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Behaviour change for demand reduction in the wildlife trade

Laura Thomas-Walters

Durrell Institute of Conservation and Ecology

School of Anthropology and Conservation

University of Kent | Canterbury | Kent

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If you are neutral in situations of injustice, you have chosen the side of the oppressor. If an elephant has his foot on the tail of a mouse and you say that you are neutral, the mouse will not appreciate your neutrality.

— Desmond Tutu

“Poirot," I said. "I have been thinking."

"An admirable exercise my friend. Continue it.”

— Agatha Christie

We step out of our solar system into the universe seeking only peace and friendship – to teach, if we are called upon; to be taught, if we are fortunate. We know full well that our planet and all its inhabitants are but a small part of this immense universe that surrounds us, and it is with humility and hope that we take this step.

– Former UN Secretary General Kurt Waldheim, 1977

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Abstract

Demand for wildlife products is a key driver of the exploitation of wild populations of flora and fauna. Accordingly, there is an increasing focus on demand-side interventions, with the aim of reducing the market value of illegal wildlife products by influencing consumers to voluntarily change their purchasing behaviour. In this thesis I draw upon literature from different disciplines and both quantitative and qualitative data to take a broader view of behaviour change for demand reduction in the wildlife trade. I show that behaviour change is difficult to achieve, and interventions may have unintended and undesirable consequences because of unaddressed systemic, cultural and environmental drivers, and limited resourcing. To facilitate more nuanced approaches to demand reduction, such as the tailoring of interventions to the specific context in which they will be used, I develop a theoretical typology of the motivations for wildlife use and consumption. I identify five main motivational categories for wildlife use: experiential, social, functional, financial, and spiritual, each containing sub-categories.

Robust impact evaluations are needed for conservation to learn and grow as a field, but conceptually linking project outcomes with conservation impacts remains difficult in complex systems. I assess both human behaviour and biological conservation outcomes following a social marketing campaign aimed at reducing the consumption of sea turtle meat and eggs on the island of São Tomé. I highlight the difficulties in conducting impact evaluations in the field, and discuss ways to address these challenges. Further, I examine the decline in demand for ivory products in to demonstrate the importance of understanding the cultural context in which interventions take place and show how theory-based impact evaluation methodologies can help establish causal attribution in cases where we lack baseline data. My thesis underlines the importance of formative market research to understand consumer motivations and develop effective messaging techniques, and the ability of alternative evaluation methods to reveal the mechanisms by which we can effect change.

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Chapter 1: Introduction

1.1 Biodiversity crisis

Healthy ecosystems provide us with a range of important goods and services. Individual species may be responsible for specific ecosystem functions, but biological diversity, both within and between species, is vital for the multifunctionality of ecosystems (Fanin et al., 2018). Loss of biodiversity reduces the efficiency by which ecological communities are able to capture and use biologically essential resources (Cardinale et al., 2012). For example, loss of soil biodiversity reduces nitrogen cycling in leaf litter, affecting ecosystem services such as timber production (Bardgett & van der Putten, 2014). The negative impacts of biodiversity loss are consistent across different ecosystems (Fanin et al., 2018). Biodiversity is an essential component for the continued stability of ecosystems and increases resilience to sudden shifts in environmental conditions (Isbell et al., 2015). Worryingly, species extinction rates have risen far beyond the background rate, leading some to suggest that we are in the midst of a sixth mass extinction (Barnosky et al., 2011; Ceballos et al., 2017; Johnson et al., 2017).

The loss of biodiversity in ecosystems can have knock-on effects on their stability, productivity, and efficiency (Cardinale et al., 2012; Rosen & Smith, 2010). The removal of hunted vertebrates may negatively impact ecosystem functioning through trophic cascades, indirect effects between nonadjacent trophic levels such as carnivores and plants (Schmitz et al., 2010). For instance, the extirpation of a top predator such a wolf may cause demographic explosions in a prey species such as deer. Overbrowsing by deer can then severely reduce plant biomass and lead to significant changes in plant community composition (Teichman et al., 2013). Further, evidence is emerging that defaunation may even affect ecosystem services such as carbon storage and sequestration, potentially contributing to climate change (Bello et

al., 2015; Osuri et al., 2016). For example, the removal of frugivores and other seed dispersers can result in a decreased dispersal of large-seeded seed species (Kurten et al., 2015). This can alter vegetation composition of forests by decreasing the diversity and proportion of large-seeded plant species, including dense and large trees which are linked to greater capacity for carbon storage and sequestration (Osuri et al., 2016).

This exceptionally rapid loss of biodiversity prompted the establishment of a multilateral treaty in 1992, the Convention on Biological Diversity (Ceballos et al., 2017). Parties to the convention adopt a series of targets to halt biodiversity loss. Unfortunately, most of the Aichi 2020 biodiversity targets will not be fully met, and progress towards alleviating the pressures on biodiversity has been poor (Díaz et al., 2019). These pressures include a range of anthropogenic causes, including but not limited to climate change, habitat loss and fragmentation, overexploitation, the spread of invasive species, and pollution (Bonebrake et al., 2019; Mazor et al., 2018). The post-2020 strategic plan for the Convention on Biological Diversity will require substantial commitment from all members of the international community if we are to reverse biodiversity declines (Mace et al., 2018; Purvis, 2020).

1.2 Wildlife trade

Wild species have a long history of being traded and used by humans, but there is increasing conservation concern about over-exploitation of vulnerable animals and plants to supply commercial trade (Hughes, 2003; ’t Sas-Rolfes et al., 2019). There are already multiple species extinctions on the IUCN Red List of Threatened Species that have been attributed to the wildlife trade, including the great auk (*Pinguinus impennis*), pinta giant tortoise (*Chelonoidis abingdonii*), and Caribbean monk seal (*Neomonachus tropicalis*) (BirdLife International, 2016; Cayot et al., 2016; Lowry, 2015). Regardless of legality, trade can contribute to the spread of invasive species and there is increasing concern over the possibility

of emerging zoonotic diseases (Broad, 2020; Wolfe et al., 2005). Thus, curtailing unsustainable trade has been recognised as a global conservation priority (CITES Secretariat, 2019; Rosen & Smith, 2010).

Various forms of regional, national, and international environmental regulation have been established to control overharvesting of wild species, although unsustainable trade is not always illicit (Phelps et al., 2016). One of the oldest and influential international regulatory frameworks governing the wildlife trade is the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which entered into force in 1975 (Warchol, 2007). Based on an assessment of extinction risk, wild species may be subject to trade bans or controls to ensure that international trade does not threaten their survival. Other considerations such as community livelihoods also play a role in determining CITES species listings (Cooney & Abensperg-Traun, 2013). Member countries (Parties) implement the convention at the national level through a system of export/import permits and domestic legislation. There is some evidence that trade measures have been effective in reducing trade in select species, for example the giant otter (*Pteronura brasiliensis*), populations of which were able to recover once prohibition of international trade in otter skins was prohibited by CITES, but it is difficult to isolate the impact of CITES from other factors which may affect levels of international trade. (IUCN, 2001; Recharte Uscamaita & Bodmer, 2010). Limited resources and enforcement capacity may hinder implementation (Challender et al., 2015; IUCN, 2001).

1.3 Drivers and enablers of wildlife trade

Trade in wildlife products may be driven by supply- and/or demand-side dynamics (McNamara et al., 2016). There are a range of actors operating along the trade chain, each governed by different forces. Illegal extraction of wild species is frequently perpetrated by local residents

(Barrett et al., 2011; Biggs et al., 2016). Selling to middlemen may be a primary or secondary source of income, or just an occasional opportunity provided by unintended bycatch from legal harvesting (Becker et al., 2013; Pires & Moreto, 2011). Profitable species may come from any branch of the biological tree, including timber, fish, and mammals large or small (Phelps et al., 2016; Scheffers et al., 2019).

Poverty is often cited as the main driver of illegal extraction, but it is only one facet (Duffy et al., 2016; Lunstrum & Givá, 2020). Economic gain may influence both the poor and the wealthy, and motivations can also include reactance to exclusionary conservation, desire for excitement, or pressure from other community members (Lunstrum & Givá, 2020). Subsistence harvesting, which is for household use and generally small-scale, may be a routine occupation or used as a substitute when food prices rise (Parry et al., 2014; Phelps et al., 2016). In contrast, commercial hunting can involve organised groups using more advanced technologies to target economically valuable species (Duffy et al., 2016).

The complexity of commodity chains varies and there can be a range of intermediary roles in the trade, from processors to transporters to retailers (’t Sas-Rolfes et al., 2019). Although we lack reliable estimates for the value of illegal wildlife trade globally it can be very lucrative for those involved (’t Sas-Rolfes et al., 2019; Wilson-Wilde, 2010). It can be difficult to effectively block transnational trade routes, particularly in large countries with porous or inadequately controlled borders (Wilson-Wilde, 2010). Poor governance and corruption often facilitate illegal trade, and the internet has become a major marketplace for wildlife products (Phelps et al., 2016; Smith et al., 2015; Sung & Fong, 2018). Indeed, inadequate enforcement means that most of this online trade is done openly, rather than protected by multiple layers of security though the dark web like many other illegal activities (Harrison et al., 2016; Roberts & Hernandez-Castro, 2017).

1.4 Consumer demand

Economic theory posits that in demand-driven markets, consumer preferences will dictate the quantity and price of wildlife products available (McNamara et al., 2016; ’t Sas-Rolfes et al., 2019). Although for some products the trade is supply-driven, there has been a surge in East Asian consumer demand for certain high-value species and markets are opening for new products (Esmail et al., 2020; ’t Sas-Rolfes et al., 2019). As prices for wildlife products rise and economic inequality between major supply and demand areas grows, the financial incentive to poach increases (Challender & MacMillan, 2014). Regulatory approaches may be insufficient to address trade drivers, instead a multifaceted approach is required that includes community engagement, law enforcement, and demand reduction (Challender et al., 2014; Pires & Moreto, 2011). Accordingly, consumers of wildlife products are receiving increasing attention from conservationists and policymakers (Challender & MacMillan, 2014).

The intention behind demand reduction interventions is to relieve poaching pressure on wildlife species by reducing demand for their products amongst consumers, but attributing conservation impacts to specific interventions is a difficult task (Burivalova et al., 2017; Challender et al., 2015). Currently we lack a robust evidence base linking a reduction in consumer demand to decreased harvest pressure on wild populations, and more research is needed to understand drivers of demand and the impact of our interventions (Booker, 2019; Veríssimo & Wan, 2018). Controlling consumer behaviour through regulatory measures has had some success, but we can also achieve change through non-coercive means (IUCN, 2001; Smith et al., 2020). This has many advantages, protecting individual freedoms while lessening reliance on political will. It may also allow for more selective targeting of audience segments, and potentially require fewer resources (Wright et al., 2015).

Voluntary behaviour change may be achieved through a range of approaches such as awareness-raising campaigns, environmental education and social marketing interventions (Greenfield & Veríssimo, 2018; Hungerford & Volk, 1990). Several new projects have pioneered this approach over the past few years, utilising interventions such as community engagement and economic incentives to reduce wild meat consumption in Brazil or promoting the use of artificial hornbill for traditional headgear in India (Chaves et al., 2017; Offord-Woolley, 2016; Kumar & Riba, 2015). Within the conservation community there has been much discussion around knowledge sharing across sectors to achieve change (e.g., TRAFFIC, 2016) and while evaluation may be limited, these new studies do provide a number of insights.

1.5 Research from the social sciences

Although traditionally grounded in biology, conservation as a discipline is increasingly embracing the social sciences (Bennett et al., 2017; Moon et al., 2019; Reddy et al., 2017) This has come with the recognition that most global environmental problems are due to the choices people make, from the illegal wildlife trade to climate change (Amel et al., 2017; Green et al., 2019). Conservationists are now attempting to understand the cognitive, social, and motivational processes that influence behaviour to provide insights into appropriate approaches for effective behaviour change (Reddy et al., 2017; Schultz, 2014). Here I review just some of the research and theories that may be applicable to demand reduction.

1.5.1 Theoretical perspectives on behaviour

A variety of behavioural models have been developed to enhance our understanding of the behaviour change process. Some are specific to a particular context, such as the ‘health belief model’, and others are meant to be applied more generally, like the ‘theory of planned behaviour’ (Ajzen, 1985; Janz & Becker, 1984; Perugini & Bagozzi, 2001). Interventions that

use behaviour change models to inform their design stage have been shown to be more effective as they encourage practitioners to explicitly consider both the underlying drivers of a behaviour, and the internal and external barriers that influence consumer behaviour (Atkin & Rice, 2012; Michie & Prestwich, 2010).

Different theoretical perspectives on behaviour may be more appropriate depending on the particular context and target audience, and models may focus on behaviour at the community level, the interpersonal level, or the individual level (Darnton, 2008). For example, the 'diffusion of innovations theory' describes how innovations, such as the adoption of new behaviours, spread through a social network and go to scale, individualised social psychology models can inform the design of interventions to encourage curbside recycling, while sociological theories of consumption may be more useful for explaining why this level of disposable waste was generated in the first place (Rogers, 1995; Wilson & Chatterton, 2011). In this thesis my focus is more often individual behaviour change, but this does not diminish the importance of interpersonal and community change (Chatterton, 2017).

Early rational choice models based on standard economic theory often relied on the assumption that individuals make reasoned choices, and weigh up the benefits and costs of a potential choice (Tversky & Kahneman, 1986). As such, a widespread tactic in conservation has been the use of mass media awareness-raising campaigns, with the assumption that target audiences merely lack appropriate knowledge (Olmedo et al., 2018; Simis et al., 2016). Unfortunately, this is an overly simplistic view. Knowledge is only one determinant of behaviour amongst many (Avis, 2016). Some other common determinants that feature in popular models include norms, affect, habits, contextual factors, and self-efficacy.

Humans are social animals, strongly influenced by the behaviour of our peers (St John et al., 2010). As such, social norms feature in many models of behaviour, including the 'norm activation theory' (Schwartz, 1977). They are generally subdivided into descriptive norms (what we think other people do) and injunctive norms (what we think we ought to do) (Cialdini et al., 1990). Also important is affect, emotional responses which may not always be congruent with attitudes (Fitzmaurice, 2005; Loewenstein et al., 2001). For example, people may fear things they logically know are not a threat. Habits are behaviours which have become automatic rather than consciously deliberated, as routinised behaviour is detached from the original motivating factors (Klöckner & Matthies, 2004). They may feature in dual process models such as the 'theory of interpersonal behaviour' (Triandis, 1997). There are also external or contextual factors which influence behaviours through the enabling environment (Triandis, 1997). Behaviours such as bicycling to work instead of driving may require facilitating conditions such as cycle lanes (Mckenzie-Mohr, 2000). Somewhat relatedly, self-efficacy or perceived behavioural control determines whether we feel capable of performing a given behaviour (Bandura, 1997).

Given the wide range of models that have been developed based on these potential determinants of behaviour it would be impossible to discuss them all in depth in this chapter, but I briefly cover some of the more notable ones here. This includes the theory of reasoned action and the theory of planned behaviour, two of the most widely used models (Sniehotta et al., 2014). They take a cognitive approach to explaining behaviour, and are forms of expectancy value models in which attitudes and behaviours are still essentially the product of linear deliberation about the beliefs and values attached to a behaviour or object (Darnton, 2008). They are more suited to explaining and predicting behaviour than identifying levers of change.

The theory of reasoned action posits that beliefs about behavioural outcomes influence an actors' attitudes to a behaviour (Fishbein & Ajzen, 1975). In combination with social norms, this determines intentions to perform a behaviour, and these intentions directly lead to that behaviour. However, later research identified a substantial gap between what people intend to do, and what they actually do (Sheeran, 2002). In part, this is because behaviour is not always within our complete control, and as such this model was extended into the theory of planned behaviour with the inclusion of additional factors, namely perceived and actual behavioural control (Sheeran et al., 2003). It has been applied in a wide variety of behavioural domains, and empirical tests show it performs with better predictive ability than the theory of reasoned action (Rivis & Sheeran, 2003).

