsistence use. Introduced in 1997, the number of community forests peaked in 2004. Just over 400 are now at some stage in the attribution process, although only 43 per cent have approved management plans (Oyono, 2004; RIGC, 2008). These are situated in diverse ecological, political, economic and institutional landscapes, with the vast majority found in the lowland forest zone (Adeleke, 2006).

NTFPs are often included in community forest management plans, but most attention to date has focused on commercially valuable timber (Vabi et al, 2002; Akoa, 2007; Ngum, 2009). Community forests appear to offer little advantage when it comes to NTFPs, and can create an added layer of bureaucracy and cost. Overall, the impact of community forests on NTFPs is modest, with most species continuing to be harvested according to customary law and on an individual basis, rather than through a community forest management plan and on a communal basis. Even when NTFPs are included in management plans, this does not appear to ensure sustainable harvesting practices. In a few cases – notably *Prunus africana* in the North-West Province – the institutional capacity built through community forests has, in fact, contributed to the overexploitation of the resource (WHINCONET, 2005; Nsom et al, 2007).

Community forests have helped some communities achieve greater control over forest areas and more significant benefits from timber production, which are real gains. In other cases, however, they have led to conflict across and within communities and have created competition between traditional and newly established community forestry institutions. This is further aggravated by the absence of a definition for what constitutes a 'community' in the 1994 law (Egbe, 1997; Nuesiri, 2008). Concerns have also arisen over the ways benefits from timber exploitation are dispersed within communities (Ngum, 2009).

Community forests are a well-intentioned initiative but, promoted largely by the donor community, the concept was poorly adapted to local conditions (MINEF, 1998; Vabi et al, 2000; CFDP, 2002; Etoungou, 2003; Awasom, 2005; Adeleke, 2006; CIFOR, 2008; Assembe, 2009). In the case of NTFPs, the additional layer of regulation provided by community forests has proven largely unnecessary or ineffective. Customary law generally works to regulate products in local trade or consumed for subsistence, and it is not clear that community forests can solve sustainability and equity problems resulting from commercial demand. In the absence of a sustainability crisis associated with NTFPs – and unlike many other countries, there have been few in Cameroon[1] – government involvement at the community level is likely to backfire, making communities' lives more difficult and contributing little to species conservation.

FORMAL AND 'INFORMAL' TAXATION

Finance and taxation measures directly impact on the use, management and trade of NTFPs, and the broader equity and sustainability of the sector. This aspect of the NTFP trade is regulated by the Ministry of Finance, the Ministry of Small and Medium Enterprises, and the Ministry of Employment, with limited coordination between them. Taxes levied on NTFPs include those on businesses, 'regeneration' taxes linked to

quotas, export taxes, taxes levied in markets and a range of 'informal taxes' (or bribes) extracted throughout the trade network.

Most NTFP traders and organizations are small-scale and informal (Ndoye et al, 1997/98; Erasmus et al, 2006; Tchatat and Ndoye, 2006; Awono et al, 2008; Njomaha, 2008). However, since 1996 traders are required to pay a flat business tax or *impôt libératoire* of CFA12,000 (about US$26) per year. In addition, taxes are imposed in markets on traders by municipal authorities. The total tax burden for small-scale traders can be significant.

Larger traders and companies are also subject to significant taxation, including regeneration taxes set at CFA10 (US$0.02) per kg of Special Forest Products exploited. The export of raw, unprocessed Special Forest Products requires payment of another, progressive and volume-based tax. In the mid-1990s, a poorly conceived export tax of 15 per cent was instituted on all NTFPs, but this was reduced over the following years as it became apparent that the tax pushed the trade underground, promoted tax-avoidance and forced many companies to close (Laird et al, in press).

In addition to formal taxes, NTFP harvesters, traders and companies must pay 'informal taxes'. Between supply zones and markets, payments to gendarmes, police, forest guards, customs agents and others can consume up to 20 per cent of traders' gross sales (Ndoye and Awono, 2005). For example, between Sa'a and Idenau, a distance of 400km, traders have reported paying US$530 in informal taxes per truck of *Gnetum* spp., even when they possessed the necessary permits (Case Study B). In part this situation results from a broader deterioration in government institutions and a rise in corruption over the past 20 years (Transparency International, 2007; Tieguhong and Betti, 2008; Assembe, 2009). But it is also due to ignorance of the legal requirements associated with NTFP harvest and trade on the part of producers, traders and government authorities, which creates openings for abuse. In the case of the extensive

Source: Abdon Awono

Figure 2.2 *Eru* (Gnetum spp.) *loaded onto taxi in transition from Cameroon to Nigeria*

cross-border trade of NTFPs between Cameroon and its neighbours, this ignorance extends to free trade agreements (such as the Economic and Monetary Community of Central Africa, or CEMAC), and also results in informal taxation. Multiple levels of formal and informal taxation have created significant burdens on the NTFP sector, making it difficult for producers and traders to profit, and creating incentives for illegal and unsustainable activities.

GOVERNMENT INSTITUTIONAL FRAMEWORK

A range of government institutions are involved in the regulation of NTFPs. In the 1990s, MINFOF, at that time the Ministry of Environment and Forests, created a subdirectorate for NTFPs. This was located in the newly established Directorate of Promotion and Transformation of Forest Products (DPT) that elaborates and executes government policy relating to the commercialization, transformation and development of forest products. The DPT was also tasked with centralizing data collection for these products. However, the DPT is forced to compete with more powerful directorates in MINFOF for influence and resources and accomplished little as a result.[2] The institutional arrangements within MINFOF have been streamlined since the late 1990s, but the same problems continue, and the DPT has limited influence compared with the directorates concerned with timber, in particular the Directorate of Forests.

Since its inception, the NTFP subdirectorate has depended on foreign donors for its operating budget on foreign donors, many of whom are also influential in setting priorities. Even so, the subdirectorate has so few resources that it is unable to collect basic statistics on the vast majority of NTFPs (Walter and Mbala, 2006; Betti, 2007; Ingram et al, 2009). The absence of basic data is a major obstacle to drafting, implementing and monitoring effective NTFP regulation, but it has not been overcome in the more than ten years since the subdirectorate was established.[3]

A host of other government ministries and departments are also involved in regulating NTFPs in one way or another. On the ground, work intended to 'regenerate' and reforest land falls under the auspices of ANAFOR (the National Forest Development Agency), which is developing a forest plantation programme. This programme integrates the regeneration of forest resources (including NTFPs), the protection of water catchments, fuelwood production, climate change and efforts to combat desertification. Other ministries intersect with NTFPs in more narrow, but still significant, ways. For example, honey – an important NTFP in many regions – is regulated by the Ministry of Livestock, Fisheries and Animal Husbandry (MINEPIA). Since honey is classed as an animal product, its processing and trade falls under the Veterinary Sanitary Inspection Law of 2000. This is the case whatever the scale of activities or source of the honey – whether wild bees, forest hives or farm hives. In practice, this law is little known, either by harvesters and traders of forest honey, or by the forest, agricultural and MINEPIA authorities themselves. This means that honey is often seized, and 'informal taxes' are regularly levied by government officials.

Coordination within and among ministries (e.g. the Ministries for Forests, Environment, Livestock, Finance, Customs, Territorial Planning, Small and Medium Sized

Enterprises, and Social Economics and Crafts) on NTFP policy is clearly necessary, but does not happen on a regular or planned basis. The lack of collaboration and coordination is exacerbated by a constant turnover in government staff. NTFPs have been the subject of numerous donor-funded research projects and meetings over the past 15 years, and a number of these have addressed the legal and policy issues surrounding the management, harvest and trade of these products. However, little concrete in the way of policy development and implementation has resulted from these processes.

Outside of government, communities must register as institutions when they wish to harvest timber or Special Forest Products. If communities do not have a Community Forest and want to exploit timber on a communal basis, they must form a legal organization – a common initiative group (GIC) or company. Communities wishing to exploit Special Forest Products must apply to MINFOF for a Special Forest Products permit. To do this they must be registered as companies or approved and accredited as 'forest resource harvesters', something few communities have yet to manage and on which there are no statistics. As a result, the vast majority of Special Forest Products are harvested without official permits (Awono et al, 2008; Tajoacha, 2008; Ewane et al, 2009; Ndumbe et al, 2009).

CONCLUSION AND RECOMMENDATIONS

Revision of the forestry and environment laws in Cameroon over the past 15 years has opened discussion around a range of forest values beyond timber, including NTFPs. Steps have been taken to develop a legal, policy and institutional framework for NTFPs, but largely under pressure from outside agencies and with little internal political will. The legal and policy framework today remains inconsistent and incomplete, and the government's institutional capacity limited. Conflicts between texts are compounded by the absence of implementing decrees and regulations that could address broader concepts in practical terms. For the laws and the decisions that do exist, a very low level of awareness is found in the harvester and trader communities, as well as among government authorities, particularly the local and regional delegations that interact with rural communities.

As a result, most features of the NTFP regulatory framework undermine this sector. For example, the products regulated are not well-defined, and so uncertainty dominates; NTFPs are taxed in formal and informal ways that are inconsistent and often heavy-handed; the long-term management of species populations is not considered when granting quotas, nor are there controls or monitoring that might limit overharvesting; and bureaucracy and costs eat away at profits and limit the groups that might legally participate in the sector.

At the same time, the regulatory framework undermines the livelihoods of small producers and traders, in favour of the politically powerful few and 'feeding the belly'. For example, community land and resources are under ambiguous legal title, and community groups must jump bureaucratic hurdles to become legal entities in order to manage, harvest and trade their own resources and forests; informal and formal taxes are levied at multiple levels and consume the bulk of profits; communities

cannot file the necessary paperwork, and do not have the requisite political power, to acquire quotas of Special Forest Products and so must buy waybills from quota holders, or enter into semi-legal or illegal activities in order to trade NTFPs.

In the absence of a functioning and legitimate statutory legal framework, most NTFP activities are regulated through customary law. However, for species that are under strong commercial pressure, statutory law is an important and often necessary complement to customary law. Dramatic changes are clearly needed on a number of fronts in order to develop and implement a legal and policy framework for NTFPs that supports harvesters, traders and rural communities, encourages a vibrant commercial NTFP sector, and promotes sustainable and equitable practices. Following are some – perhaps ambitious – recommendations for those changes.[4]

The range of values NTFPs hold for local communities – economic, environmental, cultural and social – should be acknowledged. Subsistence use of NTFPs should be recognized as central to rural livelihoods and cultures, and made exempt from taxation and direct government oversight and intervention, as should small-scale local trade of NTFPs.

Land tenure and resource rights for local communities should be rationalized. All trees growing on lands used and managed by communities should be their property.

Customary law regulating NTFPs should be respected and seen as an important complement to statutory law.

The regulatory framework for NTFPs should be streamlined and made clear. This will improve its effectiveness, minimize opportunities for corruption that thrive on confusion and ambiguity, reduce the bureaucracy and cost associated with following the law, and encourage harvesters, traders and companies to participate legally in what might widely be viewed as a legitimate and helpful legal framework.

Comprehensive and ongoing consultations with the wide range of affected stakeholders – such as harvesters, traders and companies – should inform any revision of the NTFP legal and policy framework.

Forestry and environment laws should strengthen the clarity and consistency of their NTFP elements. The nature and scope of the products regulated under a revised forestry law should be better elaborated and defined. Objectives for regulating NTFPs (e.g. to promote sustainability, improve local livelihoods, strengthen the NTFP sector and raise government revenues) should be explicit, and the trade-offs between objectives made clear (e.g. that raising government revenues might depress local livelihoods). NTFPs should be integrated into management plans for timber and other land uses.

Taxation and trade levies should be rational, legitimate and just, and the law communicated to the many levels of government that are involved in these activities, as well as to producer and trader groups. Informal taxation should be actively prohibited.

Government institutional capacity to regulate these products should be improved. Staff should be trained and their capacity built, and resources provided to relevant institutions (e.g. the NTFP subdirectorate). The government's understanding of the vast range of NTFP uses, values and roles in local livelihoods, and their relationships with each other, should be strengthened. The collection of information and statistics on NTFPs in trade should be expanded and systematic, with resources allocated for this purpose. Cooperation and coordination within and between ministries around NTFPs should be improved.

Government and other groups should undertake outreach with traders, harvesters and others, informing them about the laws and policies regulating NTFPs, and learning from their experiences.

NOTES

1 The sustainability crisis around *Prunus africana* sourcing in the past few decades is an exception (Cunningham and Mbenkum, 1993; Cunningham et al, 1997; Ndam and Tonye, 2004; Ingram et al, 2009).

2 The directorates within MINFOF that compete with the DPT for resources and power include the cabinet; finance; inventory and forest management; protected areas; wildlife conservation; the valorization and exploitation of wildlife; wood promotion; wood processing; and community forests.

3 The only government sources of data on NTFPs in trade are the government's SIGIF (Information System for the Management of Forestry Parameters) system of data collection and the COMCAM (Cameroon Timber Marketing) database of forest product exports from the Port of Douala, which includes Special Forest Products. Waybills recorded for Special Forest Products checked at MINFOF checkpoints also yield some data, as does reporting on the export of the two CITES species *Prunus africana* and *Pausinystalia johimbe*. The customs centre in Douala also documents exports from that site. Reports on harvests of Special Forest Products from MINFOF regional delegates are often unavailable, and are not summarized annually at a national level. International agencies (e.g. the Center for International Forestry Research and the Food and Agriculture Organization), academics, and conservation and development organizations have undertaken research that fills gaps in understanding of the trade, but this should complement, rather than substitute for, government records.

4 See FAO (2008 and 2009) for additional recommendations.

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Chapter 5.
The state of NTFP law and policy: Legal and policy context for community management of non-timber forest products

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Chapter 15

The State of NTFP Policy and Law

Sarah A. Laird, Rachel P. Wynberg and Rebecca J. McLain

INTRODUCTION

The case studies presented in this volume indicate that despite wide variations in cultural, economic and political conditions, experiences with NTFP law and policy are remarkably similar around the world, and are characterized by common regulatory features. This finding applies to both developed and developing countries, and includes regions that still have strong traditional and subsistence use of NTFPs and those that may have reduced their dependence on NTFPs, but have recently 'rediscovered' natural products.

Shared characteristics include a tendency to draft inconsistent and poorly coordinated laws in reactive or opportunistic ways. These laws rarely reflect a strategy and often grow from limited understanding by government of the complex ecological, economic and cultural realities of NTFP use, management and trade. Other commonalities are insufficient consultation with harvesters and producers, and under-resourced and ineffective implementation of those laws which do exist. The following is a discussion and synthesis of these and other experiences reported in the preceding chapters.

WHY AND HOW NTFP LAWS AND POLICIES ARE DEVELOPED

NTFP policies and laws are usually a complex, and often confusing, mix of measures developed over time, with poor coherence or coordination. They rarely resemble an overall policy 'framework'. Many policies are enacted as ad hoc responses to a crisis (e.g. perceived overexploitation of a species) or an overly optimistic view of potential tax revenue should 'informal' activities be made more formal. Rarely does regulatory activity follow from a careful and systematic assessment of the range of opportunities and threats associated with species, ecosystems and livelihoods.

As almost all the cases in this volume indicate, a strategic approach to regulating the NTFP sector as a whole is uncommon. A comprehensive policy approach is sometimes developed for individual species with high commercial demand, but this is not always the case. For example, brazil nuts – a pillar of the regional economy – are regulated in Bolivia under a legal system described as 'piecemeal or peripheral' (Chapter 1) and the valuable southern African species *Hoodia* is overseen by a multitude of laws in an ad hoc manner (Chapter 13).

Reactive policy-making

The tendency for NTFP laws to be drafted in response to a real or perceived overharvesting crisis is widespread, especially when use of a species changes from local trade and subsistence to large-scale commercial trade. Reactive policy-making is often an inevitability associated with the NTFP commercial production cycle. As Homma (1992) describes in his widely cited model, this cycle is characterized by four phases. An expansion phase, represented by growth in extraction of the resource, is followed by a period of stabilization, where equilibrium is reached between the supply and demand for the product. Typically, the maximum capacity of wild populations to supply raw material is then reached. If demand continues to increase and supply falls short, prices begin to rise and pressure on wild populations increases. At this point NTFP policies tend to be developed in order to protect the sector, stimulate sustainable production, or protect wild populations (e.g. palm hearts in Brazil, Case Study A; and *Hoodia* from southern Africa, Chapter 13).

A third phase involves shrinkage of the resource base which, combined with the increased cost of harvesting from ever more remote sources, leads to gradual failure of extraction. If technologies are available, prices are high and substitutes or alternative sources of supply are not available, domestication or cultivation begins to take place during the final stabilization phase. In some cases, substitution creates a collapse as seen with the once thriving trade in Amazonian rubber (*Hevea brasiliensis*) in the early 20th century (Chapter 1) and in Finland in the 1990s, when wild lingonberry crop failures shifted industrial demand towards sweeter and cheaper berries from southern and central Europe and towards cultivated cranberries and blueberries from North America (Chapter 12).

The processes of depletion, substitution and domestication vary across species and locations, and are part of a complex array of ecological, political, social and economic circumstances (Neumann and Hirsch, 2000). Alexiades and Shanley (2005) suggest that for many products Homma's (1992) model might be revised to incorporate repeated expansion–stabilisation–decline cycles, and that some production systems actually undergo de-intensification. They also emphasize that most NTFPs are part of multi-species production systems, all of which are dynamic, complex and difficult to represent in a single model.

Booms and busts in NTFP commercial cycles also result from consumer fads, scientific research that supports or undermines markets, and health concerns. In the botanical and herb industry, for example, griffonia (*Griffonia simplicifolia*), kava (*Piper methysticum*), ephedra (*Ephedra sinica*), and cat's claw (*Uncaria tomentosa*) are just a few examples of species that have experienced increased sales in recent decades, followed

by market crashes after media reports raised concerns about safety and efficacy (Chapter 14; Alexiades, 2002; Nalvarte Armas and de Jong, 2005). Health concerns associated with raw material supplies in the food sector often trigger reactive policy responses, as in the case of aflatoxins found in Brazil nuts sold in Europe and North America (Chapter 1), with Chinese matsutake harvested in Yunnan and sold in Japan (Chapter 10), and with palm hearts in Brazil and Bolivia (Fantini et al, 2005; Stoian, 2005b).

Despite the risks associated with reactive and iterative NTFP policy-making, such interventions can also have strengths. The *Hoodia* case described in this volume (Chapter 13) demonstrates that such an approach may be necessary to cope with changing conditions, in this case market and trade fluctuations. *Hoodia*'s entry into the weight-control market in 2001 led to a surge in demand for raw material that required southern African governments to respond rapidly by introducing a stringent permit system and, in some cases, prohibiting wild harvesting. A few years later, an increase in the availability of cultivated material reduced pressure on wild populations, and governments responded with a less severe permitting system. The significant changes in *Hoodia* markets, availability and demand necessitated an iterative and flexible approach by government towards permitting and regulation, a situation that is likely to apply to other 'boom–bust' species.

Opportunistic policy-making

Government action is often triggered when politically powerful groups lobby for regulation in order to increase their control over NTFP production and trade. For example, the Rooibos Tea Control Scheme established by the apartheid state of South Africa in 1954 was promoted by and benefited the white farming elite, rather than the mostly 'coloured' farmers who had traditionally gathered rooibos tea from the wild. The scheme was a statutory, one-channel marketing system set up to regulate the production and marketing of indigenous rooibos (*Aspalathus linearis*) tea and to support the sector, including subsidies for affiliated producers, research and the provision of extension services(Hayes, 2000; Wynberg, 2006).

Governments are also quick to act when a species or set of products appears to show great economic promise, part of which they might capture through royalties, taxes or other means. In Cameroon, the government instituted new taxes on medicinal plants in the 1990s in response to a widespread belief that these NTFPs were 'green gold' (Chapter 2). In India, tendu (*Diospyros melanoxylon*) – which provides as much as 74 per cent of Orissa state's total earnings from forests – was nationalized in several states in the 1960s and 1970s due to its high value and the interest of government bodies in benefiting from its trade (Chapter 3). State intervention in the management of devil's claw (*Harpagophytum* spp.) in southern Africa grew alongside increased commercial extraction in the 1960s and 1970s and peaked in the late 1990s along with the trade (Wynberg, 2006).

Information requirements for drafting effective policies

A common problem with NTFP law and policy is limited understanding on the part of policy-makers about the products, people and activities they seek to regulate. Unlike

timber or agricultural crops, NTFPs include a broad range of species with extremely different ecologies and cultural and livelihood roles, and equally diverse market chains, end products and consumers (Peters, 1996; Arnold and Ruiz-Perez, 1996; Shanley et al, 2002; Alexiades and Shanley, 2005). For many species there remain enormous gaps in our understanding, including those widely used such as Brazil nuts, devil's claw, and eru (*Gnetum* spp.).