The theory of planned behaviour still neglects the role of potentially important variables such as impulsivity, habit, self-control, associative learning, and emotional processing in determining our behaviour (Michie, Stralen and West 2011). The 'model of goal-directed behaviour' attempts to go some way to rectifying this, as a more recent composite view of the wealth of research that has been undertaken into decision making (**Error! Reference source not found.**) (Perugini & Bagozzi, 2001; Prasad & Jha, 2014). It recognises that past behaviour (both frequency and recency) and emotions (both positive and negative) also affect the choices we make, and need to be considered when designing interventions to change behaviour. Still, increased predictive ability and complexity come at the cost of requiring more sophisticated data gathering techniques, and models may sacrifice comprehensiveness for flexibility (Leone et al., 2004). Some models, such as the 'COM-B (capability, opportunity, motivation and behaviour) model' which I cover in more detail in chapter 3, are more parsimonious, and are explicitly intended to aid in the design of interventions aimed at behaviour change (Michie, Stralen and West 2011).

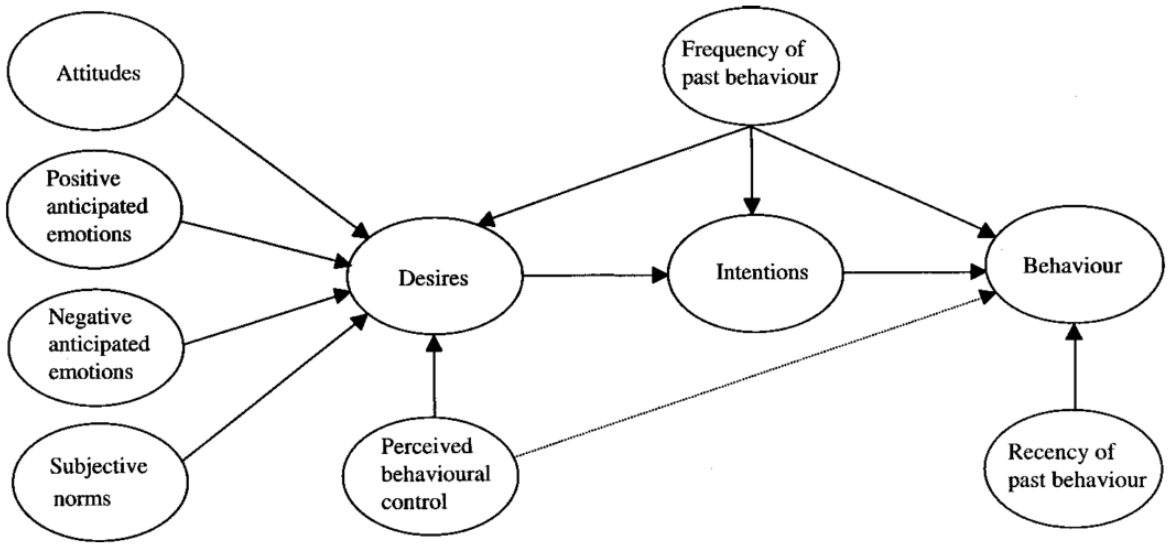

Figure 1-1. Model of goal-directed behaviour (from Perugini & Bagozzi, 2001, p.80.)

Finally, it is important to recognise that behaviour change is a process rather than a singular event, despite the lack of a temporal dimension in many linear models of behaviour (Darnton, 2008). The 'stages of change' model (also referred to as the transtheoretical model) is a widely applied cognitive model which segments audiences onto a continuum according to the category of behaviour they have reached (Heimlich & Ardoin, 2008; Prochaska & Velicer, 1997). It separates individuals based on their readiness to change behaviours. These five stages are:

- Pre-contemplation: no intention of taking action within the next six months.
- Contemplation: intention to take action in the next six months.
- Preparation: intention to take action within the next 30 days with behavioural steps taken in this direction.
- Action: behaviour change in the last six months.
- Maintenance: behaviour change that has lasted for more than six months.

Although stages of change is useful as a tool to help practitioners and academics understand the experience of behaviour change, it is less suited to accurately explaining and predicting such change (Herzog, 2008).

1.5.2 Psychological insights for messaging techniques

Psychological research into human behaviour can aid in the design of effective messaging strategies (Cowling, 2014; St John et al., 2010; Thomas-Walters & Raihani, 2017). Research in biodiversity conservation has examined the efficacy of different narratives, the impact of different messengers, and the consequences of emotionalising factual information (Draheim et al., 2011; Flemming et al., 2018; Larson, 2005; Veríssimo & Wan, 2018). However, these studies frequently focus on single variables, ignoring contextual effects like culture (Thomas-Walters et al., 2019). This limits both the generalisability of the findings and their applicability. Nonetheless, it can be instructive to examine some important findings.

Moral and social norms are direct determinants of pro-social, including pro-environmental, behaviour (Bamberg & Möser, 2007). A mismatch between norms and personal behaviour can cause feelings of guilt, a further determinant of pro-social behaviour. Campaigns to change human behaviour frequently seek to evoke a negative emotional reaction, particularly guilt and shame, by casting blame on the audience for their "wrongdoings". However, people may react with defensive processing techniques, such as media avoidance or a desire to assuage guilt by denigrating others instead (Brennan & Binney, 2010; Brown & Locker, 2009; Planalp et al., 2016). In addition, levels of guilt are decreased when audiences perceive manipulative intent in campaign messages, reducing intentions to help (Hibbert et al., 2007). Rhetoric that generates a moral shock can be effective in instigating action (Jasper & Poulsen, 1995), but further research is required to understand how this relates to the demographic and psychographic (personality, values, and motivations) variables of different audiences.

Exploring differing reactions to a variety of messaging tactics in campaigns, as well as testing attitudes as moderators of change (e.g., degree of self-efficacy), is needed to create generalisable insights into the design of future demand reduction messages.

Within conservation there is currently a trend for gain-framed messages, which try to harness positive emotion by focusing on the benefits of a given behaviour (Harris & Harrison, 2012; Kidd et al., 2019). A growing body of research shows that while there is value in positivity, there are a range of variables that can mediate impacts from gain/loss framing (Gallagher & Updegraff, 2012; O'Keefe & Jensen, 2009). These include, but are not limited to, the level of prior experience, perceived risk, self-efficacy, issue involvement, and affect. For example, the effectiveness of gain/loss framing may depend on what sort of a mood people are in, but there is mixed evidence to the direction of this effect (Ferrer et al., 2012; Harris & Harrison, 2012; Keller et al., 2003). Other evidence suggests that loss-framed messages may be more effective when the target audience has no prior experience of the undesired behaviour (Lu et al., 2016). However, most of this research has been conducted in fields such as public health, and framing studies that are conservation-specific often fail to evaluate the success of their strategies (Kidd et al., 2019).

Images that are emotive and vivid also have a powerful role to play in shaping persuasive messages, but here again we have key gaps in our understanding of their influence on conservation audiences (Thomas-Walters et al., 2019). The effect of animal imagery on people's attitudes and behaviour has almost exclusively been studied in isolation, ignoring evidence that combining narratives with images can negatively or positively alter reactions. For example, matching image valence to message framing increases impact, especially when both are presented negatively (Chang & Lee, 2009), while adding emotional photographs to fact lists can decrease their effectiveness (Flemming et al., 2018). Further, existing studies on

conservation messaging techniques focus on a fairly narrow subset of Western audiences. Research in behavioural science shows that there is substantial variability in experimental results across populations, and this lack of diversity in research participants is concerning as both culture and education level may be important factors in determining responses to campaign messages (Henrich et al., 2010). Research on conservation messaging in the Global South is needed to enable us to confidently conduct behaviour change campaigns across cultures.

1.5.3 Behavioural economics and choice architecture

Another approach that has gained popularity in policy-making circles is the use of "soft" interventions that aim to nudge people without significantly restricting their choices (Grilli & Curtis, 2019; Moseley & Valatin, 2014). Research from behavioural economics has shown that humans do not fit the standard, optimally rational economic model, and often rely on heuristics (mental 'shortcuts') to make decisions (Kahneman & Tversky, 1996). Nudges exploit these common flaws in decision-making, such as temporal discounting or loss aversion (Hummel & Maedche, 2019; Thaler & Sunstein, 2008). These are likely to be well-received by the public and have been shown to be effective in the health field (Arno & Thomas, 2016; Wellesley et al., 2015). For example, relatively simple actions such as giving restaurant patrons vegetarian menus by default can increase consumption of meat-free meals (Campbell-Arvai et al., 2014; Croson & Treich, 2014). Nudges may be context-specific however, so whether this would spillover to the active adoption of sustainable diets by participants in other areas of their life is not clear.

A recent systematic review found that the median effect size for nudges was 21% while the mean was 55%, a difference due to a few extremely high values (Hummel & Maedche, 2019). When the application context is narrowed down to environmental nudges, the median effect

size rises to 39%. This should be viewed as an upper bound for effectiveness, as there is likely to be a publication bias towards positive results. For example, the UKs' Behavioural Insights Team have published less than a quarter of the experiments they have conducted (Maynard & Munafo, 2018). The review also discovered that 38% of studies reported a statistically insignificant effect (Hummel & Maedche, 2019). Nudges can and do fail for a number of reasons (Schubert, 2017; Sunstein, 2017). Sometimes people have strong antecedent preferences that overwhelm the nudge – lowering the default thermostat setting in office usually saves energy, but this saving is reduced if the setting is too low (Brown et al., 2013). At a certain point, peoples' desire for warmth will override their bias for defaults and they will make the effort to manually change the thermostat. Alternatively, target audiences may be subject to "counternudges" from other, vested interests (Sunstein, 2017). American banks have used economic incentives and a loss aversion bias to persuade customers to consent to overdraft coverage, counteracting the default opt-out mandated by the government (Willis, 2013). In addition to these handicaps, the applicability of nudging to consumers in the illegal wildlife trade appears limited, as we generally lack access to the choice architecture in which transactions take place.

1.5.4 Social marketing

Social marketing, which uses marketing concepts to influence behaviours that benefit individuals and communities for the greater social good, holds more promise (Andreasen, 1994; Mckenzie-Mohr, 2000; Takahashi, 2009). Successful examples of social marketing campaigns in conservation include one which aimed to increase tiger population in a national park by reducing illegal hunting of tigers and their prey, and one which achieved a 23.7% reduction in fuel wood felling by encouraging villagers to switch to fuel efficient stoves (DeWan et al., 2013; Saypanya et al., 2013). TRAFFIC's Chi initiative may be the most notable example of a social marketing intervention aimed at demand reduction, featuring prominent businessmen sharing the message that "chi", or success and power, comes from within a

person rather than being acquired from the consumption of products such as rhino horn (Offord-Woolley, 2016). Social marketing is not merely communication (McKenzie-Mohr & Schultz, 2014). It begins with formative research to identify target consumers and includes the four elements of the marketing mix: Product, Place, Price, Promote (Andreasen, 1994). Unfortunately, failure to distinguish between social marketing and social advertising is a common flaw in behaviour change campaigns (Carins & Rundle-Thiele, 2000; Olmedo et al., 2017). The uniqueness of social marketing lies in its focus on behaviour change throughout the design and evaluation phases (Table 1-1). The goal is to create attractive exchanges that promote the desired behaviour and remove barriers (Andreasen, 2002). Consistent use of audience research, from pilot studies to monitoring results, plays an important role, and audience segmentation saves resources by enabling practitioners to target the main actors (Carins & Rundle-Thiele, 2000; Basil et al., 2019).

Table 1-1. The six benchmarks for identifying a social marketing campaign (adapted from Andreasen, 2002)

1. Focus on behaviour change
2. Consistent use of audience research
    a) understand the target audience
    b) pilot intervention elements
    c) monitor interventions
3. Audience segmentation
    - maximises efficient use of resources
4. Creation of attractive and motivational exchanges with target audiences
5. All 4 Ps of traditional marketing mix used
    - attractive benefit packages (products)
    - minimised costs (prices)

- convenient and easy exchange (place)
- powerful messages communicated (promotion)

6. Competition to desired behaviour considered

The potential of social marketing for “bigger-than-self” problems such as climate change has been critiqued by those who advocate for alternative approaches centred around the enhancement of environmental citizenship and value-based engagement (Corner & Randall, 2011). A value is a ‘guiding principle in the life of a person’, which may shift over a lifetime but is generally thought to be a relatively stable dimension (Schwartz 2006; Corner et al. 2014). Work by social psychologists spanning multiple decades and cultures shows that certain values consistently appear, and can vary across different dimensions. In particular, it is useful to distinguish between intrinsic and extrinsic values. Intrinsic values are those that focus on personal growth, relationships, and community involvement (Grouzet et al., 2005). Extrinsic, or materialistic values are those that focus on wealth, rewards, achievement and status (Kasser & Ryan, 1996). It has been well-established that people who more strongly identify with extrinsic values are less likely to engage in pro-environmental behaviours such as recycling, riding bicycles, or conserving electricity, and vice versa (Brown & Kasser, 2005; Gatersleben et al., 2014; Richins & Dawson, 1992). Further evidence in support of intrinsic values comes from a systematic review of conservation projects connected to protected areas (Cetas & Yasué, 2015). Projects which promoted intrinsic motivators were more likely to achieve their socioeconomic and ecological goals. To embed pro-environmental behavioural changes throughout society, we may need to foster a sense of pro-environmental identity. This is not incompatible with the use of social marketing but requires explicit consideration of deeper notions of values and identity (Corner & Randall, 2011).

1.5.5 Sociological practice theories

All of the above paradigms have been accused of a myopic focus on individual behaviour, neglecting the sociocultural structures in which humans operate (Kelly & Barker, 2016; Spotswood, 2017; Spotswood & Tapp, 2013). Disproportionate attention has been paid to cognitive, self-reflexive decision-making. While it has been recognised that cultural forces influence behaviour, rarely has culture itself been the object of behavioural research (Spotswood & Tapp, 2013). Behaviours can be viewed as "practices" performed by actors in society (Spotswood et al., 2015). Individuals are de-emphasised, and interventions may instead seek to change the social, political and economic institutions that shape deleterious practices (Chatterton, 2017). Again, practice theories can be integrated with social marketing techniques (Spotswood et al., 2017). The scale of environmental issues facing us means that we must be pragmatic and embrace interdisciplinarity, rather than relying on techniques or approaches from a single field (Welch, 2017).

1.5.6 Systems thinking

Systems thinking is an approach that recognises the uncertainty, interconnectedness, and context-dependence of the many different factors in complex systems such as the illegal wildlife trade (Ison, 2010; Knight et al., 2019). The notion of a 'whole systems' approach within the public health field is gaining momentum, and can be defined as one that "responds to complexity through an ongoing, dynamic and flexible way of working. It enables … stakeholders, including communities, to come together, share an understanding of the reality of the challenge, consider how the local system is operating and where there are the greatest opportunities for change. Stakeholders agree actions and decide as a network how to work together in an integrated way to bring about sustainable, long-term systems change" (Public Health England, 2019). It can be use alongside social marketing or other paradigms to assist with the complexity and dynamic nature of the wildlife trade.

An example of its application comes from the Government of Viet Nam, which has used systems thinking to engender social change for objectives such as smoking cessation (Truong, 2016). Programmes include a wide range of interventions, from education campaigns about the harmful impacts of smoking for the public to activities such as tailored training programs for health professionals and community health workers. Programme messages are spread through multiple media channels including radio, television, newspapers, and social media, and in more rural areas local spokespeople such as community health workers or youth unions champion the cause. There are also interventions to restructure marketing systems, by prohibiting advertisements of tobacco products, raising taxes on cigarettes, and introducing bans in many public areas. Since the implementation of this programme, there have been steady declines in tobacco use (Hoang et al., 2010). Similar whole systems approaches have also been used by the Canadian government to create an environment that facilitates smoking cessation (Kennedy & Parsons, 2012), and evidence suggests single interventions at a single level may not have significant impact, but targeting multiple levels within the obesity system can create a reinforcing action to achieve a significant shift (Venturini, 2016).