Solid background information is critical to policy-formulation, however. For example, because NTFPs are a diverse group of species, with a wide range of ecological niches, policy-makers cannot assume that intensification of harvesting will have similar impacts in all cases. Marula (*Sclerocarya birrea*) is widespread and common, fruits abundantly and is planted in yards, retained in fields and is usually well managed in the southern African region. These circumstances suggest a resilience that does not require immediate government intervention, but rather calls for monitoring of populations in areas with heavy harvesting rates (Shackleton et al, 2003; Wynberg and Laird, 2007). *Intsia bijuga* in Fiji, on the other hand, is slow-growing, occurs in low densities, is scattered in distribution and does not disperse well – all characteristics that make it vulnerable to overharvesting. In addition, *Intsia bijuga* is experiencing commercial pressure from the tourist trade, new technology has increased harvesting rates, and cultural changes have eroded customary laws and beliefs that hold *Intsia bijuga* to be a sacred species. This combination of factors has led to a sustainability crisis that – unlike the case of marula – requires legislative and policy attention (Chapter 9).

In addition to ecological data, policy-makers must also have access to information on marketing and production chains, the history of NTFP harvest and trade, technological developments that impact harvesting rates and pressure on a resource, and an understanding of broader cultural values that might promote or undermine sustainability (Posey, 1999; Alexiades and Shanley, 2005). If the objectives of policy are as broad and complex as 'sustainability' and 'equity', the information required to draft measures to achieve these objectives will necessarily be complex too.

This said, how can governments adequately understand, and so regulate, the hundreds, and perhaps thousands, of species for which there is little scientific or other information? Information requirements for policy-making exist along a gradient, increasing alongside the need for policy intervention. It is unnecessary and undesirable to regulate most NTFP species; governments should focus their data collection efforts on heavily traded species, and those under threat.

Consultations associated with laws and policies

Consultations with stakeholders are probably the most important way to gather information and to set priorities and objectives for policy. However, in most countries NTFP harvesters and producers are drawn from the least powerful members of society and typically have little say in policy-making (Hecht et al, 1988; Shanley et al, 2002; Shackleton and Shackleton, 2004; Alexiades and Shanley, 2005; Wynberg and Laird, 2007). Because harvesters and producers often belong to marginalized groups and cannot (or sometimes choose not to) participate in organized political action, they are rarely consulted during policy design, and their needs seldom drive the policy-making process. Technical experts and even non-governmental organizations (NGOs) (which may not be repre-

sentative of producers and harvesters, but can provide important assistance) often have more significant input into the design and drafting process than those directly involved in the harvest or trade of products. The consultations that do take place for NTFP law and policy are often with larger and more powerful business interests.

One reason for the limited involvement of harvesters in the policy process is the dearth of producer organizations or institutional vehicles through which their views and concerns can be expressed, and a lack of organizational capacity to do so. Even in recent decades, Brazil nut measures were drafted and passed in Bolivia without public consultation. It was only in the late 1990s that small Brazil nut producers finally forced their views into the public arena, in part by being better organized (Chapter 1). In the United States, Canada and the United Kingdom, some effort has recently gone into including harvesters, buyers and processors in proposed regulatory reforms, either through the formation of industry-specific task forces, as in the United Kingdom (Chapter 5) and Canada (Chapter 4) or through public hearings, as in the United States (Chapter 11).

In southern Africa, the non-profit trade association PhytoTrade Africa plays an important role in enabling the voice of marginalized producers to be heard. PhytoTrade Africa works to develop a natural products industry that enables poor rural communities to generate income through the sustainable use of indigenous plants. A core component of its work involves lobbying and advocacy to positively influence trade and policy regimes relating to natural products (Phytotrade Africa, 2006).

The few strategic exceptions

A few governments have developed NTFP law and policy in a more strategic manner. This includes undertaking research and building ecological, economic, social and cultural understanding of species, incorporating comprehensive consultations with stakeholders, and developing a strategy for the resulting legal framework.

In the past decade, for example, Namibia has taken a proactive and progressive approach towards NTFP policy and regulation, recognizing that these products provide vital income and livelihoods for communities in an environment characterized by extreme aridity and few economic opportunities (Bennett, 2006; Cole and Nakamhela, 2008; Nott and Wynberg, 2008; Chapter 13). Much of this has been done through the multi-stakeholder Namibian Indigenous Plant Task Team, which promotes collaborative approaches and effective regulation, and facilitates development of the local natural products industry (Nott and Wynberg, 2008).

Finland is also a notable exception to the rule of government neglect for NTFPs. The Finnish government has supported scientific research on wild berries for decades, including studies of their cultural and economic importance, as well as biological and ecological research (Kanga, 1999). At the same time, it has actively promoted berry and mushroom harvesting as an economic activity and cultural practice. Indeed, rather than discouraging harvesting as many countries have done, the government has developed programmes to promote harvesting and related industries. These include a berry crop forecasting system and income-tax relief favourable to harvesters, providing them with the information and incentives they need to participate more effectively in NTFP industries (Chapter 12).

THE POLICIES

Policies and laws that directly address NTFPs

A number of laws and policies directly address NTFPs, often to conserve or sustainably manage resources, and in some cases to improve rural livelihoods or promote broader economic growth in a region. These measures tend to focus on species in commercial trade, form part of national efforts to protect endangered or indigenous species, or regulate international trade under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The majority of measures directly addressing NTFPs, however, are found in natural resource law, in particular forestry laws. A range of other measures explicitly regulates aspects of NTFP trade and use, including quality control, safety and efficacy standards, transportation, taxation and trade (Chapter 14).

The inclusion of NTFPs in forestry laws of the 1990s

In most countries, forestry laws historically focused almost exclusively on timber resources and paid limited or no attention to NTFPs. Moreover, the subsistence and commercial value of NTFPs to local communities was totally disregarded when timber management plans were designed and logging operations undertaken. In recent decades, however, NTFPs were incorporated into forestry laws as a response to changing international policy trends. In many cases, this resulted from the direct pressure of international agencies, such as large conservation organizations and finance institutions, including the World Bank, to diversify forest management and make it more sustainable (Chapter 2). As a result, in the 1980s and 1990s, many countries integrated a wider range of objectives into forest policies, including forest health and biodiversity conservation, ecosystem functions and long-term sustainability, as well as broader economic values such as tourism, recreation and NTFPs.

However, initial efforts to address NTFPs in these new forestry laws were poorly formulated and rarely implemented. The scope and definition of the products covered remained unclear, and few specific actions were stipulated (e.g. Fiji Islands, 1992; Republic of Cameroon, 1994; República de Bolivia, 1996a). When actions were prescribed, they usually focused on permits, quotas (often set in arbitrary ways), management plans, and royalties or taxes – an approach lifted directly from the timber sector, and one that proved entirely inappropriate for the diverse, complex and less lucrative NTFP sector.

More usefully, some forestry laws of this generation included NTFPs in timber norms, requiring their consideration in management plans and logging operations in order to minimize negative impacts on locally valuable products. In many countries, the logging of high-value NTFP species for timber has proved their greatest threat. In Brazil in recent years, national and state governments have passed laws prohibiting the logging of high-value NTFP species (Table A.1, Case Study A), and in Bolivia prohibitions on felling Brazil nut trees arrived in 2004 as part of a decree addressing property conflicts (Chapter 1). But the track record for implementing such policies is often poor (e.g. Ortiz, 2002; Chapter 14).

In the past 10–15 years, a number of countries have begun to fine-tune forest policies passed in the 1990s to reflect the socioeconomic, ecological and cultural realities of NTFP use. This has resulted in a number of specific improvements in the ways these products are regulated, including re-thinking the use of costly and complex inventories and management plans for NTFPs, and revising quota and permitting systems (Chapter 1; Chapter 2; Chapter 9; Case Study A). There is still a long way to go, and NTFPs continue to have low priority in most forestry departments, but the trend in several countries is towards greater understanding and better-elaborated regulatory frameworks.

Quality control, safety and efficacy

Quality control and proof of safety and efficacy are increasingly important in developed country markets. This means that NTFP producers may be required to institute sophisticated procedures for tracking materials that end up as botanicals, personal care and cosmetic products, and food and beverages. Food safety legislation has often proved a formidable obstacle to international trade of NTFPs (Chapter 14; Iqbal, 1993; Brown, 2005; Bürgener, 2007). However, governments tend to act quickly when these obstacles arise; unlike environmental and social justice concerns, health concerns often get their attention, and pressure from influential commercial players involved in the trade can be great. For example, in the 1990s when the EU and the USA set maximum acceptable levels of aflatoxins that threatened the Brazil nut trade, the Bolivian government jumped into action, passing a series of measures that created norms for Brazil nut classification, sanitation practices and aflatoxin sampling, drawing upon the Food and Agriculture Organization's Codex Alimentarius (Soldán, 2003, in Chapter 1). These steps allowed the Bolivian government to maintain access to international markets for Brazil nuts.

The exponential increase in trade of *Hoodia* in the past ten years has been fed in part by demand for dozens of non-patented dietary supplements, many of dubious authenticity, containing unsubstantiated quantities of *Hoodia*, and making unfounded claims (Stafford, 2009). Concerns from the US Food and Drug Administration led regulators in South Africa, Namibia and Botswana to introduce permitting procedures to help track trade in the raw material across borders and support initiatives by local industries to monitor quality (Chapter 13).

Transportation

Transportation laws can have direct and indirect impacts on NTFPs. Most significant for all natural resources, including NTFPs, is the opening of previously remote forest areas following road building. More specific to the case of NTFPs is the use of transportation law to monitor trade. The State of Washington in the USA relies heavily on transportation permits as a mechanism for monitoring and tracking the harvesting of floral greens and other NTFPs; these permits also play an important role in identifying thefts of products from state and private land (Chapter 11). In Brazil, a 1993 regulation required a licence to transport any forest product. This included essential oils, medicinal plants and the seedlings, roots, bulbs, vines and leaves of native plants, many of which were not regulated in any other way. Because the law was so broad, and local

harvesters and traders could not easily acquire the necessary licence, they could either not participate in commercial trade, or did so illegally. This measure was amended in 2006, in response to these problems (Case Study A).

Taxation, including 'unofficial taxation'

Governments sometimes tax the NTFP trade in order to gain revenue from what is perceived as a lucrative business, but this often negatively impacts the sector. In Cameroon, new taxes instituted in the 1990s on the medicinal plant export business resulted in the near collapse of that sector, and a blossoming of bureaucracy and opportunities for corruption (Chapter 2; Case Study B). In Bushbuckridge, South Africa, the government charges kiaat (*Pterocarpus angolensis* – African or wild teak) harvesters and craftsmen a fee per running metre of wood in order to promote responsible use of this valuable material. In reality, however, reports of harassment and corruption (e.g. government rangers taking wood or issuing incorrect receipts) are common. As a result, craftsmen and harvesters usually choose to bypass the system (Case Study D). Some governments, however, use tax structures as a way of providing incentives to the NTFP sector. In Finland, for example, in order to encourage and support harvesters, and to offer the sector a 'carrot', the government makes picking income exempt from tax (Chapter 12).

'Unofficial' or 'informal taxation' (i.e. bribery) is a very real cost of doing business in many countries. Bribes are tolerated, and even encouraged, by some governments, and they work like any other policy 'stick' to change behaviour. In a number of countries, roadblocks set up by government officials to 'control' the transport of goods from rural to urban areas, and check required documents, bleed profits from traders and have knock-on effects for harvesters (Case Study B; Case Study C; Chapter 6). In The Philippines, one study showed that unofficial payments, or 'SOPS" (standard operating procedures), significantly impact the already meagre NTFP livelihoods of indigenous peoples (Chapter 6).

Bribery can be a good indicator not only of problems with broader governance, but also with NTFP policies and laws. Bureaucratic and confusing NTFP measures can leave communities and government authorities unclear about proper procedures, providing openings for corruption (Chapter 2; Case Study B; Chapter 6). Inappropriate and burdensome measures can also make 'unofficial payments' preferable to following regulations. In The Philippines, harvesters and traders often find it more efficient and cheaper to pay a bribe, than navigate elaborate official management plan and licensing requirements (Chapter 6).

Policies and laws that indirectly impact NTFPs

In addition to laws that explicitly address NTFPs there are a myriad of measures that may not mention the term, and yet impact their use, management and trade as much as, or more than, those that do (Dewees and Scherr, 1996). The high impact of these measures is largely because the role of NTFPs in subsistence and local livelihoods is often poorly understood and rarely considered when drafting other measures. Laws tend to be drafted along sectoral lines that do not take into account other land uses, and the complex and interconnected nature of activities.

Laws and policies with an indirect impact on NTFPs include agricultural policies, land tenure and resource rights, intellectual property, and labour law. In addition, a range of natural resource laws have a significant impact on NTFPs, including the forestry laws discussed above, mining (Chapter 7) and protected area laws that discourage or forbid NTFP harvesting in core areas (e.g. Baird and Dearden, 2003; Jaireth and Smyth, 2003; Dowie, 2005).

Agricultural policies

Agricultural policies can impact NTFPs in a range of ways. They might discourage or promote farming practices that are linked to NTFP harvests and associated livelihoods. For example, in the 1990s an international policy movement identified swidden ('slash and burn') agriculture as a major cause of tropical deforestation. Although this was unproven and controversial, the impact of restricting practices associated with swidden agriculture was significant, including on NTFPs. In the case of the Batak in Palawan, these policy restrictions led to a surge in NTFP harvesting and trade to buy food to supplement low agricultural production (Chapter 7). Agricultural policies can also include subsidies and other incentives to cultivate NTFPs, with both positive and negative impacts on rural livelihoods and species. The cultivation of rooibos tea in South Africa, for example, is promoted by a regulatory framework that encourages the clearing of natural biodiversity for rooibos plantations, and discourages wild collection of this species (Wynberg, 2006).

Agricultural policies can also be a vehicle for land and resource rights reform, with significant consequences for NTFPs. For example, the 1996 Agrarian Reform Law (República de Bolivia, 1996b) in Bolivia initially appeared to have little relevance for the Brazil nut economy, but its impact was dramatic because it sought to resolve the complex and contradictory property rights system of the country (Chapter 1). Agricultural policies can also impact NTFPs through their effect on the supply of labour available to harvest products. In Finland, the loss of domestic price supports for agricultural products following the country's accession to the EU in 1995 accelerated rural economic restructuring and the out-migration of many rural residents to urban areas. To overcome the resulting labour shortage during the berry season, Finnish berry companies have increasingly turned to the use of immigrant labour, thereby creating further changes in the NTFP economy (Chapter 12).

Land tenure and resource rights

NTFPs are harvested under a wide range of landownership systems, including communal, private, and various tiers of state control, and under different access regimes, from strict prohibitions on use through to open access. Four basic kinds of rights typically underpin such systems: use, transfer, exclusion and enforcement (Neumann and Hirsch, 2000). The many combinations of rights and forms of ownership mean that NTFP tenure systems are complex. However, clear land tenure and resource rights are fundamental to the success of any NTFP policy measure seeking equity and sustainability. These rights do not necessarily take the form of government titles, something often not possible in vast rural areas, but there must be a working understanding between stakeholders. When such understanding is not in place, conflicts over NTFP resources are common (eg Chapter 1; Chapter 2; Chapter 6; Chapter 7).

In some cases, land tenure may be secure, but resource rights are not. In Mexico, most forests are collectively owned, and while local communities have some autonomy in the management of their natural resources, the state sporadically exerts control over their use. For example, agave extraction has been regulated for hundreds of years through local institutions within the *ejido* and indigenous community structure. These have been responsible for regulating access, management practices and the distribution of benefits based on history and traditional knowledge of the species. Norms and agreements are established by general assembly and are continually modified or replaced in a dynamic process that responds to new situations and to tensions of environmental, socioeconomic, cultural or technological origin. Even with such a dynamic and sophisticated system, however, the Environmental Protection Agency now often fines local harvesters when they do not present a legal harvesting permit (Chapter 8).

In Yunnan, China, changing land and resource rights have created opportunities for greater local control and a more effective policy framework for matsutake mushroom harvests. During most of the latter half of the 20th century, China's forests were under state ownership. In the 1980s, however, forests were divided into state, collective and household holdings. In Yunnan, forests under the new tenure arrangements continued to be managed largely for timber until 1998, when logging was banned as a flood prevention measure. These developments coincided with expansion in demand for the region's matsutake, a product that previously had little value and for which rights of tenure and usufruct were in flux. This state of flux and the resulting flexibility in tenure arrangements left space for villages to develop codes of conduct for access to local matsutake grounds and the monitoring of harvest practices. Local regulation has had the added benefit of fostering adaptive management, since villages can adjust to new conditions more quickly and easily than higher levels of government (Chapter 10).

The security of resource rights may also depend on the commercial value of an NTFP. This is illustrated in India, where the state owns all NTFPs and grants usufruct rights for collection, as well as transport and sale. In theory, the state is involved in resource rights in order to protect and benefit collectors, but in practice the distribution of income from these resources is considered highly inequitable, and government is interested only in those species with high commercial value like tendu. Political devolution has recently transferred rights over many NTFPs to local communities, but these are primarily products of low commercial value and the state retains control over more lucrative NTFPs (Chapter 3).

Resource rights are undergoing change alongside broader views of property rights in many developed countries of the North. In Sweden and Finland, for example, the centuries-old principle of 'everyman's right' to harvest wild berries and mushrooms is being tested by the seasonal in-migration of large numbers of non-Nordic pickers, raising public concerns about immigration and tax policies, labour practices and benefit sharing (Chapter 12); in England and Scotland, tension exists between customary rights to roam and the codified versions of those rights (Chapter 5); and in Canada, in a reversal of trends in many other countries, as part of asserting aboriginal rights and title, First Nations are demanding the return of their right to regulate access to NTFPs (Chapter 4).

When intact, customary law can play an important role in ensuring sustainable and equitable use of NTFPs. Arquiza et al (Chapter 6) describe landownership vested in

Philippine communities, each with its own rattan territory, and many with strong customary laws that promote sustainable rattan management. Communities with a poorly defined sense of collective ownership and no traditional institutions tend to have weaker enforcement and manage rattan less sustainably. Similarly, in the case of marula (*Sclerocarya birrea*) in southern Africa, Wynberg and Laird (2007) found that where tenure is secure, customary laws are strong and local capacity exists to manage the resource base and deal with the pressures of commercialization, customary law achieves a balance between sustainable resource use and livelihood needs. However, when customary laws are weak and insecurities persist with land tenure and resource rights, significant conflicts arise around resource management, and government intervention is often necessary. In Fiji, 83 per cent of the total land area is under customary tenure ('native lands') as a result of British colonial policy that prohibited the sale of land to colonial settlers. However, even with secure land tenure and resource rights, dramatic social, cultural, technological, economic and other changes have strained customary and local laws and have led to significant sustainability problems for *Intsia bijuga* (Chapter 9).

In many countries, customary and statutory laws play complementary roles, but it is common for new statutory laws to weaken effective customary systems. In Bolivia, for decades small producers maintained strong de facto control over the resource base through a customary system of 'tree tenure'. Access rights were based on rubber trails and later, when Brazil nuts became important, on access to Brazil nut trees and related infrastructure. All these activities operated in a statutory policy vacuum until 1995. At that time the government superimposed another layer of 'rights' over the region's forests by allocating timber concessions. Conflicts were further exacerbated when efforts to modify the 1996 Agrarian Reform Law to expand the size of land grants to communities also undermined customary tree tenure arrangements. Land reform gave smallholders formal recognition of their tenure rights, but by basing it on control of contiguous territory (allocating each family 500ha), it undermined effective traditional tenure arrangements and access rights based on key resources (once rubber, and now Brazil nut trees) (Chapter 1; Stoian, 2005a).

Intellectual property rights

Policies relating to intellectual property rights (IPRs) can also have a significant impact on NTFP harvest and trade. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organization has created a global regime for IPRs, the result of which is that many NTFPs are increasingly included in patents and other forms of IPRs (Dutfield, 2002). This has important implications for the broader trade in and use of these products, since IPRs can create barriers against non-affiliated companies entering the market (Gebhardt, 1998). If narrowly applied, IPRs need not restrict the trade or commercialization of products by other companies or groups, but there are a number of cases where this has occurred. For example, the 1997 patenting of active components of *Hoodia* and the specification of a particular extraction technique have directly inhibited trade in *Hoodia* extracts over the past decade (Wynberg et al, 2009; Chapter 13).

The pharmaceutical, crop protection and seed industries, in particular, use patents to protect innovations, and plant breeders' rights (or plant patents in the USA) serve

the same function in the horticultural industry. To a lesser extent, patents and other IPRs are also used in industries that rely on whole plant material, such as the botanical medicine and personal care and cosmetic industries. These products contain multiple compounds and therefore do not lend themselves easily to patent protection, but other areas of product development, such as manufacturing and processing techniques, formulations, dosage forms and unique release characteristics, enable IPRs to be secured. IPRS are clearly a complex, difficult and expensive way for small-scale producers to ensure benefits from NTFPs, although trade organizations such as PhytoTrade Africa are using intellectual property tools to protect small producers and enhance their competitiveness.

Increasingly, geographical indications, or appellations of origin, are used as an intellectual property mechanism to protect regional products and the communities associated with them. This is done through labels on products identifying the country, region or locality from which they originate, and that yields the particular qualities or reputation associated with the products (Commission on Intellectual Property Rights, 2002). Because geographical indications are anchored to a region and are a means to identify and market products easily, they can play a role in protecting traditional and cultural practices, as well as local economies associated with non-timber and other products. However, if poorly applied, geographical indications can also result in the disenfranchisement of local groups. For example, the use of geographical indications for *Agave cupreata* in Mexico favoured the development of monoculture plantations, undermined traditional management practices and created a complex and confusing policy environment. Traditional producers are thus unable to benefit from the system, and as Granich et al (Chapter 8) observe, 'the number of regulations and the studies and administrative procedures required make the process of legal extraction of NTFPs difficult and expensive, a great burden to communities and a disincentive to compliance'.

Labour

Labour and related policies such as immigration that directly affect labour supplies can have significant impacts on NTFPs and those whose livelihoods depend on them. These impacts are particularly evident in the case studies from the global North, where many countries have experienced significant rural restructuring in the past two decades. In the north-western USA in the 1990s, for example, floral greens harvesters were transformed from self-employed sole proprietors or micro-firms with relatively independent access to floral greens harvesting sites, to predominantly de facto wage labourers heavily dependent on the floral greens companies not only for access to harvesting sites, but also for the transport needed to get to those sites (Chapter 11). In the UK and Finland rural restructuring has also been accompanied by an influx of immigrants to harvest NTFPs, but most of these have legal authorization to be in those countries and wage labourer conditions analogous to those in the USA have not developed (Chapter 5; Chapter 12).

Insider–outsider conflicts around accessing, harvesting and trading NTFPs are significant and occur consistently around the world, and hence throughout this book. NTFPs are an important, and sometimes the most easily accessed, source of cash for rural communities. 'Outsiders' often enter communities' lands to harvest products

without permission, use destructive methods and take more than wild populations can support, disregarding customary laws and controls (Lynch and Alcorn, 1994; Michon, 2005; Wynberg and Laird, 2007; Chapter 2; Chapter 7). This dynamic is played out from northern Europe to South Africa, and from Palawan to Canada to Bolivia. Migrants might harvest for their own use, but most often they exploit an available commercial opportunity, sometimes under contract with companies. The government of Sweden sought to ease tensions between local and migrant harvesters of wild berries by eliminating tax advantages for migrants (Chapter 12). In some cases, however, so-called 'outsiders' have resided in a region for generations (e.g. Chapter 1). Policy-makers must tread carefully when dealing with this potential minefield. Both 'insiders' and 'outsiders' require support, but in very different ways, and measures should take into account, and guard against inflaming, this common form of conflict.

It is also important for policy-makers to consider the many different types of 'labour' involved in the harvest, trade and processing of NTFPs. Harvesters and producers typically receive a small fraction of the final value of NTFPs (e.g. Padoch, 1988; Hersch-Martinez, 1995; King et al, 1999; Biswas and Potts, 2003; Schreckenberg, 2004; Chapter 6). In general, profits from NTFPs increase with greater processing and as the value chain progresses, alongside political power (Southgate et al, 1996; Neumann and Hirsch, 2000; Schreckenberg, 2004; Alexiades and Shanley, 2005; Chapter 1). Existing inequities and power imbalances in the value chain should be understood by policy-makers in order to create laws that benefit all stakeholders, and do not set them against each other.

Common features of NTFP policy and legal frameworks

The tension between broad policy prescriptions and the need to limit the scope of laws

Measures regulating NTFPs must carefully balance a wide range of objectives. These might include the protection of species under threat, the promotion of sustainability, the distribution of greater benefits to harvesters and producers, quality control, the generation of government revenues through taxation, and support for local businesses. A law heavily weighted to serve a single goal and one category of products (e.g. increased tax revenues and commercially traded medicinal plants) might create obstacles for achieving objectives associated with different kinds of NTFPs or stakeholders (e.g. improved livelihoods from local trading or subsistence use of the same species).

As described, the majority of laws that specifically regulate NTFPs do so in response to perceived threats to a species, and the result is often a narrow scope: species-based measures or those regulating a category of products, rather than umbrella measures for a wide range of NTFPs. In some cases, this may be the most effective response. However, this type of measure runs the risk of producing 'unintended consequences' if it lumps locally traded and subsistence NTFPs into a regulatory framework designed for commercially traded species.

There is an inherent tension in the objectives and scope of NTFP laws: on the one hand, there exists a need for broad measures that address a range of species, and on the other measures must be focused to be effective and meaningful, and avoid unintended consequences. How to focus and narrow the scope of laws is a challenge and

requires significant understanding. For example, the Brazilian government instituted regulations for a small group of *Euterpe* palms, but the species in this genus have very different ecological, harvesting and economic profiles, and static regulations restricted the ability of small producers to quickly adapt and access new markets (Case Study A).

The tendency towards overwhelming bureaucracy and reporting requirements inappropriate for small-scale producers

NTFP regulations are often unnecessarily bureaucratic. Regulations lifted from industrial timber production that include permitting, fees and management plans have proven unworkable. Even regulations tailored to NTFPs can be cumbersome, and often favour large-scale commercial exploitation over small-scale NTFP harvesters or producers. In one area of Mexico, for example, it is easier to obtain authorization to log timber than to extract mushrooms (Chapter 8). In the Philippines, the Department of Environment and Natural Resources established community-based forest management agreements to allow communities to manage forests for NTFPs, but the bureaucratic obligations that came with these agreements proved insurmountable for most indigenous communities (Chapters 6 and 7). In Cameroon, complex bureaucratic requirements create obstacles for both large- and small-scale traders, and have driven much of the commercial trade in medicinal plants underground (Chapter 2).

Most policies assume communities are literate, have technical skills or funds to pay experts, and can easily find cash to pay for permits. This is rarely the case. Additionally, the logic underlying elaborate regulations eludes most harvesters and producers because they offer little or no benefit in return for increased cost and effort, and open the door to corruption and exploitation at the hands of government officials, and can criminalize traditional harvesting and livelihood activities. Bureaucratic requirements associated with government interventions are unlikely to change, however, and this is an important reason why 'less is often more' when it comes to NTFP regulation (Wynberg and Laird, 2007).

Poor coordination of laws and policies resulting in inconsistency, conflicting mandates and confusion about jurisdiction

NTFP laws and policies tend to be poorly integrated with existing federal, provincial or state laws, and are rarely coordinated with customary law. A comprehensive policy framework for NTFPs that addresses laws and policies acting at different levels requires time, funds, research and comprehensive consultations with stakeholders. This level of investment in NTFP law and policy is extremely rare. The result is legal frameworks that are inconsistent and confusing, and a lack of clarity about which laws and government departments have jurisdiction over these products and activities.

For example, the NTFP policy environment in South Africa is characterized by a plethora of inefficient and sometimes contradictory national and provincial laws. These laws are only sporadically implemented, are often incompatible with each other, and are largely unknown by local communities. The laws then interface with customary systems that have eroded to varying degrees as a result of colonial and apartheid administration, but often offer the most effective regulation for NTFPs (Wymberg and Laird, 2007; Case Study D).

Inconsistent and often underfunded policy implementation

It is difficult to interest governments in effective NTFP law and policy because NTFPs fall into institutional and sectoral 'cracks', are usually part of informal or loosely organized trade, or are consumed for subsistence. Moreover, most producers are politically and economically marginalized and there is little political will to address their needs. When governments do engage with this sector and draft laws, it is common for implementation, monitoring, and compliance to be poor since resources and capacity are rarely allocated to what are perceived as 'minor' products(Tomich, 1996; Wynberg and Laird, 2007; Chapter 2; Chapter 9). In Fiji, for example, the government recently sought to regulate the NTFP sector more effectively through the 2007 National Forest Policy and the Endangered and Protected Species Act of 2002. Despite good intentions, however, implementation has been weak: few traders know of the laws, and monitoring and enforcement is nonexistent (Chapter 9).

Sometimes a lack of implementation results when government departments compete with each other, or their mandates conflict or overlap. As a result, no institution delegates the resources or staff needed to implement NTFP regulations (Antypas et al, 2002). In Cameroon, the 1994 Forestry Law (Republic of Cameroon, 1994) set up an NTFP Sub-Directorate within the then Ministry of Environment and Forests. This new body was provided with a civil servant to oversee activities, but had no budget and extremely limited power compared to the timber interests residing in the same ministry. As a result financial returns from taxes and fees on NTFPs went to other departments and ministries (Chapter 2). It is often the case that NTFP revenue streams, which could strengthen and build capacity within government to effectively regulate and manage NTFPs, are diverted to other, more powerful, entities in government. In the Western Ghats in India, for example, royalties collected on uppage (*Garcinia gummi-gutta*) go to the state treasury, with no allocation for conservation of the resource, and state efforts focus on policing the movement of material in order to collect royalties, rather than monitoring harvest and trade to ensure sustainability (Chapter 3).

Unimplemented policy measures can be worse than no measures. In some cases they weaken traditional structures that might better promote sustainable management or equity in trade; even cursory government regulation of NTFPs can undermine community institutions and control over resources (Arnold and Ruiz-Pérez, 2001). Confusion, conflict and corruption can also result when laws are unclear or unenforced, making the lives of producers, harvesters, and traders more difficult and encouraging unsustainable harvest of species (Chapter 2; Chapter 6; Case Study B).

THE BROADER CONTEXT: GLOBAL AND REGIONAL TRENDS THAT UNDERLIE AND INFLUENCE NTFP LAW AND POLICY

Seemingly unrelated global and regional economic, social and legal forces can have enormous repercussions in the lives of NTFP harvesters thousands of miles away. This

is ever more the case, as the world grows increasingly interconnected and trends move rapidly across societies.

Globalization and trade liberalization

Changes in macroeconomic conditions linked to the processes of globalization have played a role in shaping the content and impacts of policies affecting NTFPs during the past two decades. Since the mid-1970s, the world has experienced the development of capitalist economies in China, the countries of central and eastern Europe, the nations formerly part of the Soviet Union, Vietnam and a number of previously socialist countries in Africa. Simultaneously, advances in communications and transportation technology have facilitated the expansion and intensification of trade networks, so that many NTFPs that were once sold primarily in national or regional markets are now embedded in global exchange networks. Globalization has also affected the flow of people, which in the post-industrial economies of Europe and North America, for example, often results in companies using cheap labour from developing countries for harvesting and processing NTFPs.

In China, market liberalization sparked a thriving trade in matsutake exported to Japan. Villagers in Yunnan have benefited substantially from this trade, although they are vulnerable to declines in Japanese demand, as in 2002 when traces of pesticides were reported in mushrooms (Chapter 10). In contrast, liberalized trade relations between western and eastern Europe damaged the berry sector in Finland because the price of wild berries was substantially reduced. This created serious hardship for many rural residents and businesses in northern and eastern Finland. The Finnish government stepped in to promote harvesting by providing tax incentives for commercial berry harvesters, including immigrants, and implementing liberal immigration policies for seasonal berry pickers from other countries. Russian wild berry exporters, on the other hand, benefited from market liberalization, since they can export berries to the EU market where they can get a better price than at home. However, in Russia, an abundant supply of resources, physical proximity to major export markets and low labour costs have not in themselves proved sufficient for success in global markets; they still require more efficient transport and market infrastructure to get the products to market (Chapter 12).

In many cases, global, regional and local factors combine in unanticipated ways to significantly impact the harvest and trade of NTFPs. For example, in Palawan a combination of changes over the last decade have increased both indigenous peoples' and migrants' dependence upon NTFPs as a source of cash income. These include: the drastic reduction in agricultural production during years of El Niño and La Niña activity and as a result of swidden prohibitions instituted by local governments; the collapse of national and international markets for an important NTFP (copra – dried coconut endocarp); and economic uncertainties associated with the Asian financial crisis (Chapter 7).

Formation of regional economic alliances

Regional economic alliances emerging over the past two decades have substantially affected flows of NTFP products and labour across borders. In the USA such alliances

contributed to a radical redistribution of costs and benefits associated with floral greens exchange networks (Chapter 11). The North American Free Trade Agreement (NAFTA), for example, exacerbated the downward slide in prices paid for floral greens, prompting many long-time US harvesters to look for other ways to make a living. At the same time, NAFTA ensured a cheap and plentiful supply of labour from Mexico and Central America, making it possible for a handful of floral greens companies to remain competitive. For many Latino immigrants, NAFTA had a negative push and a positive pull effect, with low corn prices pushing many out of small-scale agriculture or small businesses in Mexico, and the possibility of higher-paying work pulling them into the north-western USA to harvest salal. However, many immigrants who entered the USA illegally had to endure abysmal labour conditions or risk being branded criminals and deported (Chapter 11).

In southern Africa, countries with shared commercial species have increasingly collaborated to design joint policies for management and ensure their effective implementation. However, the complexity and diversity of domestic laws and institutions has meant that governments cannot fully streamline policies. In the case of *Hoodia*, for example, some steps have been taken by southern African countries to collaborate on poaching, trade and the transport of illegally harvested material, but they have not found common ground on the more slippery political issues of benefit sharing and indigenous peoples' rights (Chapter 13).

Rural restructuring in post-industrial societies

In many post-industrial economies, an important consequence of globalization and the formation of regional economic alliances has been massive and widespread restructuring of economies in rural regions. This includes a decline in agriculture, natural resource extraction and associated manufacturing industries. In some countries, such as the USA and Finland, high levels of rural unemployment linked to economic restructuring have caused large numbers of youths and younger families to relocate to urban areas, creating a gap in the labour supply for NTFP harvesting. Seasonal and permanent immigrants are filling these gaps, contributing to tensions between local harvesters and 'outsiders' over access to harvesting sites (Chapter 11; Chapter 12). In British Columbia, Canada, the 'rural flight' phenomenon has been somewhat attenuated by the large proportion of First Nations communities in rural areas reluctant to leave their homes despite high unemployment rates (Chapter 4).

Wider acceptance of indigenous peoples' rights and locally based political organizations

In recent years, NTFP policies have been influenced by the growing political power of indigenous peoples and increased recognition of their land, human, cultural and intellectual property rights. Since the early 1990s, these rights have been articulated through a suite of global instruments and institutions, negotiated texts and processes relating to indigenous peoples and the protection of traditional knowledge, including the Convention on Biological Diversity (CBD) and the United Nations Permanent Forum on Indigenous Issues.

These developments mean that indigenous peoples' rights to harvest NTFPs as part of traditional practices, to control and benefit from access to resources on their territories and to protect the use of their traditional knowledge are now more widely accepted. Non-indigenous communities have also benefited from these developments and from a linked trend towards decentralized governance, or 'devolution' and 'participatory' processes that establish new, or reinvigorate existing, community-based forest governance systems (Case Study A; Chapter 2; Chapter 3; Chapter 6). Related to these developments is the rise of civil society and non-governmental organizations that promote dialogue and political engagement with human rights, social justice and environmental issues (Alexiades and Shanley, 2005).

Devolved, or local governance, could work well for NTFPs given the diverse social, ecological and economic conditions under which they are harvested, used and traded. However, many of these regulatory efforts have not been effectively implemented. Likewise, the rights granted to indigenous peoples are often not recognized in practice, and in the case of NTFPs do not always translate into greater control over resources and improved benefits (Castillo and Castillo, 2009). The 1996 Panchayats Act in India, for example, gave greater authority over NTFPs to tribal groups, but was ambiguous about which forests were included and, with the exception of Orissa state, this measure was largely ignored (Chapter 3). In the Philippines, wider commercial interests such as mining often override the rights of indigenous peoples to use NTFPs and other resources (Chapter 6). Neither have the many laws and regulations that exist to protect human rights and prevent injustice in southern Africa saved the indigenous San peoples from loss of land and natural resources, intellectual property and culture. It has taken a significant process of awareness-raising to enable them to claim and assert their rights to resources, such as those to *Hoodia*, and convert those rights into tangible outcomes (Chapter 13; Chennells et al, 2009). Although the broader legal trend is towards greater rights for indigenous peoples and more local control over resources, including NTFPs, in practice it will take many years for these rights to be realized, and few incentives exist for reluctant governments to cede these powers to local groups.

Broader concepts of conservation that include sustainable use and equity

In recent decades, the field of conservation has moved from a purely protectionist approach to one that incorporates sustainable use and increasingly views equity and social justice as integral to achieving environmental objectives. This has been supported by a suite of new international agreements and processes relating to biodiversity, forests, and climate change. The Convention on Biodiversity (CBD), for example, regulates the commercial use of genetic resources and not NTFPs and other 'biological resources', but its objectives of sustainable and equitable use have influenced national law and international standards for socially responsible business practices (Laird, 1999; Pierce and Laird, 2003; Laird and Wynberg, 2006, 2008; Chapter 13).

A more comprehensive policy approach has emerged that makes room for NTFPs and small-scale producers previously invisible to policy-makers. NTFPs are viewed as important contributors to rural livelihoods, and sometimes as alternatives to more

destructive land uses. Interest in the sustainability and equity of the commercial NTFP trade has also grown, including greater attention focused on the distribution of benefits along NTFP value chains. As awareness of the links between social justice, poverty, equity and conservation has grown, so too has awareness of the enormous and diverse role of NTFPs in rural livelihoods.

CONCLUSION

This chapter has described the multiple factors that influence NTFP policy development and implementation, highlighting the remarkable similarities in experiences throughout the world. NTFP policy development is usually reactive or opportunistic, and rarely strategic. Limited information and understanding are key constraints that prevent more effective policy-making, including understanding of the complex and dynamic production systems of which NTFPs are a part. NTFP regulations tend to be inconsistent, unnecessarily bureaucratic, and to operate in an incoherent and conflicting policy environment that provides opportunities for corruption and creates new forms of inequity. A major difficulty in regulating NTFPs is also the need to create laws that are specific enough to be meaningful, and yet broad enough to apply to a range of species and situations.

The tendency for policy-makers to overlook the crucial insights of NTFP producers and traders, many on the economic and political margins, is widespread. All too often governments favour the voices of the politically and economically powerful few, rather than those of the people most directly affected by policy interventions. Governments also tend to support economic activities that generate income they can tax and benefit from, such as mining, logging, oil, or industrial agriculture. It is difficult to attract government support for informal, dispersed activities undertaken by the politically marginal, no matter how superior the economic value or relatively limited the environmental impact of NTFPs.

Although the state of NTFP law and policy is not encouraging, a consistent and important lesson to emerge throughout the world is the value of local and customary law in regulating this complex and diverse group of species, and the need for governments to often 'leave well enough alone' or to intervene minimally. With more careful attention, however, it is possible that recent interest in laws and policies regulating NTFPs will yield more strategic, better-informed and effective policy frameworks. The next and final chapter highlights some of the issues to consider, and information and actions that are required, to achieve this objective.

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Chapter 6.
One in ten thousand? The Cameroon case of *Ancistrocladus korupensis*: The rise of rights, equity, and benefit sharing within biodiversity conservation

Laird, S.A., A.B. Cunningham, and E.Lisinge. 2000. One in ten thousand? The Cameroon Case of *Ancistrocladus korupensis*. *in*: C. Zerner (ed.) *People , Plants and Justice :The Politics of Nature Conservation*. Columbia University Press, New York, pp 345-373.

CHAPTER 14

One in Ten Thousand? The Cameroon Case of *Ancistrocladus korupensis*

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Ancistrocladus korupensis is a woody climber found in the tropical forests of Cameroon and Nigeria. The epithet *korupensis* refers to Korup, the people, and the national park that bears their name in the Southwest Province of Cameroon (figure 14-1). It was in the Korup National Park that *A. korupensis* was first collected, a forest vine with no reported local use, or name. *A. korupensis* was originally collected by staff of the Missouri Botanical Garden under contract from the Natural Products Branch of the National Cancer Institute (NCI). Since that time, it has yielded the anti-human immunodeficiency virus (HIV) naphthyl-isoquinoline alkaloid michellamine B, generating a complex debate on access and benefit-sharing (ABS) issues associated with the commercialization of biodiversity[1] (see, for example, Adams 1993; Gustafson 1993; *Le Messager* 1993; Katz-Miller 1993; *African Wildlife Update* 1993; *La Nouvelle Expression* 1995).