Systems thinking is highly relevant for understanding the wildlife trade and its distant and long-term consequences (Blair et al., 2017; Larrosa et al., 2016). For example, a whole systems approach to the rhino horn trade could focus effort on addressing the root causes of the trade, including the moderators of demand, to enable long-lasting conservation impacts. Recently a systems mapping process has been used to understand the dynamic relationships driving demand for ivory in China, enabling the project team to identify the key nodes within the system and where their interventions would be most effective (Mahajan et al., 2019). Researchers have also advocated for the use of a conceptual framework incorporating systems thinking to analyse wildlife trade in primates (Blair et al., 2017).

1.6 Impact evaluation of demand reduction interventions

Despite the increasing interest in demand reduction interventions, there is still a lack of a strong evidence base to support practitioners. The goal of impact evaluation is to measure what outcomes have resulted from an intervention, in such a way that any changes can be attributed solely to that particular project or campaign (Gertler et al., 2011; Rogers, 2014; Woodhouse et al., 2016). Despite much discussion in the academic literature impact evaluation is still lagging in conservation, particularly so with regards to demand reduction campaigns (Baylis et al., 2016; Curzon & Kontoleon, 2016; Sharif et al., 2014). This is concerning, as formal evidence of impact is necessary to allow refinement of the behaviour change techniques used in these campaigns. Impact evaluation can help NGOs and governments determine where to invest scarce resources, and allow them to show donors tangible outcomes (Mckinnon et al., 2015). This lack of rigorous impact evaluation is most likely due to a shortage of time and money, and the scale of complexity involved in the evaluation of social and environmental problems (Birnbaum & Mickwitz, 2009; Curzon & Kontoleon, 2016).

Where evaluation of programmes does exist, it is frequently restricted to the reporting of inputs and outputs, e.g., how much money is spent, how many materials are produced, or how many people are reached. Of more use are outcomes and impacts (Woodhouse et al., 2016). Outcomes are the generally finite changes that result from an intervention, such as a decrease in the number of people buying wildlife products. Impacts are the wider effects of the outcomes – e.g., a decrease in the illegal extraction of endangered species. Moving from behaviour change to actual environmental impacts is extremely difficult due to the complexity of market systems, however.

There are multiple methods for evaluating impacts. Randomised control trials have historically been considered the “gold standard”, but much work has also gone into improving quasi-experimental designs (Baylis et al., 2016; Ferraro & Hanauer, 2014; Rogers, 2014). This is necessary as establishing causal attribution can be difficult with behaviour change campaigns. There are often multiple competing messages from other NGOs and governments, and socio-economic forces operating at a range of scales. In addition, there is increasingly a move towards qualitative theories of change to help NGOs not just learn whether an intervention worked, but how and why it worked (Bamberger, 2012). One example of this is the use of process tracing with Bayesian updating by IIED, a methodology that combines qualitative and quantitative research to assess the strength of evidence supporting different purported causal mechanisms (IIED, 2017). A final vital aspect of rigorous impact evaluation is the measurement of any unintended effects resulting from interventions. To facilitate lesson learning both within and between NGOs, a deeper understanding of the crucial linkages at work is required (Hummelbrunner, 2000).

1.7 Thesis structure

There has been considerable research into consumer psychology and decision-making in other behaviour change fields such as public health, and there is scope to build on this literature to inform conservation science. This can help underpin a more nuanced understanding of consumer demand and the motivations that drive it, giving us a better grasp of the mechanisms through which demand may be reduced. It can also support our goal of using different evaluation methods to develop a robust body of evidence on the impact of demand reduction programmes.

Rather than focus narrowly on a single taxa or method, in this thesis I draw upon literature from different disciplines and use both quantitative and qualitative data. I aim to take a broader

view of behaviour change for demand reduction in the wildlife trade, in order to conceptually advance the field. This thesis consists of four data chapters, each of which constitutes a stand-alone research paper. It is structured as follows:

Chapter 2 reviews evidence from other behaviour change fields such as public health and international development to identify potential challenges to achieving demand reduction. We show that behaviour change is difficult to achieve, and interventions may have unintended and undesirable consequences because of unaddressed systemic, cultural and environmental drivers, and limited resourcing.

Chapter 3 develops a theoretical typology of the motivations for wildlife use and consumption, validated by a range of global experts. We identified five main motivational categories for wildlife use: experiential, social, functional, financial, and spiritual, each containing sub-categories. This typology is intended to facilitate more nuanced approaches to demand reduction.

Chapter 4 presents a case study in mitigating the unexpected challenges that can arise when evaluating demand reduction interventions, based on the first formal impact evaluation of a conservation marketing campaign aimed at reducing the consumption of sea turtles..

Chapter 5 examines the decline in demand for ivory products in Japan, using a qualitative theory-based impact evaluation strategy to identify market drivers. Using General Elimination Methodology and semi-structured interviews with key stakeholders, we developed a richer understanding of this consumer behavioural change and show how theory-based impact

evaluation methodologies can help establish causal attribution in cases where we lack baseline data or a credible counterfactual (White, 2009).

Chapter 6 discusses the thesis' key findings and conclusions with a focus on their contribution to current knowledge and practice. Formative market research is essential to understand consumer motivations and develop effective messaging techniques. I emphasise the need to set realistic expectations when designing a demand reduction intervention, and consider the value of systems thinking.

Chapter 2: Taking a more nuanced look at behaviour change for demand reduction in the illegal wildlife trade

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2.1 Abstract

The illegal wildlife trade threatens the future of many species, and undermines economies and livelihoods. Conservationists have largely responded with supply-side interventions, such as anti-poaching patrols, but these often fail to stem the tide of wildlife trafficking. There is now increasing interest in demand-side interventions, which seek to lower poaching pressure on sought-after species by reducing consumer's desire for, and purchase of, specific wildlife products. Individual behaviour change-approaches, from environmental education to social marketing, have been widely advocated by academics, practitioners and policy makers. However, this is an emerging field and we lack the breadth of evidence needed to understand and predict the potential outcomes of demand reduction interventions. To help us gain broader insights, we examine the literature from public health and international development on the effectiveness of behaviour change interventions, and critique the current conceptualisation of strategies for reducing consumer demand in the illegal wildlife trade. We show that behaviour change is difficult to achieve and interventions may have unintended and undesirable consequences because of unaddressed systemic, cultural and environmental drivers, and limited resourcing. We conclude that some sections of the conservation community are advocating a shift from one reductionist approach based on limiting supply, to another based on limiting demand, and argue that conservationists should learn from the public health and international development projects that have integrated systems thinking. By accounting for

the multiple interactions and synergies between different factors in the wildlife trade we can develop more strategic approaches to protecting endangered species.

2.2 Introduction

The illegal wildlife trade is a major global problem that causes wildlife declines and undermines economies and livelihoods (Sas-Rolfes *et al.*, 2019). Traditional supply-side interventions such as anti-poaching measures have largely failed to stem the tide; the loss of tigers, elephants, pangolins and other high-value species continues, driven by growing demand from consumers (Challender & MacMillan, 2014). This failure is partly because these supply-side interventions, while important, do not address the root cause of demand. Thus, conservationists increasingly recognise the importance of demand-side interventions, aiming to reduce the desire for, and purchase of, specific wildlife commodities to lower poaching pressure on sought-after species. This was acknowledged at the Kasane Conference on the Illegal Wildlife Trade in March 2015, which set its first future action as "Eradicate the market for illegal wildlife products" (Kasane Conference, 2015). Similarly, there have been multiple calls for demand reduction in both the academic and grey literature (Burgess, 2016; Challender et al., 2014; Veríssimo et al., 2012) and it was raised as an important global issue by the United Nations General Assembly in 2015, 2016, and 2017 (General Assembly resolution 69/314, 70/301, 71/326).

Demand reduction interventions aim to influence behaviour. Common approaches have focused on legal regulation or prohibition (e.g., trade bans) and law enforcement (Wyatt, 2013), but these are not the only ways to persuade people to stop consuming wildlife and/or shift their consumption to more sustainable choices (Felbab-Brown, 2017). Conservationists have become increasingly interested in achieving voluntary change through approaches such as behavioural economics interventions, environmental education and social marketing campaigns (Hungerford & Volk, 1990; Smith et al., 2020; Veríssimo & Wan, 2018). This involves understanding consumer motivations and the key drivers of demand for wildlife products to more effectively alter people's behaviour (Phelps et al., 2016; Thomas-Walters, 2017). This is why a number of authors have advocated the use of behaviour change interventions for demand reduction (Veríssimo & Mckinley, 2015; Veríssimo et al., 2012;

Wright et al., 2015), but research to assess their likely effectiveness or to identify factors that might improve success is lacking (Veríssimo and Wan, 2018).

By examining research and learning on behaviour change in other fields such as public health and international development, we may anticipate some of the issues in demand reduction. This is because both public health and international development have made substantial advances in recent years in their approach to designing and evaluating behaviour change interventions, and there is much we can learn from their experience. Here, we assess the evidence from these other sectors and discuss its relevance for demand reduction in conservation. We highlight how achieving behaviour change can be slow and expensive, and suggest that much of the current discussion in policy circles about demand reduction for illegal wildlife products may be overly optimistic. We acknowledge that there are differences between this conservation issue and other fields, notably the international nature of wildlife trade and the illegality of the behaviours, but the additional difficulties faced by conservation practitioners only serve to underscore the challenges of successfully changing behaviour.

Based on evidence from these other sectors, we first discuss why the illegal wildlife trade is conceptualised as a “wicked problem” perpetuated by various systemic and environmental drivers, making it comparable to complex issues in other sectors. We then highlight specific challenges that may make behaviour change in wildlife consumers difficult to achieve, drawing on evidence from public health and international development. Finally, we introduce the concept of systems thinking, a holistic approach to complex issues that is increasingly used in these other sectors to account for the interactions between constituent parts of a problem. As part of this, we argue for integrating systems thinking into demand reduction interventions to reduce the potential for unintended consequences and increase the likelihood of sustained

impact, as well as emphasising again the need to temper our expectations of demand reduction interventions.

2.2.1 Understanding "wicked problems"

The illegal wildlife trade, like many conservation issues, can be described as a "wicked problem" because it is embedded in complex social-ecological systems linked to other problems (Game *et al.*, 2014). This situation is also common in health and development, where evidence has shown it is vital to focus on more than the immediate impacts of concern. Instead, success often depends on understanding the systemic drivers and then developing both upstream and downstream interventions (Laverack, 2017; Swinburn et al., 2011). For example, a review of projects to raise women's social status in lower-income countries found that simultaneous programmes for different audiences were needed to influence the underlying determinants of gender inequity (Keleher & Franklin, 2008).

Similar insights come from health studies, as illustrated by the framework of determinants and solutions of obesity (Figure 2-1A) developed by Swinburn *et al*. (2011). This shows that while the immediate cause is an energy imbalance from people expending less calories than they consume, intervening with drugs, surgery or counselling at the individual level fails to tackle the wider obesogenic environment that is causing the society-wide problem. For more sustainable population health impact, the authors (Swinburn *et al*., 2011) argue for a focus on interventions that target socio-environmental drivers related to the food, physical, cultural or economic environment that enable or constrain human behaviour. However, the framework shows there are trade-offs between the potential size of an impact and the difficulty of achieving it. For example, policy interventions are the most likely to have a large impact but are often the most challenging to implement (Figure 2-1A), particularly where they are seen to

restrict freedom of choice, impose mandatory obligations or introduce new taxation (Swinburn *et al.*, 2011).

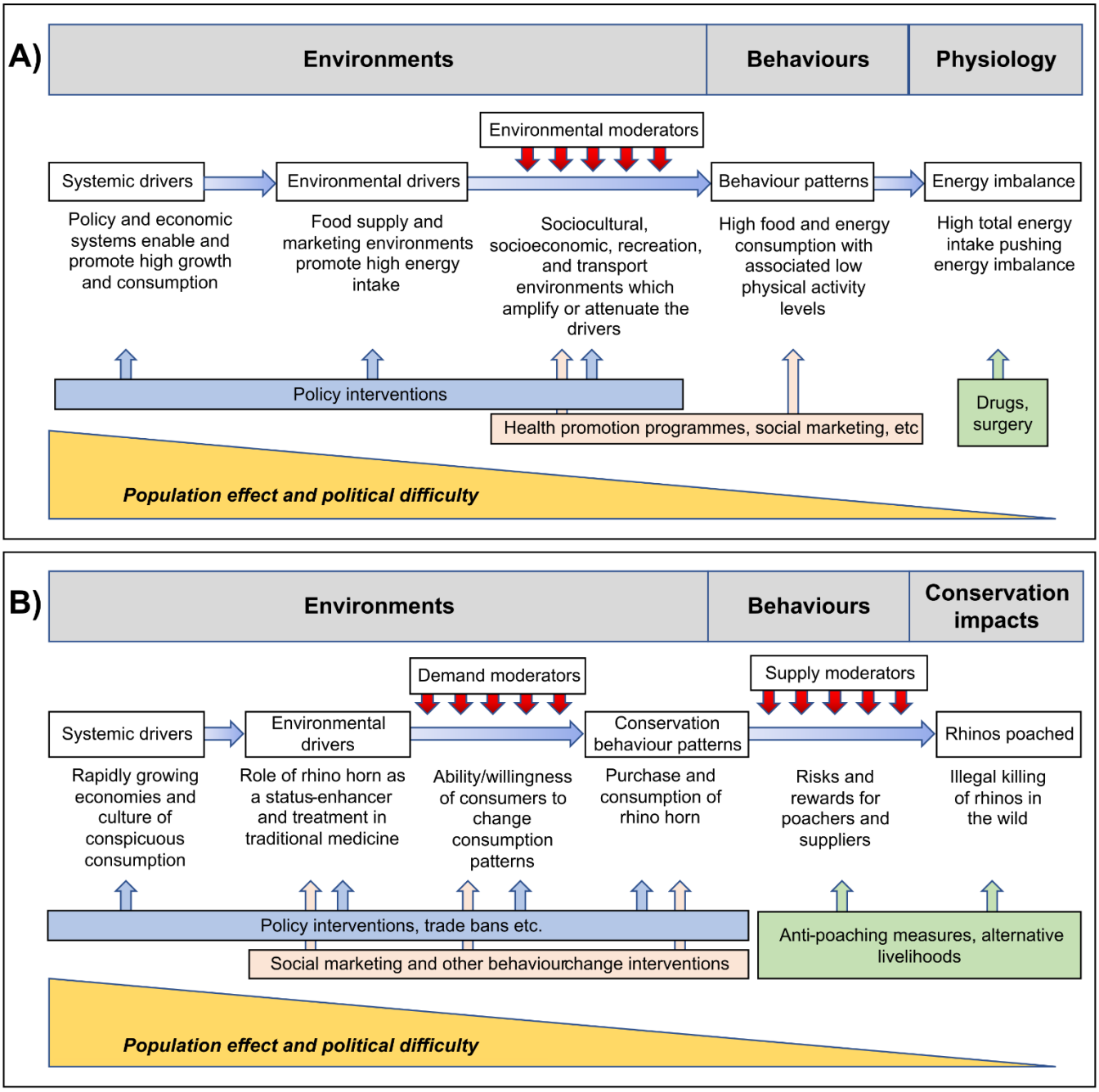

Figure 2-1. A comparison of the determinants and solutions for A) obesity and B) the rhino horn trade (Adapted from Swinburn et al. 2011). The more distal drivers are to the left and the environmental moderators that have an attenuating or accentuating effect are shown, along with some examples. The usual interventions for environmental change are policy based, whereas health promotion programmes/social marketing can affect environments and

behaviours. For obesity drugs and surgery operate at the physiological level, while in the rhino trade anti-poaching measures, alternative livelihoods are a response to conservation impacts. The framework shows that the more upstream interventions that target the systemic drivers might have larger effects, but their political implementation is more difficult.