The issues addressed in this debate were expressed in, and now grow in part from, the documents signed at the 1992 Rio de Janeiro United Nations Conference on Environment and Development (UNCED, or Earth Summit), in particular the Convention on Biological Diversity (CBD).[2] The policy process leading up to and following the UNCED, and environmental organizations' international public information campaigns highlighting the medicinal riches of the rainforest conducted around this time, were manifested in interesting ways in the case of *A. korupensis* in Cameroon. In part, this was a constructive influence, and one that helped to steer government, nongovernmental organizations (NGOs), universities, and other stakeholders through the myriad issues raised by the case. This included the implications of sovereignty over genetic resources, and the sharing of ABS strategies with other high-biodiversity countries grappling with these issues, such as Australia and Costa Rica.

Ancistrocladus korupensis was collected in 1987, early on in the biodiversity

Figure 14-1 Korup National Park, Cameroon.

prospecting policy discussions (and, indeed, years before the term *biodiversity prospecting* was coined), but it was not until 1990 that the NCI found compounds of interest in *A. korupensis*, a year after NCI staff, in conjunction with their contracted collectors (the New York Botanical Garden, the Missouri Botanical Garden, and the University of Illinois), had developed a draft letter of intent (LOI). This LOI—for all its subsequently perceived faults—was at that time a progressive step forward for a government collection program, and a significant advance in addressing the ABS issues involved in biodiversity prospecting. In 1993, the LOI—by then renamed a letter of collection (LOC)—was signed by parties representing the NCI and

Cameroon. By that time, the National Institute of Biodiversity (INBio) in Costa Rica had signed and staff were actively discussing their $2 million deal with Merck and Company for the supply of more than 1,000 samples over two years (Reid et al. 1993b; Sittenfeld 1996; Joyce 1994; Balick et al. 1996).

The development of thinking on biodiversity prospecting issues in Cameroon grew from, and had the benefit of, a rapidly expanding international policy discussion, and the specific experiences of a number of groups actively working in tropical countries. This not only included INBio, which is one type of biodiversity prospecting "model," but the groups working with Shaman Pharmaceuticals, such as the Aguarana Federation in Peru, and other countries and institutions negotiating with the NCI regarding promising compounds, such as the Department of Conservation and Land Management (CALM) in Western Australia, which provided assistance and advice during the early stages of the *A. korupensis* case (Katz-Miller and Dayton 1993; Armstrong and Hooper 1994). The Manila Declaration (1992) was also consulted by both governmental and nongovernmental parties within Cameroon actively searching for general guidelines for a relationship of the type that had been established with the NCI.

While contributing constructively to the development of ABS measures within Cameroon, the international policy process and public information campaigns also brought with them some problems. This was in part because the issues had been distorted and oversimplified when international policy discussions lacked an adequate grounding in practical experience. Oversimplification can facilitate agreement and create order in a policy equation at the international level, but, afterward, implementation on the ground can be fraught with problems.

The underlying distortions and gaps with relevance to the case of *A. korupensis* include the ill-defined scope and nature of industry demand for genetic resources; the inherent and perhaps misplaced optimism that nationalizing genetic resources will likely lead to conservation and sustainable development, or the sharing of benefits beyond the national level; and the enormously difficult task of "equitably sharing'' benefits with NGOs, research institutions, indigenous peoples and local communities, and others where "true'' owners of forest resources are not easily identified, in countries where political and economic power are centralized, and where established patterns of resource extraction are exploitative.

All too frequently, governments investing in ABS policies to control access to something for which the market is uncertain—for example, genetic resources—also tolerate or promote the clearing of high-biodiversity forests for commercial agriculture or unsustainable logging, often by foreign-owned companies. In Cameroon, more than half of timber exploitation is undertaken by foreign-controlled companies, and foreign companies severely overharvest medicinal barks for shipment to Europe, with little return to local communities or serious investment in the sustainability of these practices (Sikod 1996; Ekoko 1997; Cunningham and Mbenkum 1993; Sunderland et al. 1997; Laird and Lisinge 1998; also see chapter 12). Logging companies exported more than 1.8 million tons of timber products in 1996, making

Cameroon the third largest exporter of timber in Africa (Sikod 1996). Natural resource extraction is a major part of the national economy, yet a great deal less attention is paid to the conservation of biodiversity, sustainable use and development, and the fair and equitable sharing of benefits than is given to genetic resources, which, by and large, are part of a poorly defined and poorly understood, and certainly to date within Cameroon a largely unrealized, market.

Governments and stakeholders involved in the process of drafting access and benefit-sharing measures must do so with a firm understanding of industry demand for genetic resources. There is great variation among the industries targeted by these measures, including the ways in which they seek access and generate benefits (ten Kate and Laird 1999). Countries must also develop a strategy that balances the need to control exploitative practices on the part of industry, with the desire to promote new and varied commercial uses of biodiversity, in order to generate a range of benefits and create incentives for conservation and sustainable development. The lack of organized industry participation and/or opposition within countries developing access and benefit-sharing regimes is pronounced. Beyond concerns relating to intellectual property rights and excessive bureaucracy, the industry reaction is small and silent, or derisory. In many countries, the ABS policy process does not proceed on the basis of a sound understanding of the industries involved, nor does it grow from a well-articulated national strategy. As a result, many measures have missed the target, which—we must assume—is the coming together of the three objectives of the Convention on Biological Diversity.[3]

In Cameroon, the absence of sufficient information and a national strategy was reflected in early attempts at access control and requirements for benefit sharing. Within a forestry law (Government of Cameroon 1994) then under consideration, the government included provisions regulating genetic resources, including establishing national sovereignty over genetic resources, requiring prior informed consent from the Government of Cameroon (GoC), and benefit sharing, mainly in the form of royalties. The will to implement these ABS measures, and general interest in these issues has dwindled, however, alongside commercial prospects for michellamine B. Perceptions that outsiders are rapaciously exploiting Cameroon's genetic resources, growing originally from international policy and public education programs, and finding fertile ground within the country, persist at all levels, however. Outsiders in forest villages are frequently asked if they are in search of a million-dollar drug; or the town a foreigner inhabits might teem with rumors of their undercover explorations in the forest for pharmaceutical medicines. At the government and NGO level, suspicion of outside researchers has become routine.

An analysis of the relationship between justice and biodiversity prospecting is most compelling when it uses the language and framework of resource extraction industries such as timber and mining; when a long history of "common heritage" is placed under today's very different ethical and legal microscope; or when the bad guys and the good guys are clearly motivated and easy to identify. There are many examples of unethical collections, companies motivated by the need to re-collect a

promising species and doing so destructively, an absence of prior informed consent from local people or governments, and so on. However, it is also common for the motivations of the collectors to vary, or to be noncommercial (e.g., a publication being the desired object rather than cash), and for the company's objectives to be more complex than commonly thought (a reliable partner to provide consistent services, rather than an undocumented, untraceable load of plant material). The "good'' developing country government might exploit and draw benefits away from local communities, and the "bad'' company might tend to business as usual, while adhering to national ABS measures. Biodiversity prospecting does not always fit easily within the framework of exploitation most commonly cited at an international level today. While research and commercial collections should be carefully monitored and regulated, our analysis of justice and equity must incorporate the complexity of relationships, and the importance of histories and patterns of exploitation within high biodiversity countries.

As affirmed under the Convention on Biological Diversity, national governments have sovereignty over genetic resources. Within biologically rich countries, many governments have also concentrated power over natural resources to a great extent. Resource management and use, as administered by these centralized bodies, have historically proven anything but "equitable,'' or "fair,'' nor has there been the broad and creative sharing of benefits that is required if biodiversity prospecting is to contribute to the conservation of biodiversity or sustainable development. A minority of high-biodiversity countries have the technological and scientific muscle in place to capitalize on commercial collaborations and to make full use of "capacity building'' and "technology transfer,'' and other benefits called for under the Convention. Most of these also have the business and legal acumen to develop frameworks for collaboration that control access and ensure benefit sharing. But as yet, few even in this minority have the political and social will to establish strong links between the commercialization of biodiversity, conservation, and sustainable development, and to draw a range of stakeholders into the process.

As this case study indicates, biodiversity prospecting easily falls into established, inequitable patterns of resource extraction. There is a good chance that a benefit-sharing process, including royalties and up-front benefits such as schools, roads, and health clinics, will follow much the same pattern and will be tied to long-term conservation and development objectives in much the same way as those previously or currently supplied by timber, mining, and oil companies. The timber industry is often required to provide something like a "fair and equitable sharing of benefits''; oil companies in West Africa support the building of schools for local communities. What has this meant in practice? Access and benefit-sharing policies will be effective only if their design takes into account these historical patterns of resource use and the economic, social, and cultural context within which they occur. Taking into account local histories and cultures, as onerous as this may seem to some, and as rote and empty as the concept has become through cynical overuse, is the only sure way any effective ABS policy measure will be developed and implemented.

THE CASE[4]

Ancistrocladus korupensis

Ancistrocladaceae is an unusual family of about twenty species of forest climbers from tropical Africa and Asia, in the single genus Ancistrocladus. There is growing scientific interest in this genus, in part because of the uncertainty that remains with regard to the relationship between the Ancistrocladaceae and other plant families.[5] However, interest has been piqued mainly because of the presence in many species of a unique group of chemical compounds, the naphthyl isoquinoline alkaloids (Gereau 1997; Bringmann 1986; Bringmann et al. in press; Manfredi et al. 1991; Hallock et al. 1994). Although the recently described *A. korupensis* (Thomas and Gereau 1993) appears to have no local use in its native range in Cameroon, there are several records of local peoples' use of other *Ancistrocladus* species in traditional medicine. For example, M. M. Iwu reports on the use of aerial parts of *A. abbreviatus*, a species very similar to *A. korupensis*, in the treatment of measles and fever in Ghana (Iwu 1993; Irvine 1961). The boiled roots of *A. extensus* are used to treat dysentery in Malaysia (Burkill 1966). *A. robertsoniorum*, which is a restricted endemic of coastal forest in Kenya and was described only in 1984, exudes the insecticidal compound droserone (Leonard 1984).

Ancistrocladus korupensis is a tall (up to 25 m) canopy liana[6] with stems sometimes exceeding 10 cm in diameter. The sparingly branched main stems climb by means of numerous short, hooked, lateral branches. Leaves of the lateral branches are borne in dense evergreen rosettes, and each leaf apparently lives for over one year. Mature leaves contain the highest concentrations of the alkaloid michellamine B. Little is known of the phenology, although flowers have been collected in November, and dense crops of fallen fruit were seen in February and March of 1993 (Jato and Thomas 1993b; Thomas et al. 1994). The density of stems is estimated at one to two mature climbers per hectare. The area in which *A. korupensis* is known to grow lies at 50 to 160 m above sea level with highly acidic (pH range, 3.9 to 4.5), leached, and infertile soils with a high sand content (60–91 percent) and little clay (Thomas and Gereau 1993; Thomas et al. 1994; Gereau, personal communication, 1995).

Collections

Ancistrocladus korupensis was first collected by botanists in the early part of the twentieth century near Oban in the Cross River State of Nigeria (Talbot 1726, BM), but it was not identified to the species level. The second collection (Thomas 6889, MO, YA) was made in 1987 in the Korup National Park,[7] about 50 km from Talbot's locality. The Thomas collection was a voucher for a 0.5 kg sample of dried stems and leaves, collected under a Missouri Botanical Garden (MBG)–National Cancer Institute contract. These collections were conducted in conjunction with the Center for the Study of Medicinal Plants, Yaounde (Thomas and Gereau 1993; Jato and Thomas 1993a).

A number of years later, in 1990, researchers at NCI discovered that extracts from *A. korupensis* inhibited the ability of HIV to kill human cells; the HIV-inhibiting alkaloids michellamine A and B were subsequently isolated (Manfredi et al. 1991). Following on this research, NCI sought out additional supplies of what it thought was *A. abbreviatus* Airy Shaw, a species widespread in west and central Africa (Thomas et al. 1994). MBG collectors in central Africa (including Gabon and the Central African Republic) conducted subsequent collections of *A. abbreviatus*, *A. ealaensis*, and *A. letestui*; however, these samples showed no activity against HIV. The original voucher specimen was reexamined, and it was found that the species in question was in fact new to science. Cameroonian scientists from the National Herbarium, the Center for the Study of Medicinal Plants, and other institutions, were hired to locate the species in Cameroon. In 1991, the original collector, Duncan Thomas, was able to re-collect *A. korupensis* in Korup National Park. In 1992, the inflorescence axis was found, confirming that the species was not *A. abbreviatus*. In June 1992, the Ancistrocladus Project technician at Korup, Emmanuel Jato, found *A. korupensis* fruit and, in early 1993, both fruit and flowers, which led to the description of *A. korupensis* as a new species (Thomas, personal communication, 1995; Jato, personal communication, 1995; Thomas and Gereau 1993).

Development of a Sustainable Supply: Botanical and Horticultural Research

In 1992, after michellamine B was approved for preclinical development at the NCI, the Missouri Botanical Garden, in conjunction with the University of Yaounde and funded by the NCI, expanded its research program in Cameroon to assess the density and distribution of the population of *A. korupensis*. Researchers found that *A. korupensis* is very localized in its distribution but within this area is fairly common (Thomas et al. 1994), with vines existing in localized patches.

Over the next few years, while research continued on the distribution and taxonomy of *A. korupensis*, large collections were made of the active species, and smaller collections of other *Ancistrocladus* species, for testing by the NCI. During this time, as part of work funded by the NCI, researchers in Cameroon also undertook preliminary propagation trials and evaluated possible methods of production from wild and cultivated sources. Seedlings were collected in the forest and planted in a forest nursery and in the Korup Project Nursery in Mundemba, at the Limbe Botanic Garden, and at the compound of a University of Yaounde researcher. By July 1993, 5,000 seedlings had been raised in the Korup Project Nursery, and many others were planted out in preliminary trials to study the effects of various cropping systems (D. Thomas 1992; A. Thomas 1993; Symonds, personal communication, 1994.)

Leaf harvesting trials began in April 1992 in forests under threat from shifting cultivation on the edge of the Ndian oil palm estate, outside the national park. Sourcing of raw leaf material presented a number of problems because the harvest of live plant material from a national park is not legal, and leaf harvesting trials demonstrated

that an interval of at least two years between harvests was required. Researchers turned to leaf litter in an attempt to develop a sustainable supply. This approach proved successful since all samples of leaf litter showed high levels of michellamine B (Thomas et al. 1994).

In November 1993, Purdue University received the NCI contract for work on cultivation of *A. korupensis* at Korup. This was a three-year program, designed to determine the feasibility of cultivating *A. korupensis*.[8] The budget for this research program was subsequently scaled back from original estimates because of severe budgetary cuts in the NCI Developmental Therapeutics Program, but it was still by far the largest investment made by NCI in sourcing to date (Cragg, personal communication, 1994). By investing in this research, despite uncertainty about the future of michellamine B, the NCI hoped to insure itself against sudden supply shortages such as those experienced when taxol (from the bark of *Taxus brevifolia*) passed into clinical trials. Now that michellamine B appears too toxic to pursue, the Purdue University cultivation program at Korup is winding to a close. Findings will be published and made available to the Prime Minister's Committee, which will then decide whether to make it publicly available (Cragg, personal communication, 1997).

Michellamine B has been synthesized, but synthesis is still not economical and a licensee would likely have to work with the GoC and the Korup Project to source raw materials affordably in the future. This might prove the point at which an equitable deal can be struck, but it is questionable whether hard bargaining could take place, and a company might be tempted to throw itself into research on more affordable synthesis, or it might try other sources, rather than risk dependence on future supplies of raw material from one source.

The NCI Letter of Collection[9] and the Government of Cameroon

> Under one such arrangement the National Cancer Institute is studying a vine in Cameroon that contains a potentially promising anti-HIV agent; should this particular substance fulfill its initial promise, Cameroon would realize significant benefits from development of this resource
>
> Timothy Wirth, Undersecretary of State for Global Affairs, in April 1994 testimony before the U.S. Senate Foreign Relations Committee

In August 1992, under the auspices of their extended work for NCI in Cameroon, MBG staff met with staff at the University Center for Health Sciences of the University of Yaounde to discuss the NCI Letter of Intent, which was then signed in early 1993 by the Dean, Pierre Cateret. This LOI was subsequently revoked by the Government of Cameroon because it considered the University an inappropriate body to represent the country's interests, its view being that such a document should be signed by a minister in the GoC. As of July 1997, the LOC had not been signed by the GoC.

The process by which the government became actively involved in the case of

A. korupensis began in 1993. During this time, concerns relating to access and benefit-sharing issues, as they related to the Korup Project and Cameroon as a whole, were increasingly raised. Korup Project, World Wide Fund for Nature (WWF), and government officials entered into direct dialogue with the NCI, one result of which was the revoking of the University Center for Health Sciences and NCI LOI. However, although this document was determined to be no longer legitimate, there existed no substitute agreement or framework that outlined the terms of the NCI-GoC relationship, including the supply of raw materials for testing, as well as requirements for "fair and equitable sharing of benefits" with Cameroon, the Korup Project, and local communities in the Korup Project area.

Meanwhile, the variety and number of parties involved in the process expanded, causing confusion over roles and responsibilities; parties included the University of Yaounde, the many GoC ministries, the Korup Project, the MBG, and Purdue University. It remained unclear who had final responsibility for negotiating and dealing with the practical realities of the NCI research and development effort, as well as for brokering the various national and local interests involved. Confusion and, as a result, ill-defined suspicion resulted, with no single party appearing to have all the necessary information on hand at one time.

Without a framework agreement, for example, the Korup Project staff were reluctant to send further plant material to the United States. The NCI, meanwhile, was extremely eager to acquire additional raw materials for animal toxicology studies and was actively working to explain the benefits of the LOC. In August 1993, an interministerial committee was established within Cameroon, and a meeting was held to address the issues raised by *Ancistrocladus*. The results of the meeting included declaring *A. korupensis* a "national treasure"; restricting the number of multiplication plots of *A. korupensis*; prohibiting the export of live plant material and seeds; conducting research into capabilities within Cameroon for the establishment of research partnerships with NCI; and the establishment of three committees with the following well-articulated agendas: (1) production/exploitation, (2) laboratory research, and (3) legal aspects.[10] Unfortunately, the interministerial committees did not follow up effectively on this initial meeting, largely because they failed to clarify their respective ministerial responsibilities in the case, which resulted in confusion in the design of negotiating strategies with the NCI.

The Government of Cameroon ministries most directly involved in biodiversity prospecting–related issues are the Ministry of Environment and Forestry (MINEF) and the Ministry of Scientific and Technical Research (MINREST), although a number of other government ministries such as the Ministries of Industrial and Commercial Development, Health, Higher Education, Justice, and Finance, as well as the Prime Minister's office have become involved in the *A. korupensis* case to varying degrees. Today, the bulk of responsibility for *A. korupensis* and other "medicinal plants" lies within the Prime Minister's Follow-Up Commission for the Exploitation and Conservation of *A. korupensis* and MINEF, but there remains a great deal of confusion as to respective responsibilities, and no real movement toward the

development of a competent national authority to oversee and implement permitting procedures for ABS.

Following the August 1993 meeting, MINEF sent a letter to NCI stating that further raw material would not be sent to NCI without a full agreement between the NCI and the Cameroon government. The government also requested information on any live material of *A. korupensis* outside of Cameroon with which the NCI was working, and it asked that all cultivation work be done in Cameroon (restricted to Korup, or under the direction of the Korup Project). It also requested that immediate benefits be returned to Cameroon, including research on propagation and cultivation at Korup; provision of a field herbarium at Korup; provision of training courses in plant taxonomy in Cameroon; assistance with the development of appropriate capacity within Cameroon for the evaluation of new natural products and authentication of traditional medicines; provision of a full list of all biological samples obtained for the NCI in Cameroon (where and how collected, and all lab results); and a moratorium on collection of further samples in Cameroon until general terms for collection of such samples had been determined.

The NCI responded that they would be willing to replace their agreement with the University Center for Health Sciences for one with the GOC, and that their staff were preparing a new draft, later received by MINEF. The NCI said that it could not provide herbaria, but it saw this as the type of program that the United States Aid for International Development (USAID) would fund. The NCI offered to train researchers at their laboratories and agreed to send a summary of all biological samples collected in Cameroon and submitted to them, together with an assessment of their biological testing.

The NCI is no longer pursuing research and development on michellamine B because of its toxicity. Within the NCI research and development program, it is effectively shelved; however, the NCI would like to find a company to conduct further research on it.[11] Because Cameroon has not signed the NCI LOC, the NCI cannot *require* that a licensee do more than negotiate in good faith.[12] A signed LOC would have the added benefit of covering all of the materials collected in Cameroon in 1987 for NCI, many of which might prove of value in the future.[13]

Intermediaries

The case of *A. korupensis* highlights some of the complexities and potential problems associated with the NCI-contracted collector model. Because NCI depends on independent subcontractors to carry out collections, these subcontractors and their in-country collaborators determine the nature of benefits associated with the collection phase, and they identify in-country beneficiaries. The NCI can constrain and motivate collectors in particular directions through its contracts and funding, but it is ignorant of conditions within countries in which collections take place.

Collectors, in turn, are selected because of their abilities in plant collection and identification techniques, not because of their capacity to mediate the various

national and local interests with regard to the commercialization of biochemical and genetic resources. Beyond the obvious need for contracted collectors to follow high professional ethical standards themselves, they must also often provide advice, information, brokering, and negotiation assistance in the early stages of research and development to local partners. If they do not, the type of confusion and rumor that has typified the *A. korupensis* case is likely to result.

At the stage of collection, the NCI does not become directly involved in compensation and benefit sharing, but it has supplied additional funds to their contracted collectors to allow them to implement short-term infrastructure- and expertise-building measures in countries of collection. These types of benefits can be written into research agreements and, had the Missouri Botanical Garden and the Korup Project established a better-defined working relationship early on, and preferably some form of research agreement, a package of "process" benefits (see following discussion) might have been supplied to Korup as part of the plant collection process.

In a departure from past practices, the NCI is now ceasing to use intermediary collectors in some regions, instead entering into direct Memoranda of Understanding (MOU) with source country collaborators, particularly in South and Central America, but also in South Africa, China, and Zimbabwe. The collaborations defined in these MOUs are far more involved, and they place an emphasis on discovery taking place in the source countries. However, this approach requires a significant level of research and development capacity within source countries, and so it is limited to around a dozen or so high-biodiversity, relatively high-capacity countries (Cragg, personal communication, 1997).[14]

Forestry Law No. 94/01 and Implementing Decrees

In December 1993, the Cameroon National Assembly passed a new forestry law (Government of Cameroon 1994; concerning forests, wildlife, and fisheries) and implementing decrees (Government of Cameroon 1995a, 1995b; relating to forestry and wildlife, respectively). The law and its implementing decrees are the main legal instruments for implementing the Forest Policy. They outline the administrative procedures and norms relevant to the attribution and management of the forest. Included are provisions relating to the collection and use of genetic resources.

Article 12 of the forestry law establishes national sovereignty over all genetic and biological resources and requires prior informed consent from the GoC prior to any scientific, commercial, or cultural exploitation. A permitting process for exploitation of forest products, guidelines for the collection of genetic resources, and the equitable sharing of benefits are also detailed. Article 12 also channels all benefits in the form of royalties to the GoC. Other articles relating to benefit-sharing with local communities include 68, 51, and 85, but they address timber exploitation and do not mention genetic resources.

More recently, a framework law relating to environmental management (Government of Cameroon 1996) was adopted. Articles 64(1)(c) and 65(1) and (2) recognize

the need for a system of access control for genetic resources. This framework law further states that scientific exploration of genetic resources should benefit Cameroon and should be carried out under conditions of transparency and in close collaboration with national research institutions and local communities, as stipulated in relevant international conventions signed by the GoC, in particular the Convention on Biological Diversity. The law further calls for an enabling decree to define the contractual relationship that should exist between foreign and Cameroonian research institutions and local communities. The provisions cited establish a sufficient legal base on which subsequent access-control agreements and benefit-sharing mechanisms can be developed.

Although the forestry law and implementing decrees are silent on article 8j of the Convention on Biodiversity, which includes language to "respect, preserve, and maintain knowledge, innovations, and practices of indigenous and local communities embodying traditional lifestyles . . . encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations, and practices," the framework law stipulates in article 65(1) that the exploration and exploitation of genetic resources should be in accordance with the provisions of the CBD. This article, therefore, implicitly incorporates the relevant provisions of article 8j.

A significant institutional obstacle to implementing the genetic resources provisions of the forestry law, and to addressing issues raised by the case of *A. korupensis*, has been the lack of a clearly defined national authority to oversee access and benefit-sharing issues. As a result, rather than a strategic approach to negotiations with the NCI, and ABS issues in general, the GoC largely pieced together policies in response to events. Even the Prime Minister's Committee set up in 1993 appears defunct, not having met since 1997.

Community Forests

With the 1994 forestry law innovation of "Community Forests" (article 37), community control over forest resources, including their role in access and benefit-sharing arrangements for genetic resources, is in flux (Besong 1995; Government of Cameroon 1997). The 1994 forestry law classifies the national forest estate into two categories of forest: permanent and nonpermanent forest. The nonpermanent forest includes communal forest, community forest, and forest belonging to individuals.[15] There is some question as to whether the community forests will differ substantively from existing forest in the public domain to which communities have usufruct rights (1974 Land Tenure Act, ordinance 74–1, July 6, 1974), and whether communities will feel any greater guarantee of their long-term control of the resource base.

The application of the provision relating to community forests is complicated by ambiguity in the definition of *community*. Both the law and its decree of implementation see *community* as an entity provided for under existing Cameroonian legislation [article 28(2)]. Applications for community forests have been delayed by the GoC pending clarification of the legal status of the groups involved, and a redefinition of procedures for inventories and management plans (Sharpe 1997). A draft

MINEF manual on procedures and norms for the attribution and management of community forests defines a community as a legal entity duly registered under the existing legal text as either an association, a cooperative, a common initiative group, or an economic interest group (Government of Cameroon 1997).

THE CULTURAL CONTEXT: INDIGENOUS PEOPLES AND LOCAL COMMUNITIES

The people living in the Korup area, like those in all of southwest Cameroon, are a combination of indigenous villagers, settlers from Nigeria and the Bamenda Highlands, and migrant laborers. In the precolonial period, the forest of the Southwest was inhabited by a large number of small linguistic and cultural groups known in the ethnographic literature as Bakweri, Bambuko, Bafaw, Balong, Bakundu, Balue, Bai, Mbonge, Ngolo, Batabga, Korup, Batoke, Mbo, Bakossi, Basossi, Elung, Ninong, and so on (Sharpe 1994). Within the Korup Project area, the main ethnic groups are the Bantoid Ekoi, including the Ejagham tribes, and Ibibio, including the Korup people; the Cameroon-Congo Bantu in the area include the Oroko tribes, and Mbo tribes to the east (Thomas et al. 1989; Tchounkoue and Jenkin 1989).

The 100 or so villages within the Korup Project area have largely mixed subsistence and cash crop economies. The primary cash crops are cocoa and coffee, with other cash and subsistence crops including cassava (*Manihot esculenta*), plantains (*Musa* species), bananas (*Musa* species), cocoyams (*Colocasia esculenta* and *Xanthosoma sagittifolium*), maize (*Zea mays*) and yams (*Dioscorea* species). The typical holding is between five and ten hectares (ha) per household, with 2 ha or less under full cultivation at any one time. Fishing and hunting (often within Park boundaries) are important subsistence and economic activities throughout the Korup Project area, and to a lesser extent the harvest of various forest products, such as cane, foods, spices, medicinal plants, and dyeing and carving materials for both subsistence and sale in local markets (see, for example, Malleson 1987, 1993; Okafor 1992; Thomas et al. 1989; Wood 1993; Devitt 1988; Carter 1992; Jeanrenaud 1991; Laird and Sunderland 1996). Timber extraction from concessions surrounding the National Park is also underway. However, the Ndian Division economy is dominated by the production of palm oil and kernels, largely through the Plantations Pamol du Cameroun (PAMOL), which was previously a subsidiary of Unilever, but also through oil palm smallholders (Tchounkoue and Jenkin 1989; Wicks et al. 1986).

Over the past century, the indigenous groups of southwest Cameroon have experienced forced labor under German colonial rule, the establishment of plantations, and in-migration by large numbers of plantation workers and settlers from Nigeria and the Bamenda Highlands, the latter of which continues today (Sharpe 1994; Kofele-Kale 1981; Watts 1994). The Southwest Province continues to be characterized by plantations, mainly those under the control of the parastatal Cameroon Development Corporation, which produces palm oil, rubber, bananas, and tea, as well as those of

PAMOL (Tchounkoue and Jenkin 1989). As a result of these factors, there is no "over-arching" ethnic identity in this area (Sharpe 1994). Although there is a clear division between indigenous villagers and the "strangers" to whom they sell their land,[16] and who settle in a client relationship to the village (often in former slave towns), within and between communities there is considerable heterogeneity, and complex relationships exist that belie a simplistic distinction between the indigenous and the nonindigenous.

Richards (1993) suggests that this complex mix of old and new (colonial and postcolonial) migrant populations characterizes the forest margins throughout West Africa, and that narrow definitions of the category *indigenous peoples* should be avoided. The term *indigenous peoples* should, he argues, be used to cover all groups in West Africa with effective local knowledge of the forest.[17] Sharpe (1997) similarly criticizes a perspective on indigenousness that led a recent World Bank report on southern Cameroon to class only the 40–60,000 "pygmies" as indigenes, out of a population of 4–6 million. They argue that the Amazonian concept of undisturbed autochthonous groups makes little sense in West Africa, where most forest areas have a long and complex history of settlement and resettlement.

This long-running dynamic of migration into and out of the forest, however, does not mean that a concept of indigenousness, albeit a very different one from that found in the Amazon, is not important to local communities. In particular, the delineating of complex bundles of rights based on relative indigenousness, the recognition of these rights by others, and the mediation of disputes arising therefrom, absorb a great deal of cultural energy in West Africa (Richards 1993; Sharpe 1997). Being a "son (or daughter) of the soil" is the single most important political identity in South West Province, and it is crucial to village politics, legal systems, and land holdings, although degrees and types of indigenousness are recognized (Sharpe and Malleson, personal communication, 1996).

Today, in response to European-led conservation and development programs that now emphasize "indigenous or local communities," some have observed a tendency, as there was in colonial times, to generate "ethnic federations." Sharpe (1994) sees the emphasis on ethnicity and "nativeness" on the part of these programs as not only misplaced but potentially divisive, and likely to create interethnic conflict.[18] Richards (1993) also describes the conservation agencies' confused, but prevailing, belief that forests and forest margins in West Africa have a single " `true' owner with whom a once-and-for-all resource management deal might be struck," and that all other local interest groups are in some sense "imposters." Burnham (1993) refers to government and NGO planning documents, drafts of new laws, and publicity statements that are "shot through" with references to participatory forest management by "traditional communities," while little attention is paid to how these communities are constituted and defined.

Ironically, the forested areas that have of late become reserves or national parks, such as the Korup National Park, are typically land that either was reserved by colonial forestry departments, was depopulated by local conflicts in the centuries before colonial rule, or once served as boundary wildernesses between neighboring pre-

colonial societies (Richards 1993; 1996a). The Korup National Park includes previously abandoned farm sites, settlements, and forest managed for valuable species such as the oil seed tree *Baillonella toxisperma*, and during colonial and postcolonial times it served as a border traversed by traders and smugglers. These forested areas survive because they are old contested domains, no-man's-lands, or boundary wildernesses over which no single authority has been able to assert undisputed control. Local groups that settle in these areas are thus more "fluid" and "labile" than those elsewhere and are engaged in "competitive redefinition over time" (Richards 1993, 1996b; Burnham 1993; Sharpe 1997). As a result, in many of these forested areas it is especially difficult to identify a "true" owner or stakeholder to whom one could assign the right to negotiate access to local resources and subsequent benefit sharing.

Korup was demarcated as a forest reserve in 1937. From the beginning there was strong local opposition to the reserve in a manner that is telling for the case of *A. korupensis*. Forest reserves, purportedly for conservation, were in fact a form of timber concession. The local people throughout the southwest of Cameroon knew that this often meant little benefit for them and potential harm in the form of migrant workers in the logging camps. In some cases, chiefs might gain personally at the expense of their community. Within and between villages and native authorities there existed conflicts over the control of forest resources, and a great deal of suspicion. When approached regarding the demarcation of the forest reserve in 1936, the villagers of Korup were reportedly "universally suspicious" (Sharpe 1994). Numerous well-documented cases of dispute shortly after World War I were linked to the actions of the Forestry Service in creating forest reserves, as well as to the actions of timber companies within their concessions; in the mid 1950s, continual protests in the newly created legislative assembly led the French colonial government to suspend the creation of new forest reserves for fear of negative publicity reaching the United Nations Mandate Commission (Burnham 1993). Conservation projects and national parks, relatively new arrivals on the West African scene, are seen by many as only the latest manifestation of this historical intervention in local resource use and management. In response to these concerns, conservation policies, projects, and parks must be designed with a very real understanding of local culture and the history of resource extraction in the area.

There are three central themes with regard to the *A. korupensis* case that emerge from the history of the peoples in this area. First of all, the nature of "indigenousness" in the area is in no way clearly defined. To attempt to concentrate efforts on assigning ethnic provenance in the case of *A. korupensis* would likely prove disastrous and divisive. Although *A. korupensis* appears to have no local use (nor even a name),[19] an argument can generally be made for recognizing the contribution made by indigenous stewardship of forest resources (Laird 1994; Posey 1994; Posey and Balee 1989; Posey and Dutfield 1996; Posey 1996; Brush and Stabinsky 1996; Greaves 1994). However, in this case, stewardship cannot be assigned to any particular group, and efforts to do so would likely result in conflict, playing the indigenous peoples off against each other, and against strangers.[20] In addition, specialist, as well as common, knowledge of plant uses is often shared among ethnic groups in the Korup area.

Second, the people living in the Korup area have long experience with outside agencies that mine resources and renege on promised benefits. There is, therefore, an understandable cynicism and suspicion remaining in the area, coupled with a hard-earned ability to manipulate the situation to address local and individual needs, and this had run over into the activities of the Korup Project prior to the arrival of *A. korupensis* on the scene. This suggests that the reality behind *A. korupensis* research and development activities could never be as controversial as the suspicions it raises, and that relative transparency and active communication in dealing with the variety of local peoples, rather than unnecessarily raising expectations, would help clarify their role in the process. Clearly, local communities do not believe that historical patterns of resource exploitation have changed, that government institutions that facilitate forest exploitation have undergone a transformation, or that foreign interests (including conservation projects) have become other than economic, or primarily self-serving.

The Korup Project has, to date, attempted to include a variety of community members, largely through employment, in the sustainable sourcing of *A. korupensis*.[21] Should royalties result from a commercial product developed from *A. korupensis*, it is likely that the Korup Project would be a beneficiary of a portion of the funds, which might then be applied to the needs of the community; these include roads, health clinics, schools, water, electricity, and training and support for alternative income-generation activities. The mechanism by which this would occur, and the role of communities in detailing the exact nature and distribution of benefits, remains undefined to date. Under the present circumstances, however, it is possible to conclude that the benefits that have accrued to local communities take the form primarily of temporary employment, some training, and limited equipment and technical support.

And, finally, the divisions between anglophone and francophone Cameroon, and between urban elites and rural communities, are likely to be further aggravated should any commercial product come from *A. korupensis*.[22] Already, control over the case of *A. korupensis* has migrated closer to the center as awareness of the implications and potential value of the plant has grown. It has finally settled in the prime minister's office. This follows the pattern of access and benefit sharing experienced with other natural resources (Ekoko 1997; see discussion in Dove 1993b).[23] Timber revenues that once found their way to local councils for improving infrastructure in the Korup area are now put in a central fund in Yaounde and do not find their way back to Ndian Division. *Prunus africana* bark, used in a medicine to treat prostate hyperplasia in Europe (see chapter 12), is harvested in large quantities in other parts of South West Province, but similarly it yields minimal benefits for local communities, and there is little serious investment in sustainability that would ensure future supplies and reliable income for local collectors.[24] The tendency to nationalize species or products of great economic value should be factored into a realistic assessment of the potential impact of benefits on local communities, sustainable development, and the conservation of biodiversity.

BENEFIT SHARING

Endemism and Point of Collection

As *A. korupensis* was new to science in 1987, its distribution was not known at the time of collection, nor during the following few years. At one time it was suggested that *A. korupensis* was a common species; however, this was then revised and some considered it locally endemic to the Korup area. Although narrowly endemic, it has been found in the forest on both sides of the border between Cameroon and Nigeria. Had *A. korupensis* proved to exist only in the area around Korup, where the plant was originally collected, few questions would be raised regarding sovereignty and benefit sharing from commercialization of the compound michellamine B. However, *A. korupensis* is found in forest type shared by Cameroon and Nigeria, spanning a border that, similarly, separates people of similar ethnic heritage.

Indeed, as we have discussed, forest settlements in West Africa are often characterized by migration in and out of the forest. Richards (1993) argues that rarely, if ever, is it realistic to think of forest in West Africa as "empty" land not yet passed into human ownership and use, but it is equally distorting to treat the local groups currently found in possession of the forest edge as sole custodians. Sharpe (1997) describes West African forest settlements as occupying "social rather than geographical boundary zones," with almost all forest societies claiming to have met with previous inhabitants, or evidence of other settlements.

There are, therefore, no defining ethnic or geographic limits for *A. korupensis* that fall within national political boundaries. This raises a number of questions with regard to who should benefit from the commercialization of *A. korupensis*, which can be addressed by a range of approaches, including (1) *point of collection*—benefits should be negotiated by and returned to communities, institutions, or governments (or all of these) in areas where a species or knowledge of that species is collected; (2) *bioregional approach*—benefits should be returned to a bioregion, that is, the area to which a species is native; and (3) *global funds*—benefits should be fed into a global fund that will return benefits to communities and institutions throughout the developing world.

The *point of collection* model, based in practice on a variety of institutional mechanisms, is currently the most common. It can be seen, for example, in the prior informed consent process called for by the Convention on Biological Diversity, in the access and benefit-sharing measures under development in a number of countries and regions (such as the Philippines, the Andean Pact countries, South Africa, Fiji, Brazil, and Australia), and in many examples of two-party agreements, such as the National Institute of Biodiversity, Costa Rica–Merck & Co., the NCI Letter of Collection, as well as in the Shaman Pharmaceuticals approach.[25]

The point of collection approach avoids the need to trace ethnic or geographic provenance of samples or knowledge supplied, and it assumes that collaborators, or the state and national governments through their policies, will ensure an equitable

and effective application of benefits to conservation and development needs. These relationships are based on the services and expertise applied to biodiversity prospecting—collection, taxonomic identification, extraction, screening, and so on—which are prerequisites for the subsequent collection and organization of the sample or information itself. Point of collection arrangements will yield the most benefits, in terms of conservation and development objectives, if regulated and monitored by a range of external measures, including community research agreements, professional codes of conduct, institutional policies, national access and benefit-sharing legislation, and international policy and law such as the Convention on Biological Diversity.

The point of collection approach might reduce problems deriving from bureaucracy, potential corruption, and concentration of the decision-making process away from local communities and institutions, which is common to large administering agencies, whether bioregional or global. Employing a combination of *research agreements* (dictating the terms of collection), *contracts* (detailing and formalizing commercial agreements), *national measures* (ensuring that agreements distribute a portion of the benefits to national conservation and development priorities, and ensuring a framework for equitable partnerships), and *international policy and law* (outlining the principles behind best practices), point of collection makes use of the market, and a variety of relationships developed along the way, to return and distribute benefits throughout all stages of biodiversity prospecting research and development. However, the point of collection approach might also result in national institutions competing with each other, the concentration of power in the hands of collectors, and a few individuals enriching themselves or their institutions at the expense of wider conservation and development for the country or region in which collections take place.

The *bioregional* and *global fund* approaches, while they avoid some of the dangers inherent in the point of collection system, have their own characteristic set of potential problems. Both recognize the importance of ethnic and geographic provenance as a factor in the determination and distribution of benefits (which point of collection does not explicitly do), but both acknowledge that in practice it would be virtually impossible to implement a system based strictly on these boundaries. As a result, each attempts to "scale up" the model to include a very broad suggestion of boundaries.

The bioregional approach is based on the assumption that the countries or ethnic groups within whose territories a genetic resource is found all gain a share of the benefits, either because of some property-like right or because this creates an incentive to conserve. It attempts to respond to the fact that neither species nor cultures conform to political boundaries, but, rather than scaling up to a global level, it suggests that benefits should be based on the geographical distribution of plant species. The distribution of plant species is considered more stable and more easily traced than knowledge, and this approach would employ taxonomists, biogeographers, and natural-products chemists to set biogeographic limits and identify areas with highest levels of endemism (Cunningham 1994).