The relevance of this approach for understanding the illegal wildlife trade can be illustrated by adapting the obesity framework to help understand the trade in rhino horn (Figure 2-1B). Although as with all complex systems there are interdependencies between different drivers, and it is not a straightforwardly linear process. However, depicting the trade in this way illustrates several key points. Rhino horn trade also has multiple drivers, which may be moderated on both the demand and supply side. On the supply side, analogous to drugs or surgery for tackling obesity at the physiological level, conservationists adopt anti-poaching and alternative livelihood measures to reduce the number of rhinos illegally killed. The supply of rhino horn is then moderated by the risks and rewards for poachers and suppliers (Holden et al., 2019), but this does not address the systemic and environmental drivers of the trade. Thus, demand reduction interventions at multiple levels are also needed (Challender and MacMillan, 2014; Veríssimo and Wan, 2018). These might seek to change the purchase and consumption of rhino horn, echoing anti-obesity campaigns in public health that try to reduce people's excess energy consumption. Other solutions which aim to tackle the more distal drivers of trade, such as rapidly growing economies and a culture of conspicuous consumption, include policy interventions and trade bans (Ayling, 2015; Duffy et al., 2014).

Evidence from the health sector suggests that the use of upstream interventions for tackling the illegal wildlife trade could have larger effects than anti-poaching measures or alternative livelihood projects alone (Hastings et al., 2000; Venturini, 2016). However, there is likely to be a similar trade-off with feasibility and potential size of impact, as decisions that impact more people are likely to be more politically-contested and more difficult to implement. Similarly,

there are a number of insights from the health and development sectors that should inform projects and policies to reduce demand; these are outlined below.

2.3 Challenges to achieving behaviour change

2.3.1 Success may be partial at best

When behaviour change specialists in other fields such as public health undertake an intervention to reduce the prevalence of a behaviour, they generally do not expect to completely modify the actions of their target audience. For example, one meta-analysis of mediated health campaigns showed 8% of the target audience changed their behaviour on average, while systematic reviews of interventions to prevent female genital mutilation show a 14-23% reduction in prevalence (Berg & Denison, 2012; Salam et al., 2016; Snyder et al., 2004). This is an important finding for conservationists, whose interventions are often framed as attempting to eradicate demand. Expecting to change the behaviour of an entire target audience with one intervention is unrealistic. However, average effect sizes differ depending on the focus of a campaign, from 1-2% of the target audience for youth drug and marijuana campaigns to 15% for seatbelt campaigns. In particular, campaigns that promote the adoption of a new behaviour are twice as effective as those that aim to prevent or reduce a behaviour (Snyder et al., 2004). This suggests that promoting an acceptable alternative to an illegal wildlife product is likely to be more successful than asking people to simply stop using it.

Just as pertinently, many health and development interventions make no impact. For example, one systematic review of the effectiveness of social marketing interventions in increasing physical activity and reducing the use of alcohol, tobacco, and illicit drugs found that of 54 studies, 64% had no positive impacts on individual behaviour after two years (Stead et al., 2007). This may be explained in part by varying campaign quality, as shown by a recent systematic review (Firestone et al., 2017) that classified global health programmes by

adherence to social marketing benchmarks (Table 1-1). They found few studies considered behaviour change theories or competition to desired behaviours in their design, but effective programmes were more likely to have addressed the costs and benefits of behaviour change and used research to apply audience insights. However, even amongst programmes with high adherence to social marketing benchmarks, only 10 out of 21 studies reported significant positive behavioural results (Firestone et al., 2017). This pattern is likely to be mirrored in conservation, as while there are currently few rigorous evaluations of demand reduction interventions (Veríssimo and Wan, 2018), the published studies include examples where the desired conservation outcomes were not achieved (e.g., Veríssimo *et al.*, 2018b). Initial evidence also suggests that these campaigns lack design rigor, as a review of demand reduction campaigns for elephant ivory and rhino horn found that while the majority considered at least three of the social marketing benchmarks, no campaigns fulfilled all eight (Greenfield & Veríssimo, 2018).

Table 2-1. The six benchmarks for identifying a social marketing campaign (adapted from Andreasen 2002)

1. Focus on behaviour change
2. Consistent use of audience research - understand the target audience - pilot intervention elements - monitor interventions
3. Audience segmentation - maximises efficient use of resources
4. Creation of attractive and motivational exchanges with target audiences
5. All 4 Ps of traditional marketing mix used

- attractive benefit packages (products)
- minimised costs (prices)
- convenient and easy exchange (place)
- powerful messages communicated (promotion)

6. Competition to desired behaviour considered

2.3.2 Success can be expensive

Studies of effectiveness from other sectors are sobering but demand reduction interventions in the wildlife trade are likely to be even less effective, as public health and development projects generally have much higher budgets than are available to conservationists. For example, the annual costs of three UK Government campaigns to tackle road safety, smoking and obesity were £1.8 million, £5.8 million and £25 million respectively (Department for Transport, 2014; NSMC, 2010). This is more than the total amount of US$32 million spent each year by the international community on tackling the illegal wildlife trade through demand reduction (The World Bank, 2016). These lower budgets for the conservation projects may be due in part to purchasing power differences between organisations and governments in low- versus high-income countries, but probably also reflects lower political will and ambition.

2.3.3 Success may depend on the target audience receiving direct benefits

Behaviour change interventions often focus on positive exchange, where practitioners encourage the adoption of a new behaviour by promoting the benefits and minimising the costs to the target audience (Firestone et al., 2017). This is fairly straightforward in public health or development, as changing behaviour generally involves immediate and obvious personal benefits. For instance, interventions to decrease smoking can highlight that participants will experience aesthetic and health benefits, compensating for any loss of social status (McCaul et al., 2006). While in some cases behaviour change in conservation can avoid

personal costs, such as reducing the risk of disease transmission from eating particular species (Karesh et al., 2005), direct benefits are often lacking for wildlife consumers. For example, the benefits of reducing rhino horn consumption mostly accrue to rhinos, whereas the loss of status accrue to the former user. Thus, demand reduction interventions have to rely more on emphasising costs or changing social norms by altering what the audience considers typical or appropriate behaviour, and so are less able to focus on direct personal benefits (McDonald et al., 2020; Veríssimo, 2019).

2.3.4 Success depends on cultural contexts

Older ideas and technologies are more likely to persist over time, a principle known as the Lindy Effect (Taleb, 2012). This may help explain the finding that people still prefer traditional biomass stoves to improved stoves that use cleaner fuels, despite clear health and environmental benefits and huge efforts from governments and development organisations encouraging people to switch (Lewis & Pattanayak, 2012). Thus, demand reduction may be harder to achieve in cultures in which a product has been used for a long time. For example, ivory has been carved in China for thousands of years and demand continues, despite huge efforts from governments and NGOs (Vigne & Martin, 2014), whereas the 1921 Importation of Plumage (Prohibition) Act in the UK all but eradicated the fashion for hat feathers that had arisen a few years earlier (Anon, 2017). A long tradition of using wildlife often reflects the high value that a society places on a species, whether as an exploitable resource or as something with intrinsic value. Disrupting a behaviour that is deeply entrenched in cultural history is likely to be more difficult, and practitioners need to adjust their expectations of success accordingly or focus first on less intractable behaviours.

2.3.5 Success with alternatives is not guaranteed

One way of minimising the costs of a new behaviour is to promote a mutually acceptable substitute, as it is generally considered easier to modify an existing behaviour than stop it completely (Snyder et al., 2004). The use of electronic cigarettes for instance is more effective at stopping smoking than other alternatives, likely because they fulfil both the behavioural and chemical dimensions of smoking (Bullen et al., 2013; Kalkhoran & Glantz, 2016). Similarly the promotion of culturally acceptable, farmed or synthetic substitutes in relation to decreasing demand for wildlife products has frequently been suggested (Shairp et al., 2016; TRAFFIC, 2008; Venkataraman, 2007). For example, a Traditional Chinese Medicine user may be more willing to substitute bear bile tonic for a herbal tonic than to switch completely to Western medicine. Likewise, substituting wild meat for beef or chicken may be an acceptable substitute for some consumer segments, such as those in informal dining contexts or those who consider price a major factor (Shairp et al., 2016). For the more status-conscious consumer however, it is not an appropriate substitute because it lacks expense and rarity (Courchamp et al., 2006). Thus, to identify and market the right substitutes, it is vital to understand the motivations behind wildlife use and the role of quality, price and availability.

Where substitutes are promoted, care is needed to ensure they do not lead to perverse outcomes. For instance, in the 1980s and 1990s low-fat diets were frequently recommended to tackle the growing obesity crisis. However, as low-fat foods tend to be higher in added sugars and there is an inverse relationship between the proportion of dietary calories obtained from fat and from sugar, this may have contributed to a growing obesity epidemic (Nguyen et al., 2016; Sadler et al., 2015). Similarly, herbal tonics are seen as a preferable alternative to animal products but this overlooks the possibility that the plants used may themselves be threatened, e.g., species in the genus *Coptis* are considered an acceptable traditional medicine alternative but at least one is classified as Endangered (Feng et al., 2009; Saha et al., 2015). Even if the overt aim is not to promote a substitute, practitioners should account for

likely audience responses to a successful intervention. For example, the conservation benefits of an intervention to reduce demand for ebony furniture are negligible if consumers instead buy furniture made from equally threatened, wild-harvested mahogany.

2.3.6 Success may be accompanied by unintended consequences

Given the complexity of behaviour change interventions, care is needed to avoid unintended negative consequences. For example, research into obesity messaging shows that audiences may feel threatened and reject the message, be attracted to things that they are told are harmful, or think that an undesirable behaviour is more common and, therefore, more attractive (Byrne & Niederdeppe, 2011). Negative spillovers are another potential problem, where the promotion of one specific behaviour change leads to a different but undesirable behaviour (Thøgersen & Crompton, 2009; Thøgersen & Olander, 2003). This occurs when a person has the psychological perception that they have developed "moral credentials" by carrying out a specific pro-environmental behaviour, making them feel entitled to perform other, unsustainable behaviours (Mazar & Zhong, 2010). For example, when some American apartment residents were asked to save water to help preserve the environment, they used 6% less water but 5.6% more electricity (Tiefenbeck et al., 2013). This is a particular risk for awareness-raising campaigns that focus on low-impact individual behaviours (Thøgersen & Crompton, 2009). Thus conservation interventions that seek to address behaviours with a comparatively negligible effect, e.g., the use of ivory chips to treat colds, could encourage people to behave in ways that have worse conservation impacts, e.g., buying ivory as an ornamental status symbol (Thomas-Walters, 2017).

Motivation and desires are another key determinant of behaviour, and unintended consequences may again result if they are not taken into consideration when designing interventions. For example, pregnant women who give up smoking for the sake of their baby

may be more likely to relapse after they have given birth (Taylor et al., 2009). Thus, coercive, baby-centred messages may be counterproductive in the long term. Similarly, using financial incentives to quit smoking through “quit and win” contests frequently fails to achieve long-lasting behaviour change, as the issue of motivational context for smoking is not adequately addressed (Taylor et al., 2009). This means it can be difficult to predict what happens to the underlying motivation for a wildlife product when demand is reduced. If the motivation has not also been addressed, then it is likely that an unintended consequence will emerge, such as the consumer seeking a new product to fulfil their desires. For instance, the traditional medicine industry in Japan responded to the 1980 import ban on rhino horn by switching to saiga antelope, as rhino and saiga horn were believed to have similar medicinal effects (Kitade & Toko, 2016). Unfortunately, the saiga antelope is now classified as Critically Endangered, due in part to illegal hunting for horns (Mallon, 2008).

Another important consideration is the potential impacts of a behaviour change intervention on social norms and values. For example, the US teen substance abuse prevention program Drug Abuse Resistance Education (D.A.R.E.) involved uniformed police officers visiting schools to warn students about the harmful effects of drug use, which in many cases normalised a previously unfamiliar behaviour and made drug use seem more prevalent than it was. This explains why initial evaluations found no beneficial effect, and even an increase in illegal drug-taking by suburban students (Lynam et al., 1999; Rosenbaum & Hanson, 1998), although later campaign iterations had more success by addressing participants’ normative beliefs and encouraging the adoption of refusal skills to resist substance use (Nakashian, 2010). Similarly, mass media conservation interventions addressing behaviours exhibited by only a small fraction of the population could unwittingly demonstrate a social norm around wildlife consumption.

2.4 Systems thinking

We have argued above that examples from the health and development sectors can provide insights into the likely effectiveness of demand reduction campaigns to tackle the illegal wildlife trade. This is because all of these wicked problems involve dealing with uncertainty, interconnectedness, unpredictability and context-dependence between many different factors. This suggests we could also learn from these other fields how to tackle such complex problems. Within public health and public policy, the notion of a 'whole systems approach' is gaining momentum, as it responds to complexity through an ongoing, dynamic and flexible way of working, using stakeholder engagement and co-production methods (Public Health England, 2019b). Its advantages come from an emphasis on relationships between systems/societal levels and the use of systems language, science and tools (National Institute of Health and Care Excellence, 2010).

The Government of Viet Nam has used systems thinking to engender social change for smoking cessation through a wide range of interventions, from public education campaigns about the harmful impacts of smoking to tailored training programs for health professionals and community health workers (Truong, 2016). Programme messages are spread through multiple media channels, and in more rural areas local spokespeople champion the cause. There are also interventions to restructure marketing systems, by prohibiting advertisements of tobacco products, raising taxes on cigarettes, and introducing bans in many public areas. Since the implementation of this programme, there have been steady declines in tobacco use (Hoang et al., 2010). Over the course of ten years, smoking prevalence in Viet Nam decreased from 58 to 43% (Truong, 2016). By widening the focus away from solely voluntary individual behaviour change the organisers have used education, community engagement, and policy initiatives as complementary strategies to creating social change on a macro level (Truong, 2016).

Systems thinking is highly relevant for understanding the wildlife trade, with its distant and long-term consequences (Blair, Le, Sethi, et al., 2017; Larrosa et al., 2016), and conservation scientists are also beginning to use it. For example, a system mapping process was used recently to understand the dynamic relationships driving demand for ivory in China, letting the project team identify which interventions would most likely be effective (Mahajan et al., 2019). Researchers have also advocated for the use of a conceptual framework incorporating systems thinking to analyse wildlife trade in primates (Blair et al., 2017). Our comparison of the determinants and solutions for obesity and the rhino horn trade (Figure 2-1) also suggest a systems approach to tackling the latter, focusing on addressing the root causes of the trade, including the moderators of demand, to produce long-lasting conservation impacts.

Thus, by understanding the complexity of the wildlife trade, we can hopefully take a more holistic view of the successes and failures of any one intervention (Ayling, 2015). However, systems thinking does not represent a catchall solution to the illegal wildlife trade; rather, it suggests ways to recognise complexity, the dynamic nature of the issue, and the potential for both positive and negative feedback. Incorporating systems thinking into future demand reduction interventions acknowledges that no one thing is going to 'work' in isolation, providing more support for our argument that while demand reduction is a valuable approach, it is not a panacea.

2.5 Conclusion

Behaviour change interventions are prominent in public health and international development but their effectiveness is often low, despite relatively high resourcing and the experience and expertise of practitioners in these fields. This suggests that much of the current discussion in policy circles about demand reduction for illegal wildlife products may be overly optimistic, as

such change is often slow and expensive. Thus, there is a danger that demand reduction is currently being oversold and that without more critical assessment of its potential, it could end up as yet another conservation fad (Redford et al., 2013). Instead, we need to be more realistic and develop a better understanding of how to maximise the success of demand reduction interventions, integrating systems thinking to help address the unintended consequences of our interventions (Laverack 2017; Swinburn et al. 2011; Mahajan *et al.*, 2019). By taking this more nuanced view, we will help cement the rightful place of demand reduction and other behaviour change approaches in conservation.