Bioregional funds, as they have been proposed, would act as brokering bodies and would be funded from biodiversity prospecting payments made by large companies, or equities from smaller companies. The same bioregional organization could receive and disperse benefits from royalties to member countries. Countries would pool their resources for screening and capacity building. As a group, there is more chance of a "hit'' than as separate competing organizations within countries or among countries in a region. In some cases (e.g., Madagascar and Australia), nation-states also represent a bioregion because of the high level of endemism within a discrete unit. In other cases (e.g., Southeast Asia, southern and western Africa), political boundaries do not conform to biogeographic ones, hence the need for collective bargaining, just as is happening in the world economy with the North American Free Trade Agreement, the European Community, the Association of South East Asian Nations, and the Southern African Development Community (SADC) (Reid et al. 1995; Eisner and Beiring 1994).

The bioregional approach would clearly require strong regional collaboration and legislation such as that detailed in the July 1996 Common System on Access to Genetic Resources developed by the Commission of the Cartagena Accord (the Andean Pact), which will regulate access to the genetic resources of the member countries and their derivatives according to agreed-upon principles and objectives (see Andean Pact 1996; Secretariat of the Convention on Biological Diversity 1996a; Gollin and Laird 1996; ten Kate 1997).

A global fund for natural products, like the one for Farmers' Rights, would not "depend on a detailed accounting of genetic contributions of peoples, communities, or nations'' and, fed by commercial funds, would be dispersed widely to local communities throughout the developing world (see also, for example, discussions by Kloppenburg and Balick 1996; Richards 1993; Brush 1992). Some have suggested that the fund would apply only to those species with no biogeographic endemism, and others that a global fund for *all* species would best assist local communities.

In many ways, the concept of a global fund takes the wind out of the sails of biodiversity prospecting as it might be understood in the Convention on Biological Diversity and other international fora—that is, as an engine for the creation of incentives for conservation and sustainable development. Biodiversity prospecting at its most effective for conservation and development makes wide and varied use of local biological and intellectual resources, and it spreads benefits throughout the research, as well as the commercial, phase to a wide variety of parties including communities, research institutions, and national governments. A global fund severs the direct link between the generation and the distribution of benefits, but it could still create economic incentives through wise grant making. However, grant making through intergovernmental funds does not have a track record that suggests this is the most effective mechanism to create incentives for conservation and sustainable development.[26]

Currently, there is no bioregional fund, nor a global fund, that would negotiate terms for the relevant countries, and into which benefits would be channeled and from there dispersed. The NCI Letter of Collection states that the terms requiring

compensation do not apply to "organisms which are freely available from different countries (i.e., common weeds, agricultural crops, ornamental plants, fouling organisms) unless information indicating a particular use of the organism (e.g., medicinal, pesticidal) was provided by local residents to guide the collection of such an organism from their country, or unless other justification acceptable to both the *country organization* and DTP/NCI is provided. In the case where an organism is freely available from different countries, but a genotype producing an active agent[27] is found only in *name of country*, sections detailing the nature of benefits due country organizations shall apply."

Suppose, however, that *A. korupensis* was in fact a common weedy species. Should the application of sections detailing benefits in the NCI Letter of Collection depend on the arguments of taxonomists as to the plant's original habitat, or should it depend on the negotiations and understandings reached by scientists, communities, and government officials actively involved in the collection and subsequent supplies of materials for NCI testing? The issue is further complicated by the fact that biochemical research often changes ideas about the systematic positions of species. Taxonomists have been called as expert witnesses in court before, and this would likely increase under a system of compensation based on taxonomy (A. Hamilton, WWF, personal communication, 1995).

The rosy periwinkle, *Catharanthus roseus,* is one of the best examples of the endemism versus point of collection dilemma. Indigenous to Madagascar, it is a weedy ornamental that had spread throughout the tropics by the time Eli Lilly, which developed vincristine and vinblastine, undertook any research. It first sparked the interest of researchers at Lilly, however, not because of ethnobotanical collections done on the part of Lilly staff in Madagascar, but because Gordon Svoboda and other researchers conducted a literature search for plants from the Australasian region with "folkloric usage of believable quality and the reported presence of certain types of plant ingredients" (Svoboda 1992:1). Subsequent research led them to vincristine (Velban) and vinblastine (Oncovin) for the treatment of childhood leukemia.

It is often claimed that Madagascar should receive benefits from the commercialization of compounds from the rosy periwinkle. In fact, the argument seems stronger for the Philippines or Jamaica, where local use of the plant for medicine first attracted the interest of scientists. The rosy periwinkle case would seem to argue for a global fund approach, which can cover the large number of useful species that have crossed numerous international borders. The rarer and more localized a species is, the stronger the case for national sovereignty, such as the Kenyan case for the rare endemic *Ancistrocladus robertsoniorum*. The case of Shaman Pharmaceutical's main species of interest, blood of the dragon, *Croton lechleri*, from South America, or *Garcinia livingstonei* in Africa, on the other hand, would appear to argue for a bioregional approach, in that both species are common and are widely used in their respective regions. Similarly, bioregional sovereignty might apply in the case of a regional endemic such as *A. korupensis*, which occurs across the national boundary between two countries.

Today, support for a global fund has significantly diminished. The approach most in favor, and appearing to take advantage of the best range of benefits that can derive from these partnerships, is one that employs a point of collection model, including two-party agreements, guiding institutional and professional codes and policies, strong national ABS legislation, and regional cooperation.

"Process" Benefits

The development of *A. korupensis* into a commercial drug could yield a range of benefits for Cameroon, the conservation of local biodiversity, and communities in the Korup area. These benefits might include advance, milestone, and royalty payments that could contribute to technology transfer, training, conservation "overhead," and local community development programs, a license to manufacture a commercial product for in-country or regional consumption, the development of supply industries for raw materials or extracts, commercial drugs at cost, assistance with the development of screening capabilities for tropical diseases, and so on (for a list and discussion of benefits, see, for example, Laird and Wynberg 1996; Laird 1995a; Secretariat of the Convention on Biological Diversity 1996b; 1998).

To date, and possibly in total, however, the actual benefits resulting from *A. korupensis* stem not from commercialization—since no commercial product is yet developed—but from the research and development (R&D) process. In fact, these R&D benefits are often the most significant, since even compounds of great interest, such as michellamine B, might never make it into commercial product development. For biodiversity prospecting to maximize its contributions to both conservation and development, a wide spectrum of individuals and groups must benefit, often in distinctly different ways, and this must occur in the short, medium, and long term. Royalty payments into a global fund ten years down the road, no matter what the magnitude, will never have as great an impact as benefits scattered both spatially and temporally. It is in the wide and creative dispersal of benefits throughout the R&D, as well as the commercialization, phase that biodiversity prospecting will have the most lasting effect. One must look at the *process* by which samples are collected, chemicals extracted, R&D conducted, and sources of raw materials developed, in order for the many spin-off benefits for biodiversity science, medicinal plant research, conservation, and overall development to become fully apparent.

Setting the Stage: Research Agreements and National Legislation

Much of the confusion surrounding negotiations and the assignment of responsibility within Cameroon for the *A. korupensis* case could have been avoided had research agreements with original collectors (based on the prior informed consent of the Korup project, local communities, the University of Yaounde, and the GoC), and national legislation guiding these collections, been in place. Instead, there were no terms set for the potentially commercial NCI collections conducted in 1987 and,

once interesting compounds had been identified, no framework to guide the activities of local organizations, research institutions, and the government. Additionally, it was unclear to which body in government the responsibility for administering the case fell. At that time, this was not unusual, but much has changed since then, and awareness has been raised on the importance of having good access and benefit-sharing frameworks in place.

The drafting and development of national ABS legislation is receiving a great deal of attention, as countries work to implement the Convention on Biological Diversity (see, for example, Glowka 1998; Secretariat of the Convention on Biological Diversity 1996a; Government of the Philippines, 1995, 1996; Andean Pact 1996; Barber and LaVina 1997; ten Kate 1997; Laird 1995a; Mugabe et al. 1997; Review of European Community and International Environmental Law 1997). Research agreements have received less attention, but they are extremely important as a complement to national legislation, and more so in its absence; it is here that the details of relationships are hammered out.

Research Agreements

The technologies and expertise resulting from the R&D phase of biodiversity prospecting will often be far more important than the commercial revenues. Thus, a research relationship must be established early on that reflects the best possible terms for local communities and tropical countries. Tropical country research institutes and conservation projects have long collaborated with outside scientists, relying heavily on their expertise to develop a research and knowledge base, and management plans for conserved areas. Tropical countries will continue to depend on outside expertise, particularly in light of the responsibilities of country parties to the Convention on Biological Diversity to inventory and monitor their biodiversity. But, increasingly, this will be done on terms set by biodiversity-rich governments, institutions, and local communities.

To set these terms, the biodiversity-rich institutions must negotiate research agreements that clearly outline the responsibilities and expectations of each party and ensure that all research, whether academic or commercial, contributes in some way to conservation and development activities in the areas in which it takes place (Laird 1995b; Cunningham 1993). This must be done carefully, however, so as not to create numerous bureaucratic obstacles to important academic research. Two elements form the core of research agreements: *control* by local projects and communities over the nature of research projects, and the use of resulting information, whether commercial or academic (including the choice not to commercialize); and the *contribution* of research programs to the management costs or needs of conserved areas, and the equitable return of benefits to local projects and communities from any commercial activity.

It is important for conservation projects, research institutions, universities, and local communities to tackle the implementation of research agreements as a precursor to any biodiversity prospecting–related program.[28] The manner in which

research is conducted creates a framework of community, project, and institution or government control over resources and knowledge, which is often carried over into commercialization. If groups do not provide prior informed consent, and if they do not assert control over the manner in which academic research is conducted, they are unlikely to have a say in the extension of this research into commercial areas, or any control over the dissemination of material and knowledge through academic publications, databases, and other forms of distribution common to pure research.

CONCLUSION

The case of *A. korupensis* is one of only a handful in recent years in which a rainforest species yielded compounds of great interest for drug development. As such, it can provide valuable lessons in the practical realities of the relationship between biodiversity prospecting, conservation, and sustainable development.

It would be an exaggeration to say that this case created incentives for conservation and sustainable development. On a local level, many forest communities now know that the forest might contain a million-dollar drug, but this does not appear to have changed local peoples' relationship with the forest, nor has it spurred local-level conservation efforts. At the national level, we find a government that, unlike most, has come across a potential source of "green gold." Since this discovery, however, government-sanctioned forest clearance for agriculture, and dramatically increased timber exploitation, have caused significant damage to biodiversity and ecosystems within Cameroon; option values do not appear to be a heavily favored decision-making tool within the government.

Access and benefit-sharing language in the 1994 forestry law has not been implemented, and the Prime Minister's Committee has ceased to meet. NGOs, conservation projects, universities, and other groups within the country, which might undertake the difficult job of brokering various interest groups involved in ABS issues, and of assisting the government in operationalizing the concept, are not, for the most part, much better suited to this task than they were ten years ago.

The case of *A. korupensis* in Cameroon is a very particular one, but it serves to illustrate the difficulty in predicting the form international concepts and policies will take when laid on top of existing social, economic, and cultural systems. In some countries, practical implementation will follow with surprising consistency the international framework. In others, it will not. ABS, as articulated in the Convention on Biological Diversity, is a particularly complex policy to implement, involving a wide range of commercial sectors, scientific disciplines, cultures, and governments. ABS, like the Convention itself, reflects the grouping of extremely heterogeneous, and potentially inconsistent, spheres of activity and thought: the conservation of biodiversity, sustainable development, and the fair and equitable sharing of benefits resulting from the commercial use of genetic resources. Given this complexity, a dogged commitment to practical realities and an on-going redefinition of the ABS concept based on experiences such as those described in this case study are required.

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All errors and omissions are, of course, the sole responsibility of the authors, who have endeavored to "get the story straight," but know it is a complex one to tell.

NOTES

1. *Biodiversity prospecting* has become a widely accepted term used to describe the collection, screening, and development of new commercial uses of biochemical and genetic resources (see Reid et al. 1993b). Although the scope of the Convention on Biological Diversity is limited to "genetic resources," the scope of most national ABS measures drafted to implement the Convention reflect an expanded understanding of biodiversity prospecting that includes biochemicals, derivatives, by-products, and traditional knowledge (see, e.g., Government of the Philippines 1995, 1996; Andean Pact 1996). This reflects a broadening of the term *biodiversity prospecting*, which is now applied not only to the pharmaceutical, biotech, and agriculture industries, but also to phytomedical, personal care and cosmetics, horticulture, and other industries that explore, or prospect, for new leads in biological diversity.

2. The objectives of the CBD are the conservation of biodiversity; the sustainable use of its components; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including appropriate access to genetic resources and appropriate transfer of relevant technologies (article 1) (see Glowka et al. 1994).

3. In drafting national ABS measures, governments, NGOs, researchers, and others involved in the process need information on the industries they intend to regulate. National measures drafted to date, such as the Philippines' Executive Order and Implementing Rules and Regulations (Government of the Philippines 1995, 1996), are built on an assumption of demand by industry that overlooks the unique manner in which genetic resources and biochemicals are used (see chapter 15 on the similarities between natural products and "infor-

mation''-based industries). These measures bluntly go after "benefits'' more effectively extracted with a finer tool than those employed. In the case of the Philippines, for example, companies are loathe to sign on to anything that looks like compulsory licensing, and they are publicly stating their reluctance to work there; in other cases, the procedures for prior informed consent are so elaborate that they strike some as a "nightmare'' (see ten Kate and Laird 1997, 1999).

4. Aspects of this case have been documented and analyzed in light of the benefit-sharing provisions of the Convention on Biological Diversity, as part of case studies drafted for the United Nations Environment Program (UNEP) for the fourth meeting of the Conference of the Parties in Bratislava, May 1998 (Laird and Lisinge 1998).

5. Recent investigations based on molecular evidence place the Ancistrocladaceae near the Droseraceae (D. Harder, personal communication, 1995).

6. In providing an example of ecologically driven collections, Gentry (1993) said the following: "Climbing plants (lianas), by their very nature, are mostly diffusely branched, fast-growing and light-demanding. Thus, their leaves are likely to be more scattered throughout the rainforest canopy, shorter-lived, and generally less apparent to herbivores than those of many other mature forest plants. Therefore ecological theory might predict that vines should be expected to concentrate more of their resources in specific highly active 'qualitative' (i.e., toxic) defensive compounds rather than energetically expensive broad-spectrum 'quantitative' (i.e., mechanical) defenses like tannins and lignins. It is precisely these low-molecular weight toxic compounds that tend to be biodynamic and medicinally effective.''

7. The Korup National Park was established by the Government of Cameroon in 1986. The National Park covers 1,259 square kilometers and is rich in biodiversity, with over 3,000 species of plants and animals recorded (Tchounkoue and Jenkin 1989). In February 1988, a Project under World Wide Fund for Nature (WWF) management was formed with the overall aim of conserving biodiversity within Korup National Park. In April 1993, the European Union signed a four-year funding agreement with the GoC to support the Korup Project. Funds, personnel, and resources are provided by a number of other donors and the GoC, and the Project is managed by WWF. Aspects of the Korup Project include parks management, conservation education, research coordination within the park, and a rural development component, which is involved primarily in the 300,000 ha "Support Zone'' surrounding the National Park. One hundred seventy-two villages lie within this area, twenty-seven of these lying 3 km or less from the park boundary; a further seven villages are located inside the National Park (C. Butcher, personal communication, 1995).

8. The directive (MAO/RFP) received by the NCI asked Purdue University to address the following objectives: (1) to study the feasibility of cultivating the plant to develop a reliable biomass source from which to obtain sufficient quantities of michellamine B for clinical evaluation; (2) to investigate the selection and propagation of high-yielding phenotypes; (3) to develop production systems to optimize the yields of michellamine B; (4) to examine the biology of the plant so that its growth and development and the accumulation of the secondary product can be predicted and understood.

9. For general background and more information on the NCI LOC, and on the NCI approach to ABS issues, see, for example, Cragg et al. 1994; Mays et al. 1993; Baker et al. 1995.

10. The Production and Exploitation Committee was established to oversee the inventory of *A. korupensis*, to produce a monograph, and to research and establish the methods of harvesting and cultivation. It was agreed that all work on *A. korupensis* and other medicinal plants within the Korup area would be coordinated and supervised by the Korup Project to

"safeguard the interests of the indigenous people of the area and the interests of Cameroon as a whole." The Research Committee was intended to study and develop a plan of action for the medicinal, chemical, and processing aspects of *A. korupensis*. The committee was to look into local capabilities with regard to exporting extracts rather than raw materials, the requirements of doing so, the location for such a committee, the timeline for such program, and the potential for developing screening capabilities within Cameroon for local medicinal plants. The Legal Aspects Committee was to devise a first instrument of negotiation with NCI and subsequently draft a long-term agreement. Initially, the committee would draft a document based on the Manila Declaration, the Department of Conservation and Land Management, the Australia draft agreement, and the NCI Letter of Collection. The committee would reconvene to discuss this document. This committee was also intended to determine the assignment of responsibilities within the government and the need for a permanent commission to deal with biodiversity prospecting issues.

11. Dr. Bringmann in Germany, with a longstanding interest in this genus, continues to conduct research on *A. korupensis*. This species has also yielded the korupensamines, antimalarial alkaloids that are under investigation by local scientists within Cameroon and Nigeria (Bringmann et al. 1994). The University of Yaounde continues to acquire small amounts of material from the Korup Project for antimalarial testing.

12. The NCI LOC requires direct negotiations between a successful licensing pharmaceutical company and appropriate source country organizations. Kaufman (1993) argued that the NCI has means at its disposal to insist that companies provide compensation to source countries. For example, the NCI license to a company could be made void if no mutual agreement between the company and the country of collection were reached. By holding the patent, the NCI has a certain amount of control over the ultimate marketing of beneficial drugs, therefore helping to guarantee the source country a fair return. Overall, although the NCI cannot commit to explicit royalty and licensing provisions, staff seem to feel that the support of the NCI and the National Institutes of Health (NIH), as well as members of the U.S. government (see, for example, the statement by Timothy Wirth quoted earlier), for the policies formulated in the LOC will guarantee source countries the types of compensation outlined in the LOC. For example, according to Dwight Kaufman (Deputy Director, Division of Cancer Treatment, NCI, 1993), "The LOC can't be more specific in guaranteeing recompensation to the host country, since by U.S. law the NCI, as a U.S. government agency, is not authorized to promise or encumber future intellectual property or patent rights. . . . The LOC is, nevertheless, a firm commitment to ensure that royalties and other forms of compensation shall be provided to the host country. We assure the world community that this commitment shall be honored."

13. Down the road, Camptothecin (isolated from the Chinese tree *Camptotheca acuminata*) was dropped from NCI clinical trials in 1972 because of severe bladder toxicity, and for ten years research was put on hold, until the mechanism of action of the antitumor activity of camptothecin was understood. In the 1980s, SmithKline Beecham developed a derivative of camptothecin—topotecan—that has lower toxicity and better selectivity (Carte and Johnson 1996). This research was funded by the National Cooperative Drug Discovery grants for the NCI, with industry and academic collaboration. The NCI sponsored clinical trials. Also, a Japanese pharmaceutical company, Yakult Honsha, developed a soluble camptothecin derivative, CPT-11-irinotecan.

SmithKline Beecham, the NCI, and Yakult Honsha currently obtain natural camptothecin from Chinese and Indian pharmaceutical concerns. Although total syntheses for camptothecin exist, and yields for synthetic materials are constantly improving, they are still not competitive with semisynthetic production from the natural product.

The delay between plant collection of *Camptotheca acuminata* (in the 1950s) and product development (in the 1980s) clearly argues the case for strong agreements between companies (or the NCI) and source countries. The commercial potential of a species long outlives the professional relationships on which collections are based, and agreements are needed to protect the interests of source countries and local communities. Whether or not research into *Ancistrocladus* comes to anything in the near future, the government of Cameroon should ensure that an effective agreement is in place to guarantee returns from any future work on this species, as well as on any others collected as part of the NCI program in the 1980s.

14. In addition, some intermediary collectors have changed their practices. As James Miller, Head of the Applied Research Department at the Missouri Botanical Garden, put it, botanic gardens in 1987 still operated under a series of unwritten principles and practices, while today the MBG (along with other botanic gardens such as the Royal Botanic Gardens, Kew, and The New York Botanical Garden) has a written Natural Products Research Policy. "While Missouri Botanical Garden would no longer even think of exporting samples for commercial development without a series of signed accords in place, in the mid-1980s all of our programs operated on spoken agreements, These were generally informal agreements with the national herbaria and other botanical organizations with which we collaborated. We generally relied very heavily on their help and logistical support and in turn provided training, some institutional support and the opportunity for their scientists to participate in our research'' (J. Miller, personal communication, 1995).

15. The British Colonial Forestry Ordinance of 1917 did vest forest reserves in designated local councils—so-called Native Authorities—although these laws were superseded by the 1974 forestry law (Sharpe 1997). Under the British colonial law, "vacant'' lands were considered to belong to the local communities, in the form of the Native Authorities. Under the French colonial law, however, all lands "vacant and without a master'' belonged to the state. The criteria for recognition of personal ownership were strict, and swidden cultivation fallow were not included unless perennial cash crops such as coffee and cocoa had been planted. When the two federated territories were unified in 1972, the British concept of "communal land'' was scrapped in favor of the French system (Burnham 1993).

16. Watts (1994) defines *strangers* as "nonindigenous people who have lived in the area for up to three generations.'' Some dispute the concept that land can be sold and transferred away from a community's control, and that this is what communities intended when they "leased'' rights to the land to Europeans and "strangers.'' Ejedepang-Koge (1975), for example, describes the communal system of land ownership employed by indigenous peoples in the South West Province: "Every individual native can use as much of it as possible but has no right whatever to dispose of it. He has the crops he plants, the house he builds, the animals he keeps on it, but not the land itself, for it belongs to the community, to the ancestors. As such he has only the traditional user's or occupancy right to the land. It can be said that an individual has only holding rights on the land he occupies, under strict traditional conditions. . . . Following this concept, being dispossessed of one's land is a very grave thing for its means, among many of these people, that ancestors can no longer live on such land, that the dispossessed person can no longer enjoy the support of his ancestors who henceforth will have no permanent place of contact with him, and then his labours on any other land cannot therefore be adequately regarded; he can't be satisfied.''

17. Human populations in the forested "boundary wildernesses'' are not indigenous in the sense of being undisturbed autochthonous groups, Richards (1993) maintains, "but rather they are divided into factions that have negotiated a place for themselves in a complex and labile sociological landscape where the prime criterion for success is the local knowledge that

allows for survival in a harsh and isolated environment beyond the effective scrutiny or assistance of central authority.''

18. See, too, Oates's (1995) account of the confusion in objectives and activities that results when conservation programs try to incorporate a "development'' component for local communities without a complete understanding of what comprises the "community,'' and how development activities might influence a long history of migration into and out of forest areas. In the Korup area, for example, "development'' to local communities includes the return of migrants who left before the establishment of the Park. This is an objective of many community development associations, and it could have significant repercussions for conservation programs in the area (Sharpe and Malleson, personal communication, 1996).

19. Because *A. korupensis* is a canopy liana (growing to 30 m) its leaves are very difficult to spot in the forest. It is too brittle for cordage and construction purposes, and it does not appear to have been used by local communities. Thomas (personal communication, 1993) maintains that most old-growth species are not used by the local people, most of whom are migrants recently settled in the area, who tend to utilize the more common, widespread secondary species. Mbenkum (1993) reports that local people tend to use plants from lower altitudes (where *A. korupensis* is found) in far greater proportion than higher-altitude species because of historical migration patterns. Although there are no widely known or reliable reports of local uses of *A. korupensis,* M. M. Iwu (personal communication, 1996) makes the point that uses for highly toxic species such as *A. korupensis* are often not revealed to lay people, and that specialist uses might exist.

20. A centralized administrative or organizational structure for the communities in the Korup area, which might assist in the determination and distribution of benefits in this case, does not exist. Land tenure and forest management are determined on a village basis, administered by chiefs and elders (in village councils) according to traditional laws, and each village has a "territory'' recognized by others. All land in the Project area is or was claimed by villages, which will often have clear boundaries, particularly between different ethnic groups (Thomas et al. 1989; Tchounkoue and Jenkin 1989; Wood 1993). Should rights then be assigned to villages that control, or once controlled, land on which *A. korupensis* collections take place? This would likely create more cause for conflict than any benefits would warrant.

21. For the most part, expertise brought in as part of the *A. korupensis* research phase has not been applied directly to what might be considered the priority needs of local communities. However, during the research phase, local communities have benefited from the employment of approximately ten staff members in leaf collection, cultivation, and research. It is also thought that supplying *A. korupensis* to industry might make it an alternative agricultural crop (although as a crop, *A. korupensis* would be even less reliable and less under the control of local farmers than cocoa, their main cash crop). A variety of methods for its cultivation were researched to promote local community participation in industrial supply: interplanting with oil palms, both mature and juvenile; cultivation in traditional fields and fallows; and planting out in primary and secondary forest. Some individuals and community groups have supplied land in exchange for oil palms or cash, and should *A. korupensis* prove a valuable crop, they will have ownership over the plants on their land. Should it fail, crops such as the oil palm supplied by the Project will continue to produce income (Symonds 1994, personal communication; Thomas 1993).

22. See also, for example, discussions by Wamulwange (1993) on the conflicts between traditional and political governments in Zambia, and Agyare's (1993) discussion of a case from Ghana. In many areas of the Southwest Province, for a number of generations at least,

the village was the highest level of political organization. Emphasis on centralized authority in village chiefs and Paramount Chiefs was a product of colonial administrative needs to organize and govern local communities (Sharpe 1994; Kofele-Kale 1981; Geschiere 1993). During the colonial and postcolonial period, power to control the use of forest resources has steadily moved farther away from the villages and now rests largely in the hands of the central government in Yaounde. It is from here that new laws and policies regarding forest and resource use emanate, although in practice, "the legal framework governing forest resources is inextricably entwined with local level informal accommodations between staff of different ministries, the political authorities, and wealthy and powerful villagers'' (Sharpe 1994).

23. In Ndongo, in South East Cameroon, a French logging company brought money, housing, education, and social services to a remote area, but when they had finished logging, according to local chief Comada Marcel, "They just left us with nothing but the road they built and that is just a path today'' (*Cameroon Post* 1997).

24. Dorsey (in press) makes the point that "equitable benefit-sharing schemes,'' as promoted under the Convention on Biological Diversity, become questionable and perpetuate injustice when local communities benefit the least and incur the greatest costs from biodiversity conservation.

25. These examples of two-party arrangements based on point of collection are distinctly different from each other, however. For example, in the case of INBio-Merck, the collecting institution—INBio—receives all of the benefits, but it makes a commitment to share them with the National Park System and to apply them to the objectives of INBio, which include serving the national good. Shaman Pharmaceuticals, on the other hand, does not usually sign agreements with collaborators for the return of benefits, but promises to distribute benefits to all of the company's collaborators throughout the world. This is, in effect, an extended version of the point-of-collection model, although it will operate more like a fund.

26. For example, after years of discussion and planning, the Commission on Plant Genetic Resources agreed at its fifth session that a number of issues must be resolved with regard to farmers' rights, including the nature of funding (voluntary or mandatory); the question of linkage between financial responsibilities and the benefits derived from the use of plant genetic resource; the question of who should bear financial responsibilities (countries, users, or consumers); how the relative needs and entitlements of beneficiaries, especially developing countries, were to be estimated; and how farmers and local communities would benefit from funding (United Nations Environment Program 1994).

27. For example, in Sarawak, it appears to have been a single individual of *Calophyllum lanigerum* that produced the anti-HIV compound calanolide A (Soejarto 1993). Following collection, this particular tree was felled by loggers, prompting an extensive effort to locate other individuals with the active compound. In subsequent years, calanolide A was synthesized, but, based on the requirement included in the NCI LOC, the company currently holding the license to calanolide A is undertaking negotiations with the government of Sarawak (G. M. Cragg, personal communication, 1997).

28. In 1994, in South West Province Cameroon, for example, staff of the Limbe Botanic Garden drafted a research agreement and initiated a process of discussion with researchers, government officials, and local communities to better define and articulate the relationships involved in research collaborations, and general terms for access and benefit sharing.

Chapter 7.
Certification as a Market-Based tool for Conservation: In search of comprehensive standards for non-timber forest products in the botanicals trade

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In search of comprehensive standards for non-timber forest products in the botanicals trade

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SUMMARY

Non-timber forest products (NTFPs) are receiving increased attention from standard-setting agencies including governments, trade associations, and private sector certification organisations. A sub-set of the NTFP category, botanicals, is witnessing a proliferation in standards-setting initiatives addressing topics as diverse as ecological sustainability, social justice, and product safety and efficacy. To examine this trend a survey of companies, industry associations, research institutions and NGOs worldwide was undertaken, and more than 100 sets of voluntary standards and regulations that apply to the trade or sourcing of botanicals were collected and analysed. It was found that many sets of standards under development are single-issue oriented and fail to address the wide and overlapping range of questions that arise as a product moves from source to shelf. Although a range of problems arises from this fragmented approach, steps are available to streamline processes and make standards development and implementation more effective.

Keywords: non-timber forest products, botanicals, standards, sustainability, medicinal plants

INTRODUCTION

Consumer interest in natural products and herbal medicines spurred tremendous growth in the botanicals industry during the 1990s (Brevoort 1998, Laird 1999). Global sales in botanicals and homeopathic remedies topped an estimated $20 billion in 1999 (Gruenwald 2000). However as the botanicals sector, which includes herbal medicines, personal care products, and functional foods, grew rapidly it became evident that the industry lacked oversight and standard operating norms in many countries. Popular articles began to question the efficacy of herbal remedies (e.g. Golden 2001), as well as the safety of herbs (e.g. Grady 1998, Neergaard 2002), and painted the industry as an unregulated "Wild West" where consumers needed to be wary of products, labels and claims (Burros 2002). Published reports of herbal remedies causing serious, and sometimes fatal, reactions among patients began to appear in a number of medical journals (Slifman *et al*. 1998, Haller and Benowitz 2000, Ang-Lee *et al*. 2001). Other authors insisted that the botanicals industry needed to pay closer attention to issues of sustainable and ethical harvest (e.g. Cunningham 1993, King *et al*. 1999; ten Kate and Laird 1999; Harnischfeger 2000), as the majority of species used are still being sourced from the wild (Lange and Shippmann 1997, Lange 1998). As a result of this widespread scrutiny of the botanicals sector there has been a recent groundswell of interest in standards development to ensure the safety, efficacy and, increasingly, sustainability of plant material entering the trade.

This paper presents results from a study which assessed: 1) current industry practices and attitudes relating to raw material sourcing, 2) constraints to sustainability and accountability in the main consuming sectors today, and 3) opportunities and strategies for promoting more sustainable and ethical sourcing. These strategies include consumer campaigns, establishment of brokers for environmentally and socially sound material, direct sourcing partnerships between companies, and NGOs and community-based organisations, corporate and industry association policies and guidelines; national and international law and policy, domestication and sustainable management of species; and certification (Laird and Pierce 2002). The potential role of standards and certification in promoting more sustainable and ethical sourcing within the broader contexts of industry practice are discussed, as well as current trends in standards and regulations for NTFPs.

Methods

In 2001 a cross section of the botanicals industry and other interested parties was surveyed to ascertain current practices and attitudes relating to raw material sourcing as well as to gauge constraints to and opportunities for promoting more sustainable and ethical sourcing practices. Telephone and in-person interviews were conducted with 55 companies, 15 industry associations, and dozens of NGOs and research institutions on five continents. Of the 55 companies surveyed, 27 were from Europe, 17 from the United States, seven from South America, two from Africa,

and two from Asia. A diversity, both geographically and in the market chain, was represented but an emphasis was placed upon North American and European companies, based on the assumption that these markets pose the greatest opportunities for creating change in business and consumer practices.

Interviewed companies ran the spectrum from the very large (annual earnings in excess of $1 billion) to the extremely small (companies with fewer than five employees and annual sales of less than $1million); however the majority of companies were medium to large-sized. Thirty-five companies marketed products directly to consumers, with the others producing, brokering, or processing raw materials in some form. 27 companies were involved almost exclusively in the botanical or phytomedical sector, 12 exclusively in the personal care and cosmetic field, and another 16 combined these or other activities, including vitamins and functional foods. Interviewees were asked about basic company data (type of company, size), company procedures for researching and developing new products, where and how raw material is sourced, nature of relationship with sources, industry trends, and opinions toward standards, certification initiatives, and national and international regulations. A list of companies interviewed, as well as the interview form used, is available at www.rainforest-alliance.org/news/archives/news/news44.html

In addition, more than 100 sets of voluntary standards and regulations that apply, or could potentially apply, to the trade or sourcing of botanicals were collected and analysed (Pierce *et al*. 2002). The standards ranged from individual company guidelines to industry association standards, fair trade guidelines, organic and forest certification standards, socially responsible business codes, international accords, good manufacturing practices, good agricultural practices, good laboratory practices and various other quality control protocols. This collection of standards, while far from exhaustive, provided a basis for understanding the complex array of regulatory and voluntary norms that pertain to the botanicals industry.

The rise of standards

Nearly a century ago, yet-to-be elected U.S. President Woodrow Wilson delivered the following remarks to the Middle States Association of Colleges and Schools: "We are on the eve of a period when we are going to set up standards. We are on the eve of a period of synthesis when, tired of this dispersion and standardless analysis, we are going to put things together into something like a connected and thought-out scheme of endeavour" (Wilson 1907).

Wilson's pronouncement proved prescient not only for educational institutions but for the world of business, as the 20th Century witnessed the wide scale adoption and application of standards to improve industry safety, performance and efficiency. Governments were quick to adopt standards as a means to regulate industries and protect consumer safety in fields as diverse as food processing, manufacturing, and the provision of health care. Standards flourished in the private sector as well. The International Organisation for Standardisation (ISO), founded in 1947, exemplifies the ascendancy of standards in modern society. Composed of a membership of national standards setting bodies from 140 nations, ISO currently oversees the publication of more than 13,000 standards (ISO 2002).

Standards, which provide a quantitative or qualitative yardstick or reference benchmark, are commonplace across industries, and are used to set parameters for starting materials, production processes, finished products and services (Ervin and Elliott 1996, ISO 2002). The two principle aims of standards are to facilitate trade (for example, ISO sets standards for optimal thickness of credit cards, car bumper heights, and camera film speeds) and to ensure the quality (e.g., sanitation, efficacy, or the social, ecological and economic attributes) of a product or process. Standards can be either mandatory (e.g. government regulations) or voluntary. By themselves standards do not guarantee a particular performance threshold. Rather, the process through which they are developed, the technical rigor of the standards themselves, and the consistency and competency with which they are applied determine their value and impact.

Standards in the forestry sector have blossomed in the past decade, and the concept of certification as a tool to assure consumers that their wood purchases support ecologically sensitive forestry practices is now well established[1]. Recently forest management certification programs have attempted to address non-timber forest product (NTFP) harvest and certification organisations have audited several NTFPs including palm hearts, maple syrup and chicle (Mallet 2000). Development of NTFP standards and certification systems, however, has proven to be even more challenging to implement than timber certification (see Pierce 1999, Shanley *et al*. 2002). This is due to the vast number of products encompassed by the term 'NTFP', their unique harvest circumstances, varying uses and markets, lengthy and complex supply chain, and distinct end uses.

Standards are an important, though poorly understood, subject. Due to issues such as bovine spongiform encephalopathy (BSE) and other food safety issues (e.g. see Graff 2002, Wines 2002, the State of California's Proposition 65 Law [www.oehha.ca.gov/prop65.html]), consumer awareness of the importance of product traceability and standards for ingested or topically applied products is on the rise. Evidence from studies of fair trade (Nelson *et al.* 2002) and forest certification (SFWG 1998) operations shows that certification may increase prices or open niche markets as well as produce intangible benefits

[1] The University of Minnesota's Social Sciences in Forestry database [http://forestry.lib.umn.edu/bib/SSiF.phtml] lists over 350 certification-related journal articles, book chapters and conference proceedings.

such as improving morale, creating greater transparency in pricing, catalysing external investment and generating positive publicity. The central question remains, can standards improve product quality and the social and environmental practices of businesses in the botanicals sector?

Current sourcing practices in the botanicals industry

Companies are frequently unaware of how or from where their raw material is sourced. This includes ignorance of the geographic origins of raw materials, production systems (wild-harvest or cultivation), and the social and environmental impact of raw material sourcing (Laird and Pierce 2002). In part this is due to the common practice of sourcing raw material as a bulk commodity from a long line of intermediaries. The physical and cognitive distance between most botanical companies and their sources of raw materials creates and perpetuates socially and environmentally irresponsible practices. Many gatherers of medicinal plants are poorly paid for their labour, a common practice that does little to inspire resource conservation. King *et al.* (1999) report that harvesters receive between $0.30 and $0.65 per kilogram for raw cat's claw (*Uncaria tomentosa*) in Peru, yet the price of bulk, unprocessed cat's claw in the U.S. in 1999 fetched $11/kilogram. Gatherers of Devil's claw (*Harpagophytum* spp.) typically earn 50p–£1.20 per kilogram of raw harvested roots, while finished Devil's claw products retail for nearly £140/kg in Western Europe (Wynberg 2002, Lombard 2002).

Harvesting of many wild plants for the botanicals trade is often environmentally unsustainable. Fourteen plant species have been listed on the Convention on International Trade of Endangered Species of Wild Flora and Fauna (CITES) Appendices as a result of concerns expressed about their trade as medicinals, and 233 plant species currently listed have medicinal uses (Schippmann 2001, http://www.traffic.org/cop11/briefingroom/medicinalplants.html). Table 1 provides some examples of well known, and in cases threatened or endangered, NTFPs currently used in the botanicals sector.

Current status of standards is the botanicals industry

Numerous standards for botanicals have been developed over many years, with a great deal of thought and experience on the part of the groups involved. These can be grouped into the following categories:

- **Wildcrafter standards** that outline best harvest practices for gatherers;
- **Ecologically responsible forest management standards** (e.g. Forest Stewardship Council) that assess water and soil conservation, wildlife habitat, forest management planning, and harvest activities;
- **Fair trade certification programs** that assure equitable sharing of profits among producers, worker's rights and decent working conditions;
- **Organic standards** that insure pesticide-free agricultural production (and are occasionally applied to agro-forestry and forest operations);
- **Good agriculture practices (GAP)** guidelines that set standards for proper handling and sanitation of starting materials during harvest, storage, and transport;
- **Good manufacturing practices (GMP)** criteria that set guidelines for facilities, personnel and processing procedures (there are GMPs for pharmaceutical drugs and for food products, which in the U.S. includes products such as herbal "dietary supplements"); and
- **Quality control and methods validation programs** that assure the proper preparation of materials, including species authentication, absence of heavy metals and pesticide residue, and correct chemical composition for standardised products.

Table 2 provides an overview of the foci, strengths and weaknesses, and principle messages of existing botanicals standards. The aim of the study was to determine the general thrust of particular standards and perform a gap analysis of specific subject matters omitted or poorly addressed. It was assumed that all standards and guidelines – and the terms are used generically and interchangeably throughout the text – have the potential to influence practices, policies and regulations within the industry. For example, the European Agency for the Evaluation of Medicinal Products (EMEA, www.emea.eu.int) recently endorsed a set of GAP standards developed by the European Herbal Growers' Association (EUROPAM) and are likely to propose the standards as the basis for the development of an EU-wide GAP for medicinal and aromatic plants.

In addition to the programs mentioned in Table 2, there exists a range of standards for finished product certification, Good Laboratory Practices (GLP) and other quality issues. A host of labels guaranteeing the potency, freshness, quality or minimum active constituents of herbal medicines can currently be found on any pharmacy or health food store shelf. Other criteria for good business practices, such as CERES (Coalition for Environmentally Responsible Economies) and Natural Step, provide guidance on waste reduction, sustainable energy use and the development of other tools, policies and systems for companies to improve their social and environmental performance. Governmental regulations and international treaties such as CITES also set standards for sustainable and fair-trade in species.