2.6 Supplementary Information: A guide to systems thinking in practice

Having discussed the theoretical contributions systems thinking can make to demand reduction interventions, it is now useful to look at some of the main considerations in implemented a systems thinking approach in principle. Systems thinking is about widening your perspective. It enables us to see how interventions fit within a wider context, identify what is driving the system, and understand the different perspectives and priorities of those working across the system. I continue to use rhino horn trade as an example case study, but I must emphasise that a single person cannot accurately capture a whole system. I include the example only as a starting point to illustrate the concepts I discuss. Similarly, I provide a diagrammatic outline of a systems thinking approach, but in reality it is not a linear process. Applying systems thinking is an iterative process, and the exact timing of different steps will involve on judgement calls.

This is just an overview, but more detailed guidance can be found in Public Health England's 'Whole systems approach to obesity: A guide to support local approaches to promoting a healthy weight' (Public Health England, 2019a). This is the culmination of a four-year, multimillion pound programme which developed a practical guide describing the 'how-to' process of setting up a local whole systems approach. Other useful resources include the World Wildlife Fund's 'The art of systems change', and David Stroh's 'Systems thinking for social change' (Fuller Transformation Collaborative, 2019; Stroh, 2015).

2.6.1 Introducing causal maps

Before describing the process, it would be useful to look more closely at causal maps. Also known as causal loop diagrams, these are qualitative models that represent the variables and causal relationships in a system (Kim, 1994). They help us to disaggregate system variables,

making the interrelationships and feedback structures explicit (Mahajan et al., 2019). Creating a causal map helps facilitate the exploration and understanding of system dynamics.

There are some notations that are commonly used to represent these relationships in a causal map. An increase in one variable bringing about a corresponding increase in another variable can be denoted with a '+' plus sign, or 's' for same. An increase in one variable bringing about a contrasting decrease in another variable can be denoted with a '-' minus sign, or 'o' for opposite. Balancing loops may be denoted with a 'b', reinforcing loops with an 'r'.

Variables in a system may build on one another to either amplify or resist change. These feedback loops can be reinforcing, acting as engines of growth or decline, or balancing, self-regulating. For example, a reinforcing loop may be a decrease in abundance of a species X increasing consumer demand (see for example, the anthropogenic allee effect; Courchamp et al., 2006), which then increases expected profits for poachers (Fig 2-2A). Increased poaching efforts lead to an increase in harvesting of wild species, negatively affecting their abundance, and so the cycle intensifies. An alternate, balancing loop may be an increase in poaching causing greater supply of species X (Fig 2-2B; Niraj, 2009). More product available on the market could decrease the price, and eventually the poaching effort. This tension between supply and demand eventually balances out. Of course this is a simplification, and other variables are also likely to influence trade in a particular species in a specific location, such as supply from other locations or the abundance of an alternative species.

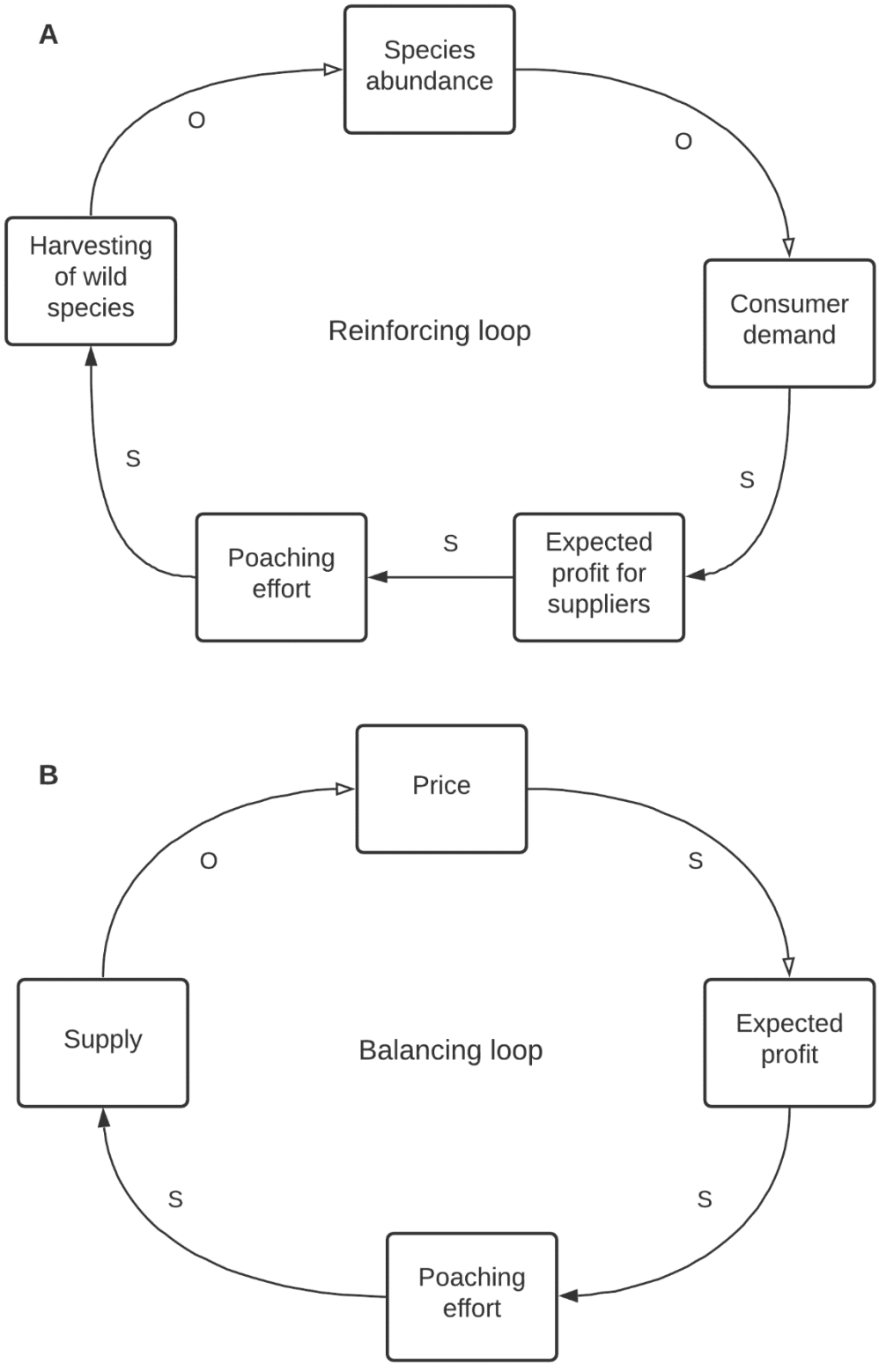

Figure 2-2. Examples of reinforcing (A) and balancing (B) feedback loops in the wildlife trade

2.6.2 Process of applying systems approaches

I have deliberately not numbered the different steps involved in the process of applying a systems thinking approach, as they can be conducted concurrently and you may move back and forth between them (Figure 2-3). This is particularly true for the initial steps, which are about building readiness for change. The central problem needs to be defined, the system bounded, and relevant stakeholders identified. Together, stakeholders can then create a causal map to identify potential leverage points. When a shared action plan has been agreed upon stakeholders can begin to intervene, ensuring they critically reflect on the process and consider opportunities for strengthening. As I go through these steps in more detail, I include an example from the wildlife trade.

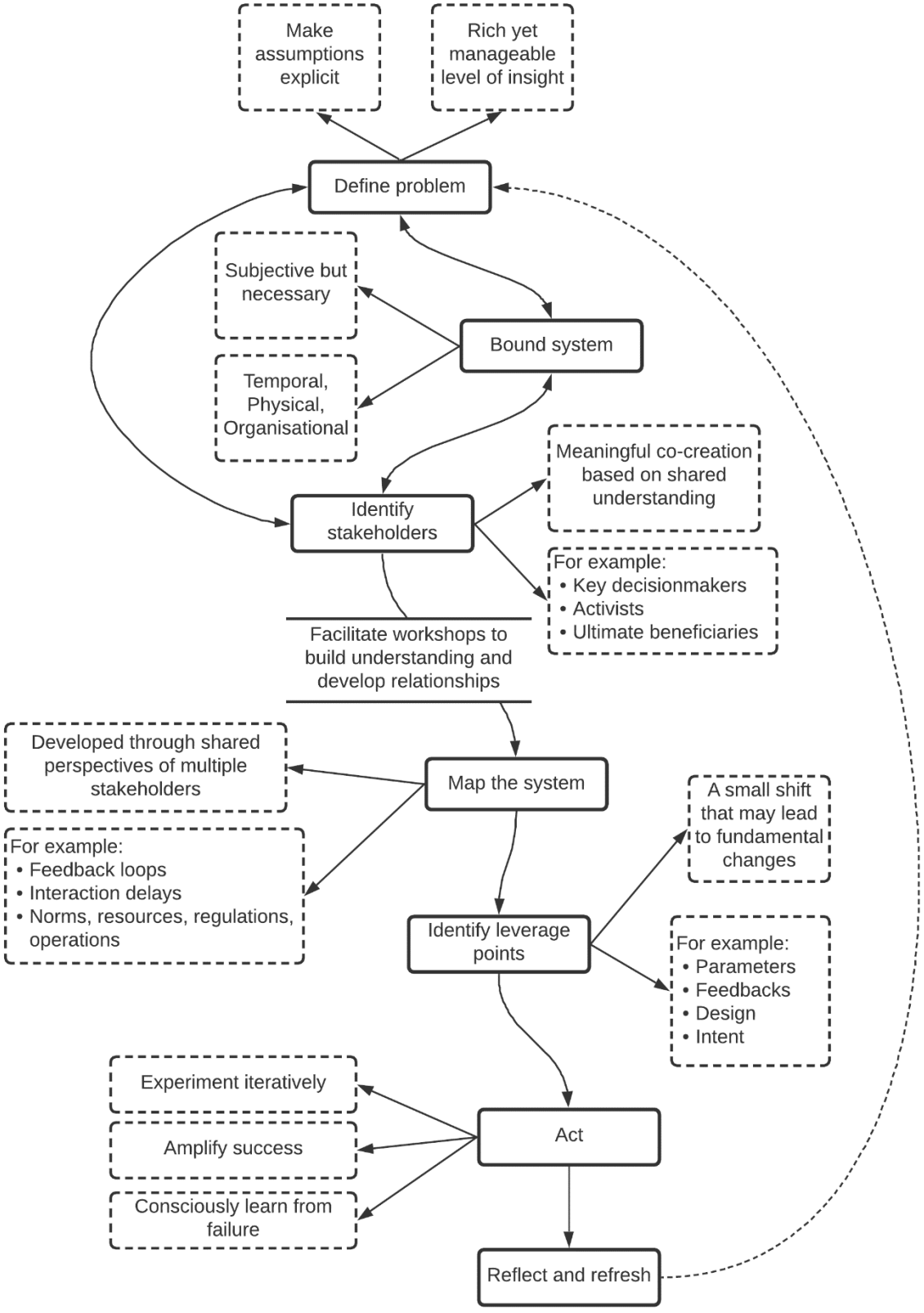
Make assumptions explicit
Rich yet manageable level of insight
Define problem
Subjective but necessary
Bound system
Temporal, Physical, Organisational
Meaningful co-creation based on shared understanding
Identify stakeholders
For example:
• Key decisionmakers
• Activists
• Ultimate beneficiaries
Facilitate workshops to build understanding and develop relationships
Developed through shared perspectives of multiple stakeholders
Map the system
A small shift that may lead to fundamental changes
For example:
• Feedback loops
• Interaction delays
• Norms, resources, regulations, operations
Identify leverage points
For example:
• Parameters
• Feedbacks
• Design
• Intent
Experiment iteratively
Amplify success
Consciously learn from failure
Act
Reflect and refresh

Figure 2-3. An overview of the steps involved in applying systems thinking approaches in practice, from defining the central problem to critically reflecting on the process and considering opportunities for amplifying success.

2.6.2.1 Define problem

Before you can hope to solve a problem, you need to understand the system that generated the current conditions. Ask, what is the problem we want to target? Why are things the way they are and how did we get here? This definition may evolve as the project continues, (particularly as a result of discussion with other stakeholders), but it is good to have a clear understanding of what problem you are working to address from the start.

Example: demand for rhino horn products in Viet Nam is contributing to unsustainable harvesting of wild rhinos.

2.6.2.2 Bound system

You need to carefully define the system in which you are going to intervene. Without placing some limitations on the area of focus, it would be impossible (or at the very least, impractical) to take a detailed look at all the variables and relationships contained within a system. Boundaries can be physical, organisational, or temporal. Bounding a system also involves epistemological concerns about what is deemed relevant and irrelevant. Although this will inevitably be subjective to a degree, to reach a consensus with diverse stakeholders you will need to explicitly justify the criteria you use to make these decisions.

Example: Rhino horn consumers residing in major cities (Hanoi & Ho Chi Minh) in Viet Nam.

2.6.2.3 Identify stakeholders

The overarching purpose of a systems thinking approach is to bring stakeholders together around a common goal, and create a comprehensive, co-ordinated, long-term action plan. As part of this, we want to appreciate multiple, partial, perspectives rather than solely regarding a single dominant perspective as the 'truth'. Different stakeholders have diverse perspectives, each of which is valuable, but this may cause conflicts. Dialogic processes are needed to negotiate how the problem should be defined.

It may be useful to explicitly consider any conflicts between a stakeholders' espoused purpose and their hidden priorities (Stroh, 2015). For example, a politician may be publicly committed to environmental issues, but their most pressing concern is re-election which could be less likely if they enacted unpopular policies. Understanding these conflicts can help you to develop strategies that may move stakeholders from their current level of support to a desired level of support.

Example: Local and international non-governmental organisations (TRAFFIC, Save Vietnam's Wildlife), prominent business leaders, elected officials, representatives from relevant government departments.

2.6.2.4 Map system

Once stakeholders have been identified and have agreed on a shared mission, you can begin to develop a causal map of the system. The purpose of this exercise is to answer a focused question and yield actionable insights, rather than to map an entire system (which would likely be an unmanageable task).

It would be helpful to have an experienced facilitator run workshops with diverse stakeholders. Focusing on the outcome variable (e.g., rhino horn consumption), stakeholders should collate a list of causes in small groups. This initial list can be based on evidence, expertise, or perceptions. They should then prioritize as group to prioritise important drivers as a starting point for the map.

Next, stakeholders need to identify the root causes of these prioritised causes. Ask “what other causes have a direct effect on this one?”. These additional causes should be added to the map, with an arrow denoting the direction of the effect. (Remember, this is a causal map rather than a mind map – linked variables must directly influence each other). Note how the two causes influence each other – does an increase in one lead to a decrease or increase in the other? Including as many causes as possible in the map now will later aid in the development of relevant interventions.

It can also help to identify broader themes, and the fundamental system parts operating at different levels. For example, you may wish to highlight norms (attitudes, values, and beliefs), resources (available human, social, and economic capital), regulations (policies and procedures), & operations (power/decision-making processes and structures) (Foster-Fishman et al., 2007).

Example: I have included a tentative systems map for rhino horn demand in Viet Nam in Figure 2-4. However, please remember that maps should not be the outcome of a single person, and this map is not exhaustive or complete. E.g., it does not include medical drivers, and represents only a single perspective.

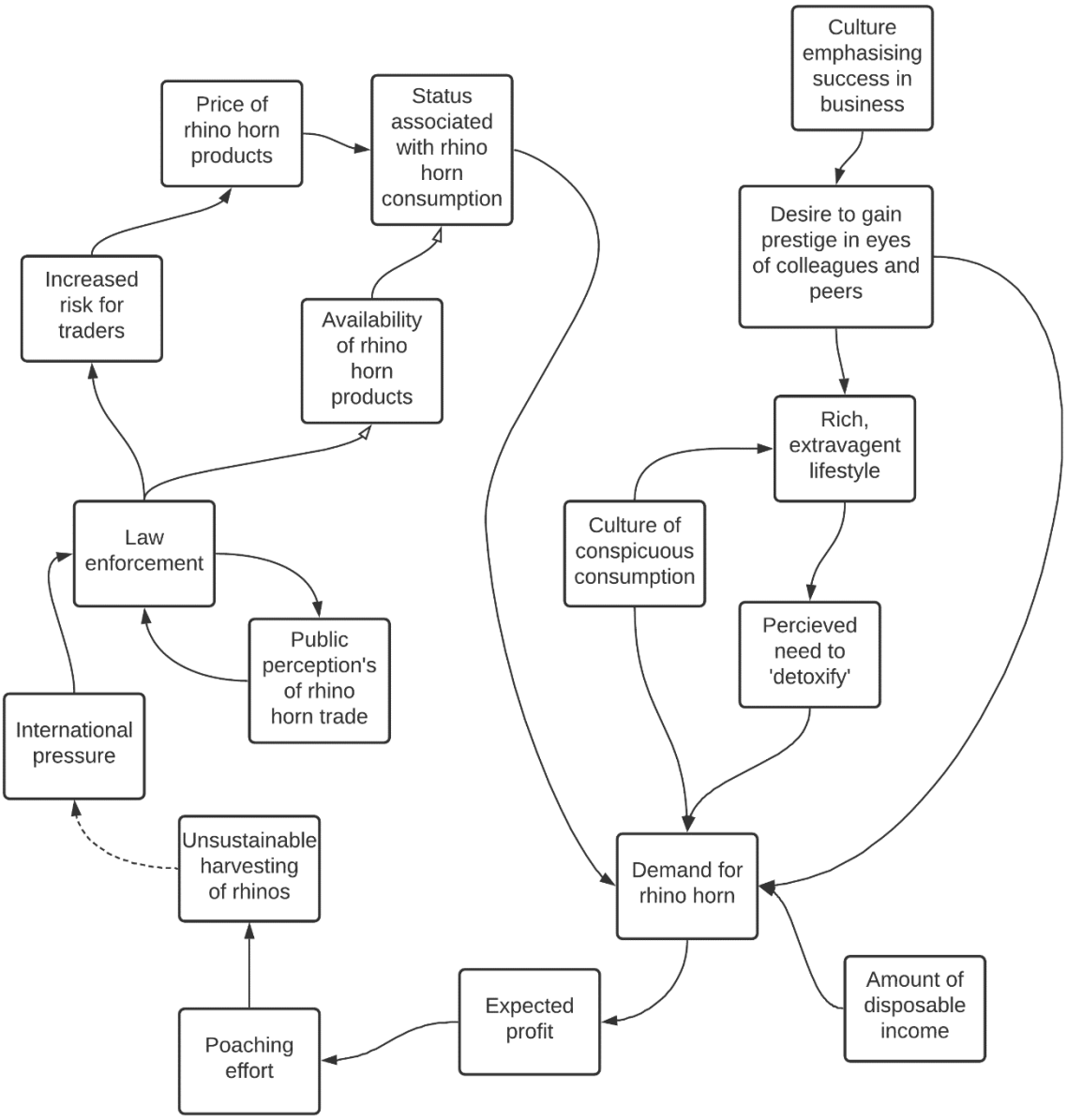

Figure 2-4. Initial causal map for rhino horn trade in Viet Nam. Note: this is not a complete causal map and reflects only a single perspective.

2.6.2.5 Identify leverage points

A common way to identify potential interventions is through the use of leverage points. These are places in the system where a small change could lead to a large shift in system behaviour (Meadows, 1999). They range from shallow to deep, and consist of four major system characteristics: parameters, feedbacks, design and intent (Abson et al., 2017).

- **Parameters**: mechanistic characteristics such as taxes, or physical elements such as rates of material flows
- **Feedbacks**: interactions between elements that drive internal dynamics (e.g., feedback loops) or provide information regarding desired outcomes (e.g., effectiveness of a given scheme)
- **Design characteristics**: structure of information flows, rules, power, and self-organisation
- **Intent characteristics**: norms, values and goals embodied within the system

Another way to look at how a system functions is with an action scales model. This is a simple tool representing a complex system through the lens of four systems levels (events, system structures, system goals and system beliefs), as a means of conceptualising where to intervene (Public Health England, 2019a). Events are behaviours and outcomes that arise from how the system functions. For example, a businessman consuming rhino horn in a nightclub. Intervening at this level may provide a short-term fix, but generally does not address underlying structures such as physical infrastructure, relationships between system parts, and the flow of information. Reshaping structures, for example improving the accessibility and affordability of Western medicine, is more likely to reduce the frequency of future events.

Goals drive system structures, and competing goals across different parts of the system may make it harder to effect change. Actions at this level try to change the targets or ambitions that the system (and people within it) are aiming to achieve, for example by establishing a conservation accreditation scheme for traditional medicine practitioners. Goals reflect the deeply held beliefs, norms, attitudes and values of the individuals and organisations within the system. These beliefs keep the system functioning as it does, and represent an additional level at which to intervene. For example, development of evidence to demonstrate that rhino

horn trafficking is detrimental to the local economy, or changing social norms which hold that rhino horn consumption enhances status.

Sustainable systems change is likely to require intervening at all four levels. Events must be tackled, structures redesigned, goals refocused, and beliefs transformed. However, stakeholders should look for opportunities where their efforts will have the greatest impact, which is often at the 'deeper' levels. The action scales model can be visually depicted as a set of scales with the weights of these four systems levels on one side (Figure 2.5). Larger weights represent greater likelihood of achieving systems change, but also increased difficulty in effecting these changes. The model can helps visualise a coherent set of actions that will move you from the current system (left side) to your desired reality (right side).

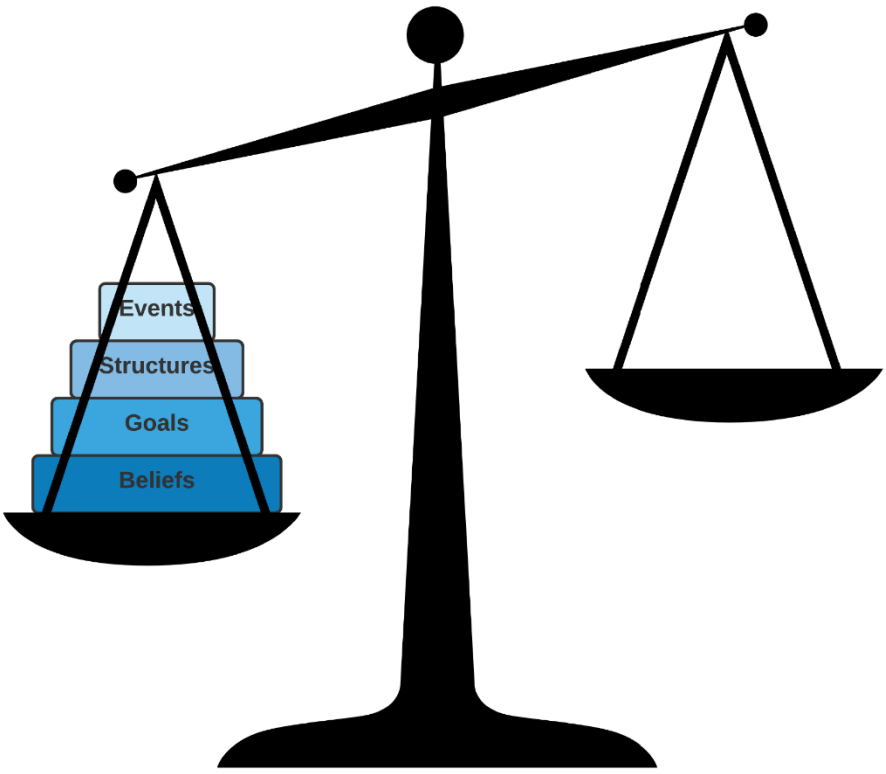

Figure 2-5. Action scales model (adapted from Public Health England, 2019)

Example: structural measures which target regulatory and institutional impediments to rhino horn trade in Viet Nam, and social pressures to change the attitudes and behaviours of rhino horn consumers (Naito et al., 2021).

2.6.2.6 Act

Once stakeholders have agreed on an action plan, and are confident in their shared purpose, action can begin. Interventions should be accompanied by continuous monitoring and adaptive management (Fuller Transformation Collaborative, 2019). This includes understanding the changing relationships and dynamics within the system (B. Williams, 2015). Generative approaches to causal inference, such as Bayesian Contribution Tracing or General Elimination Methodology, are particularly well-suited to a systems context (Befani & Stedman-Bryce, 2017; Patton, 2008). Regular evidence-based discussions between stakeholders will allow you to critically reflect on the process of achieving systems change, and consider opportunities to amplify success (Stroh, 2015).

Chapter 3: Developing a theoretical typology of motivations for wildlife use and consumption

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3.1 Abstract

The dominant approach to combating the illegal wildlife trade has traditionally been to restrict the supply of wildlife products. Yet conservationists increasingly recognise the importance of implementing demand-side interventions that target the end consumers in the trade chain. Their aim is to curb the consumption of wildlife or shift consumption to more sustainable alternatives. However, there are still considerable knowledge gaps in our understanding of the diversity of consumer motivations in the context of illegal wildlife trade, which includes hundreds of thousands of species, different uses, and diverse contexts. We developed a typology of common motivations held by wildlife consumers that can be used to inform conservation interventions, based upon consultation with multiple experts from a diversity of backgrounds, nationalities, and focal taxa. We identified five main motivational categories for wildlife use: experiential, social, functional, financial, and spiritual, each containing sub-categories. This typology is intended to facilitate more nuanced approaches to demand reduction, such as the tailoring of interventions — whether behaviour change campaigns, enforcement efforts, or incentive programmes — to the specific context in which they will be used. It is an important step towards producing a more systematic approach to designing demand reduction interventions that are more likely to succeed.

3.2 Introduction

Wild species have a long history of being traded and used by humans, but there is increasing conservation concern about over-exploitation to supply commercial trade in these animals and plants (Hughes, 2003; Challender and MacMillan, 2014). While many trade chains are sustainable and provide a range of benefits for local communities (e.g., Golden *et al.*, 2014), illegal and/or unsustainable trade in wildlife threatens the future of many species (Milner-Gulland *et al.*, 2003; Rosen and Smith, 2010). The illegal wildlife trade is estimated to be one of the largest and most lucrative international crime sectors, and has impacts that extend beyond harming those species directly traded, including undermining local livelihoods and damaging the broader stability of ecosystems (Rosen and Smith, 2010; Cardinale *et al.*, 2012; 't Sas-Rolfes *et al.*, 2019). Curtailing this trade is both a major conservation priority (Rosen and Smith, 2010; Challender, Harrop and MacMillan, 2015), and an increasingly high-profile global issue, as recognised by the United Nations in 2015, 2016, and 2017 (General Assembly resolution 69/314, 70/301, 71/326).

The dominant approach to combating the illegal wildlife trade has traditionally been to restrict the supply of wildlife products, through interventions such as trade bans, improved customs checks and anti-poaching measures, (Phelps, Carrasco, & Webb, 2014). More recently, conservationists are increasingly recognising the importance of demand-side interventions aimed at the end consumers in the trade chain (Verissimo and Wan, 2018). This new focus was highlighted in Decisions 17.44 to 17.48 at the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) 17th Conference of the Parties, which emphasised the need for increasing demand reduction efforts (CITES Secretariat, 2016). This trend is driving an increased focus on shifting individual behaviour through approaches such as social marketing and environmental education programs aimed at curbing the consumption of wildlife or shifting consumption to more sustainable choices (Veríssimo and Wan, 2018; Veríssimo *et al*., 2018).

Interventions to shift unsustainable wildlife demand should use research from behavioural science fields like sociology, marketing, and psychology (Veríssimo, Challender, & Nijman, 2012). This is because we need to better understand the drivers of consumption, and the internal or external barriers that inhibit consumers from shifting towards a desired behaviour (e.g., using a sustainable product). Knowledge of these factors enables conservationists to more effectively influence consumption patterns. A variety of behavioural models, including the theory of planned behaviour or the model of goal directed behaviour, can serve to enhance our understanding of the behaviour change process (Davis *et al*, 2015; Ajzen, 1985; Perugini and Bagozzi, 2001). Previous research has shown that interventions using behaviour change models to inform their design stage are more effective than those which do not leverage these models (Michie and Prestwich, 2010; Atkin and Rice, 2012).

One behaviour change model that has been widely used is the COM-B model (Michie, Stralen and West 2011). This model posits that there are three essential components for behaviour change to occur: the capability (the physical and psychological ability to change), the opportunity (a physical and social environment that is conducive to change), and the motivation (positive personal beliefs and desires towards change; Figure 3-1). This paper focuses on addressing key knowledge gaps around the third component, consumer motivation. We define consumer motivation as the drive to satisfy unmet needs and wants, whether physiological and/or psychological, through the acquisition of products (Pincus, 2004). Understanding the underlying motivations driving the uses of specific products, along with the societal and cultural context in which they are consumed, allows for more effective behaviour change interventions (Rothschild, 1999; Michie, Stralen and West, 2011; Taylor *et al*., 2009).

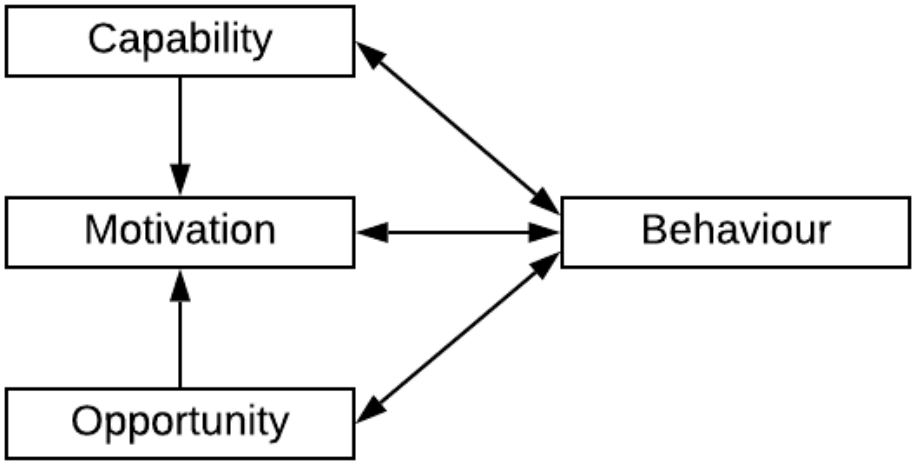

Figure 3-1. The COM-B system - a framework for understanding behaviour, based on capability, motivation, and opportunity (from Michie, Stralen and West, 2011)

The wildlife trade encompasses a diverse range of wildlife products used for a variety of purposes. Uses range from rhino horn being consumed by Vietnamese businessmen as a signal of their social status or a remedy for hangovers (Truong *et al.*, 2015), to bushmeat consumption in Gabon driven by the need for a healthy diet (Milner-Gulland *et al.*, 2003), to illegally imported orchids used for ornamentation in China (Williams *et al*., 2018). Approaches to reduce demand need to consider this diversity of motivations and uses, yet currently there is no applicable taxonomy for motivations in the context of the wildlife trade.

This paper provides a typology of common motivations held by end consumers in the trade chain that can be used to inform conservation interventions. It is intended to facilitate more nuanced approaches to behaviour change, such as the tailoring of interventions — whether behaviour change campaigns, enforcement efforts or incentive programmes — to the specific context in which they will be used. We also wish to highlight the diversity of demand for wildlife products which necessitates a diversity in demand reduction approaches. We begin by describing the work that has been undertaken to catalogue motivations for wildlife use so far,

and outline our methodology. We explain our typology in detail, including several case studies. We then move on to potential direct applications for this typology and the importance of identifying motivations as part of baseline research. Finally we provide an outline for future research that may help to guide interventions efforts, for example, to compare whether different motivations are impacted differently by different types of interventions.