Given the complexity and bewildering array of issues addressed by standards in this industry, it is not surprising that most existing standards and certification programs for botanicals are single-issue oriented. For example, they might address only fair trade, or quality control, or organic issues. An environmental principle of EUROPAM's Good Wildcrafting Practices draft document reads, "Harvesters involved in the production of herbs must ensure that they avoid damage to existing habitat", yet the document provides few specifics or criteria that spell out what actions constitute avoiding ecological damage (see

TABLE 1 *Examples of NTFPs used in the botanicals sector*

Common name	Scientific name	Origin	Habit	Cultivated/wild harvested	Plant part used (Use)	Conservation status	Trade data
Cat's claw	*Uncaria guinansis, U. tomentosa*	Central and South America (most trade from S.A., part. Peru)	Vine	Wild harvested with some cultivation trials underway	Root and stalk bark, occ. leaves and stems too (Medicinal)	"Vulnerable" in some parts of its natural range (Alexiades 2002a)	700 tons exported from Peru in 1995 (Alexiades 2002a); $963.1 in sales in the US in 2000 (Sauer 2001)
Ginseng	*Panax ginseng, P. quinquefolius*	Asia and North America respectively	Herb	Wild-harvested and cultivated	Root (Medicinal)	CITES Appendix II; UPS "at risk" list	60 tons of wild roots exported from the US in 1995 (Robbins 1997)
Goldenseal	*Hydrastis canandensis*	North America	Herb	Wild-harvested with recent efforts at mass cultivation	Root (Medicinal)	UPS "at risk" list	Est. 125 tons harvested each year (Foster 2002)
Muira puama	*Ptychopetalum olacoides*	South America	Shrub	Wild-harvested	Bark and roots (Medicinal)	Unknown (but of concern – see Shanley and van der Pahlen 2002)	Unknown
Pau d'arco	*Tabebuia* spp.	Central and South America	Tree	Wild-harvested with efforts underway to attempt cultivation	Bark (Medicinal)	Unknown but of concern (van der Pahlen 2002)	Unknown
Pygeum	*Prunus africana*	East, Central and West Africa, Madagascar	Tree	Majority wild harvested with some efforts to cultivate coming on line	Bark (Medicinal)	CITES Appendix II	Annual market value $150 million; annual harvest 3,500 MT (Cunningham *et al.* 1997)
Cascara sagrada	*Rhamnus purshiana*	North America	Tree	Wild-harvested with some cultivation	Bark (Medicinal)	UPS "to watch" list	Unknown
Rosewood	*Aniba* spp.	South America	Tree	Wild-harvested	Wood (essential oil)	Of concern (see Coppen 1995)	92.3 MT exported from Brazil, 1985 worth $938,000 (FAO 2002)
Sandalwood	*Santalum* spp.	South Asia	Tree	Wild-harvested and some cultivation (rare through over-exploitation in wild)	Wood (essential oil)	Of concern	65 tonnes exported from India in 1990/91 (Coppen 1995)
Sangre de drago	*Croton lechlerii*	South America	Tree	Wild-harvested and cultivated	Latex (medicinal)	Potentially under pressure (Alexiades 2002b)	26 tons of latex exported to US in 1998 (Alexiades 2002b)
Yohimbe	*Pausinystalia johimbe*	West-Central Africa	Tree	Wild-harvested	Bark (medicinal)	Secure – but perhaps not as "common" as described (see Sunderland *et al.* 2002).	120 tonnes exported to Europe, 1996 (Simons 1997); $2.14 million in US sales, 2000 (Sauer, 2001)
Black cohosh	*Actaea racemosa* (form. *Cimicifuga racemosa*)	North America	Herb	Wild-harvested with some cultivation efforts underway	Root (medicinal)	UPS "at risk" list	550 tons harvested 1997–1999 (Lyke 2001); $6.15 million in US sales, 2000 (Sauer 2001)

(UPS=United Plant Savers, CITES=Convention on International Trade in Endangered Species of Flora and Fauna)

TABLE 2 *Attributes of various standards and certification programs for botanicals*

Program Attribute	Wildcrafter Standards	Organic Certification	FairTrade Certification	Ecological Certification	Good Agricultural Practices	Good Manufacturing Practices	Methods Validation Programs
Emphasis	Guidelines for harvesters	Pesticide-free standards; organic processing guidance	Assures fair wages and good working conditions	Forest ecosystem assessments	Proper sanitation and handling of herbs	Standards for appropriate facilities and trained personnel	Standards for proper preparation of botanical remedies
Weakness	Difficult to implement; relies on harvesters to be organised or accept organisation	Weak forestry and ecosystem standards	Mainly focused on high volume/ high value agricultural commodities	No attention to processing or manufacturing stages of production	Little to no ecological or social criteria for sourcing of herbs	No attention to sourcing issues	Overlooks sourcing issues; variable standards and applications
Main Message	Trained or certified ecologically-sensitive harvesters	Pesticide-free herbs	Equitable trade with producers, fair labour conditions	Sustainable forestry and harvesting, healthy forest ecosystems	Contaminant-free starter materials	Clean and safe manufacturing	Botanical medicines produced by standardised methods
Oversight	Voluntary or mandatory guidance	Independent certification to 3rd-party accredit, standards or government standards	Independent verification by 3rd-party certifiers	Independent verification through third-parties	2nd- or 3rd-party oversight	2nd- or 3rd-party oversight – usually a government regulation	1st- or 3rd-party companies and laboratories
Agents	Private companies, associations and NGOs (e.g. Trinity Alps Botanicals[1], United Plant Savers[2])	Private companies, NGOs (e.g. Skal[3], Soil Association[4], Organic Crop Improvement Association[5])	FairTrade auditing bodies (e.g. TransFair[6], Max Havelaar[7], Fairtrade Foundation[8])	Certification bodies (e.g. SGS Qualifor[9], Rainforest Alliance[10], Scientific Certification Systems[11])	Governments or trade association (e.g. American Herbal Products Association[12])	Governments, and in the US (in absence of national dietary supplement GMP), trade associations (e.g. NSF International[13], National Nutritional Foods Association[14])	Internal company programs, independent laboratories (see Institute for Nutraceutical Advancement[15], or Shuster Labs[16], for examples)

1= www. Trinityalpsbotanicals.com; 2 = www.plantsavers.org; 3 = www.skal.com; 4 = www.soilassociation.org; 5 = www.ocia.org; 6 = www.transfair.ca; 7 = www.maxhavelaar.be; 8 = www.fairtrade.org.uk; 9 = www.qualifor.com; 10 = www.ra.org; 11 = www.scs1.com; 12 = www.ahpa.org; 13 = www.nsf.org; 14 = www.nnfa.org; 15 = www.inanetwork.com; 16 = www.shusterlabs.com

www.europam.net). The forest management principles and criteria of the Forest Stewardship Council (FSC), by contrast, provide detailed criteria covering issues of management planning, environmental impact, protection of wildlife, erosion control, post-harvest monitoring and a host of other specific environmental provisions (www.fscoax.org). On the other hand, standards put forth by EUROPAM and organic certification organisations are far superior to FSC guidelines in the area of post-harvest handling of products, sanitation requirements and processing criteria. Fair trade criteria provide some of the most comprehensive guidance on issues of fair compensation and proper working conditions for labourers, but we, like Nelson *et al.* (2002), found ethical trade standards to have lax environmental standards. The unfortunate result of standards proliferation in the botanicals industry is that there now exists a host of programs that cover only discreet segments of the sector's full production chain.

Figure 1 illustrates the fragmented approach to standards setting in the botanicals industry. The figure is necessarily simplistic and implies the primary focus of each program rather than its overall scope. For example, while

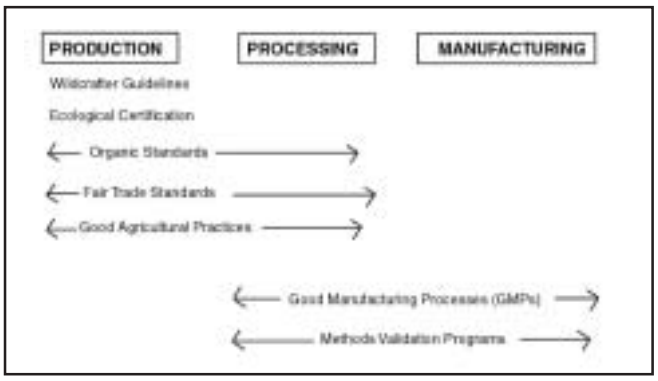

FIGURE 1 Major *focus of standards along the botanical supply chain*

FSC criteria may focus almost exclusively on the environmental, and to some extent, social, aspects of forest product *harvest*, they also contain a chain of custody criteria that necessitate product tracking through manufacturing processes to point of sale. Organic criteria, on the other hand, focus on *production* and *processing* stages for agricultural, agro-forestry and in some cases, forest products, as well as tracing products to ultimate point of sale. On the other hand, GAPs, GMPs and methods validation programs attempt to assure the *safety* and *efficacy* of botanical products, issues that organic, fair trade and forest certification programs are reluctant and ill-prepared to tackle due to a lack of expertise. Most programs provide a label that may be displayed on products or at the final point of sale.

DISCUSSION

Who should set the standards?

Many within the botanicals industry are increasingly questioning who are the appropriate bodies to coordinate standards development and how such groups will obtain widespread support for standards. As one company representative stated, "As more certifiers come into the game, it gets more confusing for the consumer. It begs the question: What standards are 'the standards?"

Can companies be trusted to police themselves through first-party developed standards, and will the public trust a company's own first-party labelling claims? Labels on Herb Pharm (www.herbpharm.com) products claim that the *yohimbe (*Corynanthe yohimbe*) in their yohimbe liquid extract is "custom wildcrafted" (a claim that they have trademarked, but which is unsubstantiated by external parties). Other companies, while not engaging in actual product labelling, include descriptions on products that tout environmental performance. Solgar (www.solgar.com) labels claim that: "Solgar's Cat's Claw is harvested in an ecologically sound manner so that the bark may grow back and replenish itself without the destruction of the plant." While many companies with these types of labels include them as part of larger programs to address sustainability, other companies are less scrupulous. Robbins (2002) reports that more than 100 companies are selling herbs labelled as responsibly harvested in the marketplace, none of which are independently substantiated.*

First party claims are notoriously unreliable. A WWF UK and Flora and Fauna International survey of sustainability claims used in the wood products industry found that less than 3% of companies making environmental claims could in any way substantiate their allegations (Read 1991). The problem with unauthenticated first party claims is that well-intentioned companies can be undercut by competitors who use specious claims. The President of Raintree Nutrition, a U.S. manufacturer of herbal supplements, expressed the following reservations about first party claims: "For every one company doing sustainable harvesting out in the rainforest, there are eight others out there saying they are doing it right, but are not."

Development of standards by second parties, namely trade associations, was considered a good idea by company respondents. Trade associations have been working on a number of guidelines for the botanicals industry, mostly dealing with issues of improving quality – for example, the recent publication of GAP documents by the American Herbal Products Association (AHPA) and EUROPAM. The Farm Manager at Trout Lake Farm, a producer of raw herbs in the U.S., believed that trade groups can play a key role, "Developing industry standards is a positive step, but should be coordinated by AHPA or another body. Otherwise, each company will have its own approach, and the same fractionalisation that we already have will continue." However, trade associations were also criticised as being too conservative to implement radical change on the environmental front. One company researcher said, "In general, societies and professional associations are nervous about sustainability issues. They might be interested in principle, but anything that sounds like increased regulations make people shy away, and they are unlikely to follow through."

Independent, third-party standards-setting entities such as governments, NGOs and private certification companies tend to be more favourably viewed by consumers, and many companies are supportive of their approach in theory. However, a number of company representatives reported bad experiences with certification organisations, ranging from corruption to incompetence, and these comments applied to both small and large certifiers. One company representative claimed that, "When we go through organic certification every year, I end up teaching the certifier, because he doesn't teach me anything new." Another suggested that the potential for adulteration was significant, "If you do certification, you need a system to seal containers, because anything certified will have a higher value. You'll be amazed at how 100 kilos of something that got certified can turn into 1,000 kilos. Inventories have a way of stretching themselves in this marketplace."

Who should oversee standards?

Companies expressing the greatest support for the use of standards to improve industry practices and accountability often cited the usefulness of guidelines in "creating a level playing field" with known rules. Many companies saw a need for stronger monitoring of claims in marketplace or other mechanisms that would make it possible to invest in sustainable and ethical sourcing without having to face competition from companies who had not made similar investments but nonetheless were reaping gains from bogus claims. As the Director of Research at Tom's of Maine said: "It is difficult to let consumers know that our end products are more expensive because the company is trying to do the right thing in growing the raw material. There are so many false claims around for organic material. Some kind of intermediary system is badly needed."

What is to be included in the standards?

The issue of *what* is to be standardised, and perhaps certified as complying with a particular standard, poses a significant question. Many medicinal plant species are difficult to distinguish in the field and need to be properly authenticated by botanical experts at, or shortly after, harvest. The most sophisticated species authentication services link botanical voucher specimens with a tracking system that follows plant material through the chain of custody, and for processed material use organoleptic/ sensory evaluation, microscopic evaluation and chemical evaluation (Betz 2001). Industry groups have taken this issue on board, and AHPA's Botanical Raw Materials Committee will issue a Botanical Adulteration Manual to guide members, as well as incorporate this issue into its Code of Ethics (Betz 2001). The Royal Botanic Gardens, Kew recently established an Authentication Centre of Chinese Medicinal Plants with the Institute of Medicinal Plant Development in Beijing to provide authentication and quality assurance services for herbs used in Traditional Chinese Medicine. Likewise, some private companies also provide authentication services to buyers who seek properly identified plant material.

With respect to the harvest activity, are the gatherers (in the case of many wild species) or the property itself where the species occurs, to be certified, or both? Is the management plan or harvest strategy for the single species only to be considered, or should standards apply to the structure, function and processes of the entire management forest unit (see Shanley *et al*. 2002)? Is the manufacturing facility and manufacturing process to be evaluated or the final herbal product itself, or both? Clearly, botanical products raise a number of questions and a herbal remedy may conceivably need to comply with a battery of standards and certification evaluations prior to its final sale. The better these different standards and evaluations are streamlined and potentially integrated, the cheaper and more effective the evaluations will be, resulting in a clearer, more holistic message for the consumer.

How will standards be harmonised?

Collaboration and harmonisation of standards between competing standards-setting groups and certifiers is extremely limited. Even when groups copy wholesale sections of standards from competitors, a practice that our analysis of standards documents demonstrates to be commonplace, there is no mechanism to ensure that similarly worded standards will be consistently interpreted or applied in the field. Furthermore, there is little collaboration between accreditation systems – those bodies that "certify the certifiers". The International Federation of Organic Agriculture Movements (IFOAM) and the FSC, for example, have very loose guidance documents for NTFPs and have allowed accredited certification companies within their folds a relatively free rein to create their own standards on a case-by-case basis. This is due, in part, to a lack of expertise within the accrediting bodies, as well as a tepid commitment to this category of products. However, the lack of an overarching structure for NTFPs within IFOAM and FSC has resulted in the creation of widely varying standards and inconsistent field applications.

Are standards worth the expense?

A survey of American consumers by TRAFFIC North America in August 2001 found that a majority of herbal supplement users would purchase products with sustainably sourced ingredients when given the choice (Robbins 2002). Companies are aware that there is a valuable market niche for green-labelled products, but are unsure of how much to invest in sustainable sourcing. As the Director of Botanical Purchasing at Celestial Seasonings reported, "We had our experience with organic chamomile tea. Our test groups said consumers would buy it, but when they saw the certified organic chamomile for $5 next to non-organic for $2, they bought the non-organic. So what they say in consumer testing is not always borne out."

By contrast, the President of Consumer Labs, believes that investing standards is a prudent business practice, "Our seal has even more marketing power than $3,000 spent on a radio spot. It's another expense, but it's one of the most important things a company could be doing." (NBJ 2001). If standards-setting groups are to gain industry support, they must convince companies that their services are worthwhile investments. Negative comments about a lack of standards oversight, scepticism over willingness-to-pay studies, and displeasure with the incompetence of certification agencies all point to the need for greater rigor and probity among standards-setters.

Small growers and gatherers will potentially face great cost burdens in meeting sanitation and sustainability guidelines. These groups traditionally receive a miniscule share of the retail sale of a product, and can ill afford additional production expenses. Certification programs in the coffee and forest product trade sectors have been cited as being too costly, complex and unappealing for small producers to consider (see Rice and Ward 1996, Aguilar 2000, Rickenbach 2002, Shanley *et al*. 2002). The expense and difficulty in tracing raw materials, a requisite of sustainability and sanitation standards alike, is considered to be a daunting challenge by some industry insiders because many botanicals are gathered over large areas in remote communities and pass through a number of intermediaries on their way to market. Unfortunately, the complexity of existing standards and regulations is increasingly viewed as a hurdle to sustainability and quality assurance rather than a facilitator.

The dangers of standards fragmentation

Many in the industry are confused by the number of competing standards and dismayed by the lack of measures to enforce accountability. As the Technical Director of Botanicals International/Hauser said: "Recently everybody

and their brother have been setting up certification programs. Everyone has a spin on certification and I think it is confusing with multiple certification agencies. What good is certification if no one knows what it means? If you look at a Good Housekeeping Seal or an Underwriter's Laboratories Seal, they have spent millions of dollars and multiple years to have people understand it. I look at bottles all the time, and there are all kinds of seals, and it is creating more confusion for consumers than clarification. In general the idea is good, it is just being done very poorly."

The botanicals industry is currently more concerned with safety and quality issues than sustainability and ethical sourcing of starting materials. Industry led standards-setting initiatives focus primarily on proper species identification, sanitation, and methods validation guidance. However, standards-setting groups that address sustainable and equitable sourcing have little experience with safety and efficacy standards. There is little to no communication between groups focusing on issues of quality control and groups that create ecological and social justice standards. Hence there is a disparity between issues that industry sees as vital and topics that environmental NGOs view as paramount, and no current set of standards satisfies either constituency.

Opportunities for better integration of standards

To date there have been few attempts to harmonise standards between competing initiatives or jointly implement standards in the field. Joint assessments have great potential, as they can lead to: a) sharing of lessons, assessment methodologies and knowledge in the field; b) potential cost savings for clients who would otherwise have to pay for multiple separate assessments, and; c) the eventuality of mutual recognition between programs or the development of more formalised joint assessment programs. Case studies that follow botanicals from forest to retail shelf can supplement knowledge from joint field assessments and provide concrete examples of gaps and weaknesses in current standards, highlight exemplary standards, and identify where competing standards and initiatives may be harmonised or implemented in complementary fashion.

Greater efforts toward creating mutual recognition programs may result in cost savings, clearer public messages and a streamlining of standards and applications. Recently the International Social and Environmental Accreditation and Labelling Alliance (www.isealalliance.org), which includes representatives from the organic, forest certification and fair trade movements, began work to foster harmonisation and cooperation between accreditation organisations as well as to implement pilot projects involving multiple organisations. In the USA, NSF International and the National Nutritional Foods Association (NNFA), two botanicals industry trade associations, recently announced a joint-recognition policy that facilitates enrolment in NSF's Dietary Supplement Certification Program by companies who have already obtained GMP certification under the NNFA (see www.nnfa.org and www.nsf.org for more details). Unfortunately, these harmonisation efforts are still interest-group specific and have not included a strategy to link business interests with sustainability interests.

Perhaps one of the best ways to move the botanicals industry toward greater acceptance of more holistic standards for sourcing is through the promotion of internal company policies, and industry association policies. Weleda AG, for example, has a policy of sourcing species that are either cultivated in their native habitat, grown organically, or wild-harvested in accordance with EU regulation 2092/91 (see Straub 2000). Only 24 of the 55 companies that we interviewed reported having any kind of written environmental or social policy. When pressed, only 14 companies claimed to have developed internal polices (and these rarely incorporated sourcing issues), while the remaining 10 considered that adherence to external principles or standards (e.g. CERES, UPS, ISO 14001, GAP, FSC, etc.) served as the company environmental or social policy. The development of internal policies helps companies to spell out specific commitments to employees and the public, improve communications and provide a yardstick for measuring performance.

CONCLUSIONS

Neither industry groups nor NGOs have adequately educated consumers about pressing issues in the botanicals industry, such as quality assurance, safety, efficacy, and sustainable and equitable sourcing, or the importance of standards as a tool to address these issues. The number of labels on botanical products is large and growing daily. Development and implementation of standards in the botanicals sector is fragmented and far from a Wilsonian ideal of a "connected and thought-out scheme or endeavour." If consumers are not better informed about standards, standards-setting groups, and how to distinguish between reputable and bogus claims, little will be gained from the current flurry of standards-setting initiatives. On the contrary, much may be lost if the proliferation of standards and claims results in consumer confusion and cynicism.

It is highly unlikely that a single comprehensive standard can be created to address all of the ecological, social and product quality issues at the production, processing and manufacturing phases of trade, except perhaps as a theoretical exercise. Instead, nascent efforts to harmonise standards and field implementations among similarly oriented organisations (e.g. organic, ecological and fair trade certification) should be encouraged with the hope that mutual cooperation, and potentially, mutual recognition, will prevail. Standards-setting groups need to carve out discreet niches in which they are competent and not attempt to address areas or subject matters outside of their ken. Standards groups also need to be vigilant in policing their ranks and assuring the legitimacy of product claims. The

greatest challenge in creating holistic standards for environmentally and socially sound botanicals lies in combining industry backed quality standards with NGO backed sustainability standards. Industry and NGOs need to open lines of communication, candidly share their views of raw material sourcing and discover ways to wed their respectively supported standards. If standards for botanicals fail to link the critical issues of sustainability and quality, there will be many losers, key among them businesses, consumers, local communities and the source plants themselves.

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