3.3 Expert elicitation techniques

Expert elicitation is the process of synthesising the subjective judgments of experts on a subject, particularly useful where there is insufficient data (Slottje et al., 2008). It utilises and makes explicit the accumulated experience and knowledge possessed by experts, and has been applied to multiple case studies in conservation (e.g., Arlidge et al., 2020; Hemming et al., 2018; Petrolia et al., 2020). Experts are those who possess substantive information on a particular topic and who are often deferred to in its interpretation (Martin et al., 2012). Efforts should be always made to structure the procedure in a way that minimises inherent biases in subjective judgment. Ideally a balanced and well-composed multidisciplinary sample of experts are selected, and the actual elicitation process can take place using a variety of formats, including email surveys, phone interviews, and group workshops.

Various approaches to expert elicitation have been developed, but there are five general steps. These are 1) deciding how expert knowledge will be used, 2) determining what to elicit, 3) designing the elicitation process, 4) performing the elicitation, and 5) encoding the elicited information (Martin et al., 2012). Specific approaches include the Delphi method and IDEA protocol, and in practice resources often determine the extensiveness of the expert elicitation procedure (Martin et al., 2012; Petrolia et al., 2020; Slottje et al., 2008). For example, in the Delphi method there will be an initial questionnaire leading to multiple rounds of interactions between experts and the researchers facilitating the study (Doria et al., 2009). A consensus between 51-80% of the experts can be deemed acceptable, and is usually achieved after two

to four rounds (Doria et al., 2009; Hasson et al., 2000). In each round any outstanding issues from the previous round are raised and refined, such as definitions of concepts. Although not applicable to this research, expert judgements can take the form of statistical estimate which can be quantified to inform model parameters, for example, defining the prior probability distributions when building Bayesian networks (Low-Choy et al., 2009).

3.4 Review of consumer motivations

In the consumer literature motivation is defined as an inner drive that reflects goal-directed arousal, which results in a desire for a product goals (Sirgy et al., 2014). In other words, it is the drive to satisfy needs and wants through the acquisition of products (Pincus, 2004). It is therefore key to develop deep insights through examining the underlying motivations behind the specific uses of species and/or the psychology of the consumers, and the societal and cultural context within which they make their choices. The psychologist Abraham Maslow developed a hierarchy of needs to explain personal growth as a progression from basic survival needs to more sophisticated psychological desires, based on six levels (Wahba & Bridwell, 1976):

- Physiological – basic needs such as food, water and sleep
- Safety and security – physical safety, secure employment and shelter
- Belonging and love – friendship, family, and a desire for group acceptance
- Esteem – recognition of status and self-respect
- Self-actualisation – the desire for self-fulfilment
- Self-transcendence – meaning beyond the self

These are supposedly the universal basic needs that are behind conscious motivations. When a lower level need is satisfied the next will emerge, and in this way humans are perpetually seeking. The actual hierarchy lacks empirical support however, and the rank-ordering of the needs has been questioned (Wahba & Bridwell, 1976). The hierarchy is based on Western ideology and popular with Western marketers, but is considered ethnocentric by some and

does not account for differences in cultural needs of societies (Hofstede, 1984). The hierarchy was based on research with American subjects and has been shown to not apply to collectivist cultures (Gambrel & Cianci, 2003). For example, while self-actualisation and self-fulfilment may be important needs within individualistic societies, a collectivist society places heavier emphasis upon belonging within a community and acceptance (Hofstede, 1984). Trade in wildlife products is a global phenomenon, and a typology of motivations for wildlife use needs to be able to generate a nuanced understanding of consumers in different cultures (Wahba & Bridwell, 1976).

Later research from cognitive social psychology recognised that goals or needs are organised in hierarchical systems, in which higher-order goals are vertically linked to sub-goals (Kruglanski et al., 2002). However, multiple goals may active at any given time – i.e., a consumer can value a product for both the functional benefit it provides and the social status it confers (Barbopoulos & Johansson, 2017; Lindenberg & Steg, 2007). Consumer research began to focus more closely on consumption behaviours, identifying values that are oriented to the achievement of specific goals and influence consumer choice (Sheth et al., 1991; Sirgy et al., 2014). For example, the theory of consumer values (namely functional, social, emotional, epistemic, and conditional) has been tested in over 200 consumer choice situations, and has excellent predictive validity (Sheth et al., 1991).

Many consumer theories and frameworks are unidimensional, developed for single product types, or situational variability (Barbopoulos & Johansson, 2017). However, the consumer motivation scale is multi-dimensional, incorporating potential sub-goals (Table 3-1). It is also sensitive to context, measuring situational variance, while still being relevant to a wide variety of products. It recognises that people are driven by both intrinsic and extrinsic motivations and builds upon three higher order “master goals”: the gain goal (to protect or develop one's resources), the hedonic goal (to feel better right now), and the normative goal (to act appropriately) (Barbopoulos & Johansson, 2017; Lindenberg & Steg, 2007). Each of these

master goals represents distinct sub-goals. In developing and validation this scale the authors drew upon theoretical constructs from economics, sociology, and psychology. However, it does not represent an exhaustive list, and further sub-goals may be identified and incorporated.

Table 3-1. The nine preliminary sub-goals of the gain, hedonic, and normative master goals (Adapted from Barbopoulos & Johansson, 2017)

Goal	Sub-goal	Underlying motive
Gain	Value for Money	To get value for money, pay a reasonable price, avoid wasting money
	Quality	To get something of high quality and reliability, that meets one's highest expectations
	Function	To get something useful and practical, that serves many purposes
	Safety	To feel safe, calm and prepared for the unforeseen
Hedonic	Pleasure	To get something that satisfies immediate needs, that makes one feel good and happy
	Stimulation	To get something exciting, stimulating or unique, avoid dullness
	Comfort	To get something pleasant and comfortable, avoid hassle and discomfort
Normative	Ethics	To act in accordance with one's moral principles and obligations, avoid guilt
	Social Acceptance	To make a good impression, identify with peers, live up to expectations

3.4.1 Existing typologies for motivations in IWT

Despite previous research on consumers in the wildlife trade (e.g., Drury, 2011; Shairp et al., 2016; Theng, Glikman and Milner-Gulland, 2017), only a few studies have collated a list of specific motivations. A typology of consumer roles described in Phelps *et al*. (2016) outlined the different uses for wildlife products, and provides insights into the key actors in wildlife market chains. This focus on “types of use” differs from “motivations for use” though, as people can use the same product in a similar way (e.g., eating, building), yet have very different motivations behind that usage. For example, pangolin meat may be consumed for basic subsistence needs in Ghana, but it is predominantly used to display social status in Vietnam

(Boakye *et al.*, 2016; Shairp *et al.*, 2016). Although the behaviours are superficially the same (consumption of pangolin meat), due to the differing motivations the two sets of consumers are highly unlikely to respond to the same intervention strategy.

As part of acknowledging the complexity of demand, Ayling (2015) called for a more systematic approach to addressing wildlife consumers and highlighted examples of demand, such as demand simply for personal pleasure. This piece was followed by an initial list of motivations, which identified a set of ten motivational clusters that influence wildlife product use around the world (Burgess, 2016). This approach was developed further by Thomas-Walters (2017), in which clusters, such as “functional”, became umbrella headings for other, more specific, motivations, such as “medicinal” and “nutritional”. However, this initial categorisation had some gaps, particularly with regards to common uses for plant products, such as fuel and housing/craftmanship. It also lacked validation by experts outside of the East Asian cultural sphere.

3.5 Methods

For this study we drew upon these umbrella clusters to develop a comprehensive typology of motivations. We wished to fill gaps, including the omission of categories such as the use of wildlife products for fuel, and ensure that the typology could be applied globally. This process involved iterative rounds of feedback from multiple experts from a diversity of backgrounds, nationalities, and focal species. We identified experts as someone who had studied at least one specific case study of motivations for the use or consumption of a wildlife product, and who had general knowledge of the wildlife trade. This was not restricted to those working in academia, but ability to attend an in-person workshop at a wildlife trade conference was required. Experts were selected to ensure that we had representatives with knowledge of trade in wildlife species across all relevant taxonomic groups, from orchids to pangolins, tropical timbers to sea turtles (Table 1). They came from across academia, conservation practice,

policy, and the private sector, and had worked in key consumer countries around the world, including in Asia, Europe, and North America. Experts had training in a range of social and natural science disciplines.

Table 3-2. Areas of expertise represented by key experts included in the workshop. Includes sectors, species, countries, and disciplines.

Areas of expertise	**Represented**
Sectors	– Academia, e.g., researchers
	– Nongovernmental organisations, e.g., wildlife conservation charities
	– Business, e.g., commercial consulting
	– Policy, e.g., former civil servants
Species	– Mammals, e.g., saiga and pangolins
	– Birds, e.g., songbirds
	– Fish, e.g., sharks and arowana
	– Reptiles, e.g., sea turtles
	– Amphibians, e.g., Asian grass frogs
	– Plants, e.g., trees and orchids
Countries	– Asia, e.g., China and Indonesia
	– Europe, e.g., UK
	– North America, e.g., USA
	– South America, e.g., Trinidad and Tobago
	– Africa, e.g., São Tomé and Príncipe and Tanzania
	– Australia, e.g., New Zealand
Disciplines	– Natural sciences, e.g., ecology

	– Social sciences, e.g., anthropology, geography, government policy, international law and psychology – Interdisciplinary, e.g., conservation, marketing and wildlife trade

The draft typology was developed by five of the co-authors, building on the previous typologies described above, and then updated based on written feedback from another 10 experts. To refine the typology further we held a workshop at the IWT Evidence to Action 2018 symposium with approximately 30 participants. Issues of linguistic uncertainty identified during email consultation were resolved at the beginning of the workshop. Ethics approval was granted by the University of Kent School Research Ethics Advisory Group, reference 10-PGR-18/19. Expert panels can result in the loss of diverse opinions and domination one or more members of the group (Martin et al., 2012). However, they also provide a forum to pool knowledge and reach agreement amongst experts on the topic at hand. To minimise the potential risks, we had an initial feedback round prior to the workshop via email where responses were not shared, and we also held smaller focus groups within the workshop.

The workshop involved a structured roundtable discussion with multiple rounds of comments, followed by a final round of adjustment to reach a qualitative consensus on the typology. The roundtable discussion involved every attendee and was facilitated by the core author group, giving everybody present an opportunity to comment on each aspect of the proposed typology, including its structure and definitions. We considered consensus to be reached when no attendee had any remaining objections or questions, with the understanding that that there would be opportunity to provide further written feedback when the typology was revised in line with the workshop discussion. We introduced the typology in detail and explained the changes we had made in response to preliminary feedback. All suggestions from participants were noted and discussed in the workshop.

We additionally raised some outstanding issues that required extra consideration, for example: 1) Should recreational drug use, pet ownership and “aphrodisiacs” constitute their own categories? and; 2) How best to define and portray complex motivations that stem from culture, tradition, and spirituality? Multiple points of view and relevant examples were put forward until there was broad agreement amongst participants as to the appropriate course of action. We then asked the attendees to split into focus groups, select specific wildlife trade products, and see how they would fit into the proposed demand taxonomy. This involved groups considering whether motivations were adequately represented for a range of wildlife product purchases, such as commercial shop owners displaying arowana fish in their shops for an indirect benefit, or traditional medicine patients purchasing lion bone solely because the desired product, tiger bone, is unavailable. Each focus group was facilitated by one of the core author group. After a final round of discussion within the workshop, we made further refinements based on the feedback received. The workshop was followed by further iterative rounds of comments and edits with the co-authors of this article until all were satisfied with the accuracy and usefulness of the typology as presented below.

3.6 Wildlife consumers motivation typology

We identified five main motivational categories for wildlife use and consumption: experiential, social, functional, financial, and spiritual, each containing sub-categories (Figure 3-2). Consumers who are driven by experiential motivations are seeking to fulfil hedonistic pleasure, provide novelty, or satisfy curiosity (Holbrook and Hirschman, 1982; Park, Jaworski and MacInnis, 1986; Baumgartner, 2010). Social motivations entail the desire to form or strengthen social relationships (Barbopoulos & Johansson, 2017; Sheth, 1991). They may include aspects such as a need for companionship (as may be the case in pet ownership) or conspicuous consumption to impress peer groups (Baumgartner, 2010; Giovannini, Xu and Thomas, 2015; Lu et al., 2016). This latter motive for consumption is based on the idea of

Veblen goods, the expense of which signals the social class of the possessor (Goodstein and Polasky, 2014).

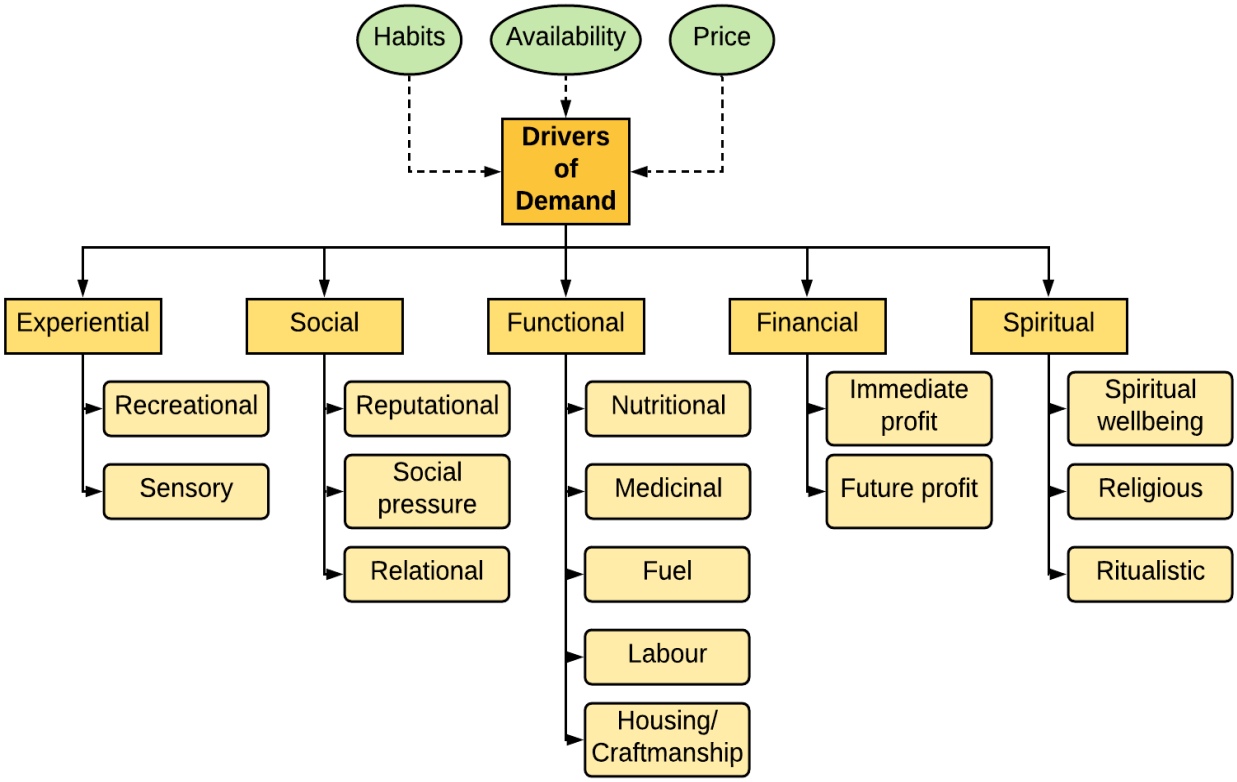

Figure 3-2. Typology overview for the motivations behind the use of wildlife products, showing five main motivational categories (experiential, social, functional, financial, and spiritual) and sub-categories,

In contrast, functional motives rely on the practical use of a product or the function it performs (Baumgartner, 2010; Sheth *et al*. 1991). In our typology, this category of functional covers wildlife products acquired to fulfil an everyday purpose or function, such as hunger or heating. A related but distinct category is financial, where material goods are desired for the monetary value they may provide. Consumer research has not paid much attention to profit-seeking purchases in the past, but they are an important facet of consumption (Zhou and Pham, 2004). Finally, we come to the purchase of material goods to fulfil spiritual needs, and/or bring

protection, luck, or fortune in business and life (Richins, 2005; Skousgaard, 2006; Park and Baker, 2007). Although we refer to this category as spiritual motivations, behaviours practiced in the search for existential meaning or the sacred may be embedded within cultural practices and have social functions also (Oman, 2013). It is difficult to fully separate spirituality and religiousness as concepts, but the former is seen in more personal, experiential terms which may or may not involve the 'Divine', while the former incorporates institutional beliefs and practices (Gall et al., 2011; Rose, 2001; Zinnbauer et al., 1997).

This typology builds upon the existing literature, and is closely related to the motivational clusters suggested in Burgess (2016). However the categories presented here are more comprehensive, gaps such as fuel or craftmanship have been filled in, and it has been applied to demand for wildlife products outside of the East Asian cultural sphere. The structure also differs from previous work. Instead of a list of possible motivations we have identified overarching categories to group drivers that are closely related. Our higher order categories map those identified in the theory of consumer values and the consumption motivation scale – social, experiential (or hedonic), and functional (or gain), with the addition of spiritual and financial (Barbopoulos & Johansson, 2017; Sheth, 1991). This is because we wished to take into account the most influential motivations relevant to the wildlife trade and to practitioners, based on the expert elicitation process. Moral principles were not identified as a driver of specific wildlife purchases so were omitted from this typology, but we acknowledge that they could arise as a significant preventative influence on consumption. Category names may have been altered slightly to be more comprehensible to a lay audience (e.g., experiential rather than hedonic or epistemic).

For this work, we have focussed on motivations that drive demand for specific products, but acknowledge that there are a multitude of contextual and enabling factors that could also affect

usage such as habits, availability, and price. For instance, someone may desire tiger bones for a traditional remedy but be unable to purchase any, so they opt to buy lion bone instead. In this case, availability has affected the consumer's decisions, but the underlying motivational driver is still medicinal. Similarly, a large number of people in both Vietnam and China value ivory for its ornamental qualities, but use is much lower in Vietnam because potential consumers currently lack the financial means to purchase it (National Geographic and GlobeScan, 2015). A detailed description of the behaviours driven by the different motivations is laid out in Table 2.

Table 3-3. Detailed typology for the motivations behind the use of wildlife products, with a definition and examples for each category and sub-category.

Category	Description	Examples
1. Experiential	Motivated by the desire to fulfil hedonistic pleasure, provide novelty, or satisfy curiosity (Barbopoulos & Johansson, 2017; Sheth, 1991)	
a) Recreational	Motivated by the desire for leisure or pursuit of a pastime activity	E.g., Musical instruments made from armadillo hide in Bolivia (Peredo, 1999)
b) Sensory	Motivated by the desire to please the senses, including aesthetic, olfactory, and tactile	E.g., An appreciation for the feel or texture of animal fur (Downes, 2018)
2. Social	Motivated by the desire to form or strengthen social relationships (Barbopoulos & Johansson, 2017; Sheth, 1991)	
a) Reputational	Motivated by the desire to give others a certain impression, or to benefit socially; or to gain currency	E.g., Rhino horn given as a gift in Vietnam (Vu and Nielsen, 2018)

	in a business transaction, or highlight social standing or wealth	
b) Social influence	Motivated by direct influence from peers, family members, or those in influential positions such as health professionals; or indirect influence through perceived socially normative behaviours and attitudes.	E.g., Social expectations driving shark fin soup at weddings (Cheung and Change, 2011)
c) Relational	Motivated by the desire for companionship; or for closeness to a larger social group or cultural/national identity.	E.g., Pet ownership (Bush, Baker and Macdonald, 2014)
3. Functional	Motivated by the need to fulfil an everyday purpose or function (Barbopoulos & Johansson, 2017; Sheth, 1991)	
a) Nutritional	Motivated by the desire to fulfil a dietary need, such as protein or food, for people, their livestock, or pets	E.g., Wild caught fish traded globally (Pauly et al., 2002)

b) Medicinal	Motivated by the desire to treat an illness or promote wellness (i.e. curative/preventative)	E.g., Cordyceps caterpillar fungus traded as medicine in China (Holliday and Cleaver, 2008)
c) Fuel	Motivated by the need to cook or generate heat	E.g., Acacia wood sold from East Africa for charcoal (Okello, O'Connor and Young, 2001)
d) Housing/crafts	Motivated by the desire for shelter, clothing and other practical items	E.g., Iroko tree used in Benin to build furniture (Ouinsavi, Sokpon and Bada, 2005)
e) Labour	Motivated by the desire to exploit the labour of working animals	E.g., Working elephants in Myanmar (Leimgruber et al., 2008)
4. Financial	Motivated by the desire for financial gain (Zhou and Pham, 2004)	
a) Immediate profit	Motivated by the desire to generate income	E.g., Slow loris used to sell "selfies" in Turkey (Kitson and Nekaris, 2017)
b) Future profit	Motivated by the desire for future profit or an investment strategy	E.g., Ivory used as an investment in China (Gao and Clark, 2014)

5. Spiritual	Motivated by the desire to fulfil spiritual needs, and/or bring protection, luck, or fortune in business and life; sometimes interlinked with cultural practices (Skousgaard, 2006; Gall et al., 2011)	
a) Spiritual well being	Motivated by the desire to improve one's fortune in this life or any others	E.g., Ornamental fish used to improve feng shui (Ng, 2016)
b) Religious	Motivated by the desire to practice, engage, or signal an affiliation with an organised religion, or spiritual belief	E.g., Lansan tree resin used to make incense for religious services in St Lucia (Daltry et al., 2015)
c) Ritualistic	Motivated by the desire to practice rituals or traditions	E.g., Songbirds bought as a rite of passage for young men in Indonesia (Anggraini, 2017)

When applying this typology there are three key aspects that need to be considered. First, it is a multivariate rather than discriminate typology. Although the motivational categories are discrete, products may well be used for multiple reasons and thus conservationists should not use this typology to pigeonhole consumers, who may be driven by multiple motivations. Indeed, using the typology as a checklist when doing formative research into consumer demand may help academics and practitioners keep an open mind regarding what motivations are driving the trade. For example, one of the largest threats to songbirds (*Passeriform spp*.) in Southeast Asia is the capture of wild birds to be kept as pets (Souto *et al.*, 2017), particularly in Indonesia (Bergin *et al.,* 2018; Burivalova et al., 2017). These birds are highly valued for their beauty and singing ability (Regueira and Bernard, 2012). They are entered into songbird competitions, and winners receive both social status and monetary prizes (Jepson, Ladle and Sujatnika, 2011). The ownership of a songbird is also considered a rite of passage for young men in some parts of Indonesia (Anggraini, 2017). Each of these motivations is distinct, but they may be simultaneously held by consumers (Figure 3-3). Moreover, while each of these motivations are distinct, some of them may be more pressing than others. In such cases, techniques for examining the attributes that influence consumer choice can be used to quantify the relative strength of different motivations (Hanley, Mourato and Wright, 2002). For example, choice modelling, a stated preference method, works on the assumption that participants in a hypothetical market situation will choose products that will provide them the highest level of utility, revealing which attributes different consumer segments most value (Hinsley, Verissimo and Roberts, 2015; Shairp *et al*., 2016). Exploratory and confirmatory factor analyses can also be applied to psychometric scales in surveys to assess the relative importance of different motivations (e.g., Clary & Snyder, 1999).

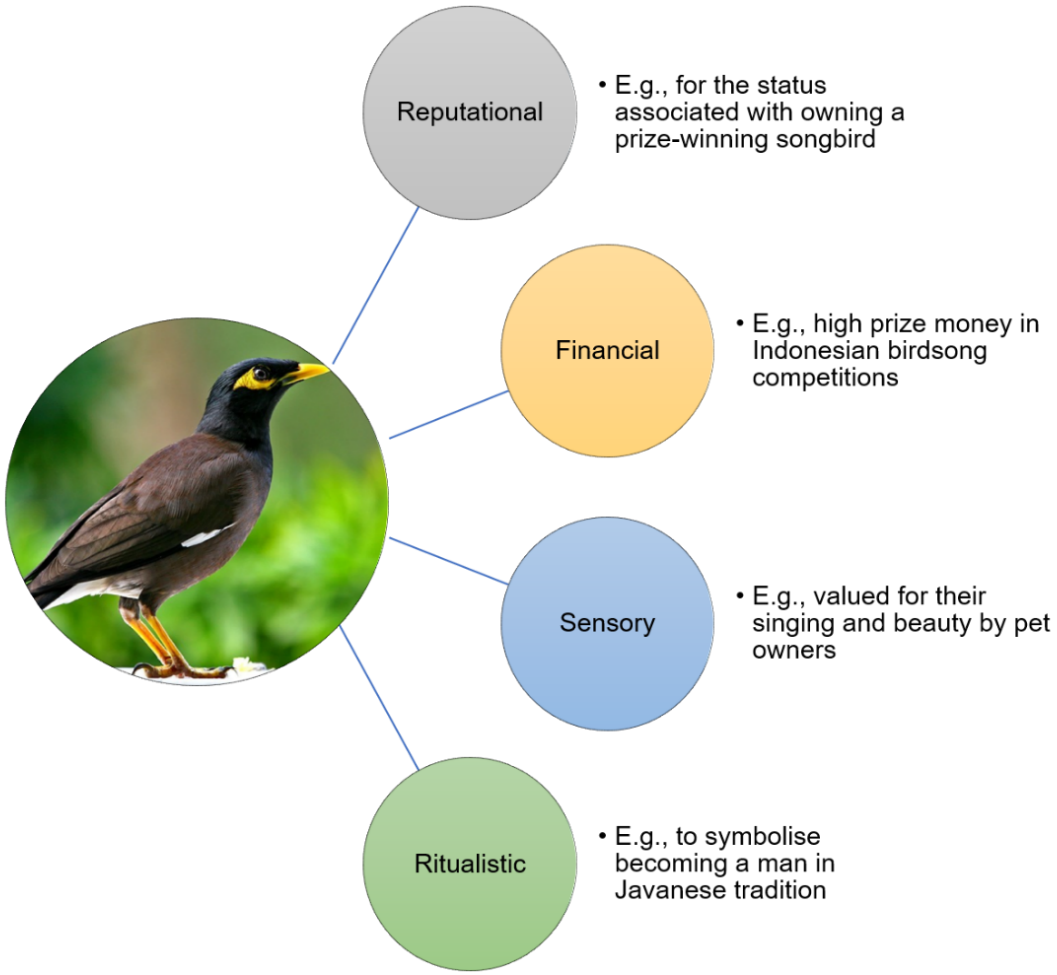

Figure 3-3. Reputational, financial, sensory, and ritualistic motivations associated with the purchase of songbirds (Souto *et al.*, 2017; Jepson, Ladle and Sujatnika, 2011; Regueira and Bernard, 2012; Anggraini, 2017)

The second consideration is that although some motivational categories (e.g., financial gain) may apply to multiple actors along the trade chain, our typology focuses on the end consumers so care is needed to understand which groups are actually driving demand. For example, seahorses (*Hippocampus* spp.) are used globally in traditional medicine (Figure 3-4), with the largest demand coming from China and Taiwan (Foster et al., 2019). Dried seahorses are used as a remedy for a variety of medical conditions in traditional Chinese medicine (TCM), including sexual dysfunction and difficult childbirth (Rosa and Defavari, 2013). If a Chinese man visited a TCM practitioner for an arthritis treatment and was prescribed dried seahorses,

then the demand for seahorses is not necessarily coming from the patient. If he just wished to have a generic remedy and was happy to take whatever he was prescribed, then the species-specific demand would actually be coming from the TCM practitioner. It may therefore be more effective to target these intermediaries in the trade chain rather than the consumer himself. This example of mediated demand is different from someone who specifically requests seahorses because of a belief in their curative properties, which is where our typology would be of use in consumer segmentation.

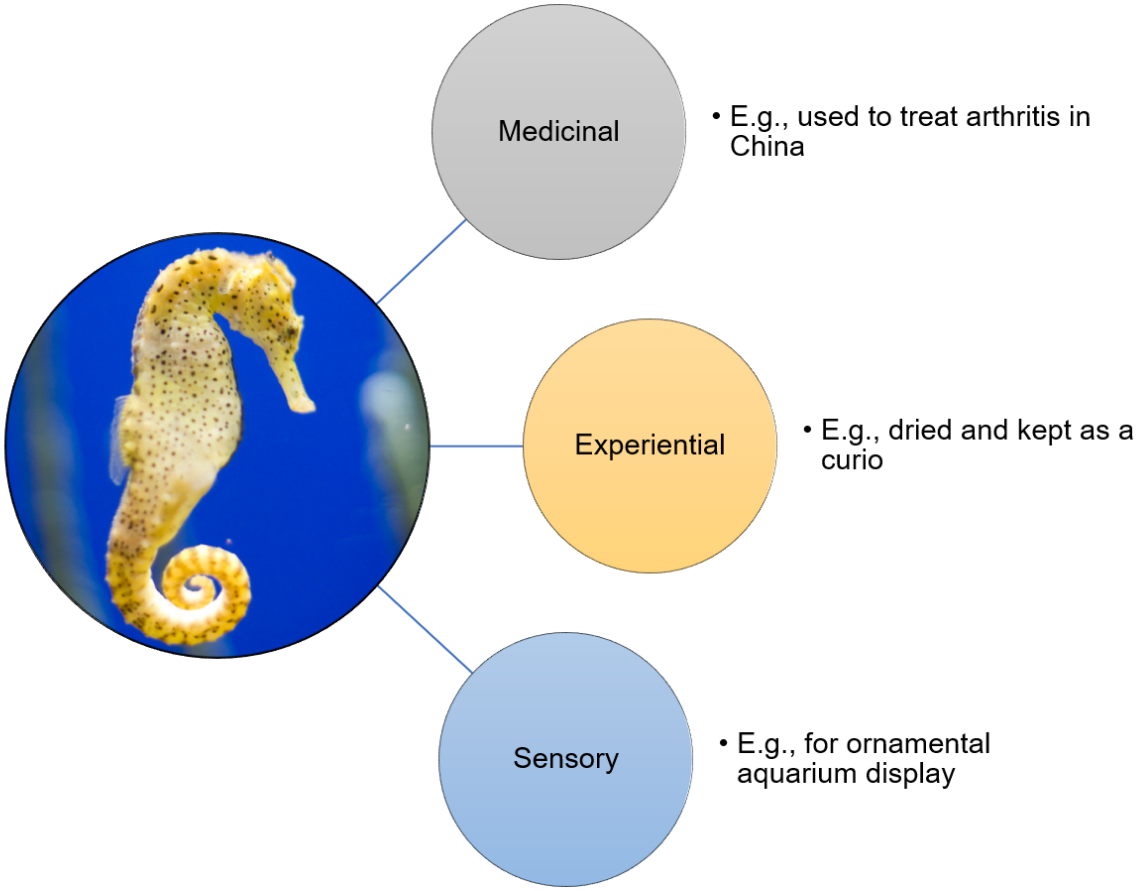

Figure 3-4. Medicinal, experiential, and sensory motivations associated with the purchase of seahorses (Kumaravel et al., 2012; Foster et al., 2019; Martin-Smith and Vincent, 2006)

The third consideration relates to the COM-B model, which recognises that motivation is only one of the factors that enable behaviour change (Michie, Stralen and West, 2011). Thus, while it is always important to understand motivations, in some cases it will be more effective to use

structural or legal interventions that target capability and opportunity (Rothschild, 1999). For example, there is great demand by international consumers for orchids (Hinsley *et al.*, 2017), with people buying these plants as a hobby and out of an aesthetic appreciation for their beauty (Figure 3-5). In some cases, many of these plants are illegally supplied from the wild and so conservationists might seek to tackle the problem through a demand reduction intervention. However, research on consumers shows that for collectors in China, colourfulness is a larger motivator than origin (Williams *et al.*, 2018). Therefore, a more cost-effective conservation strategy may involve facilitating artificial propagation of more colourful orchids, or to improve enforcement so as to increase the costs and barriers of importing wild-sourced plants.

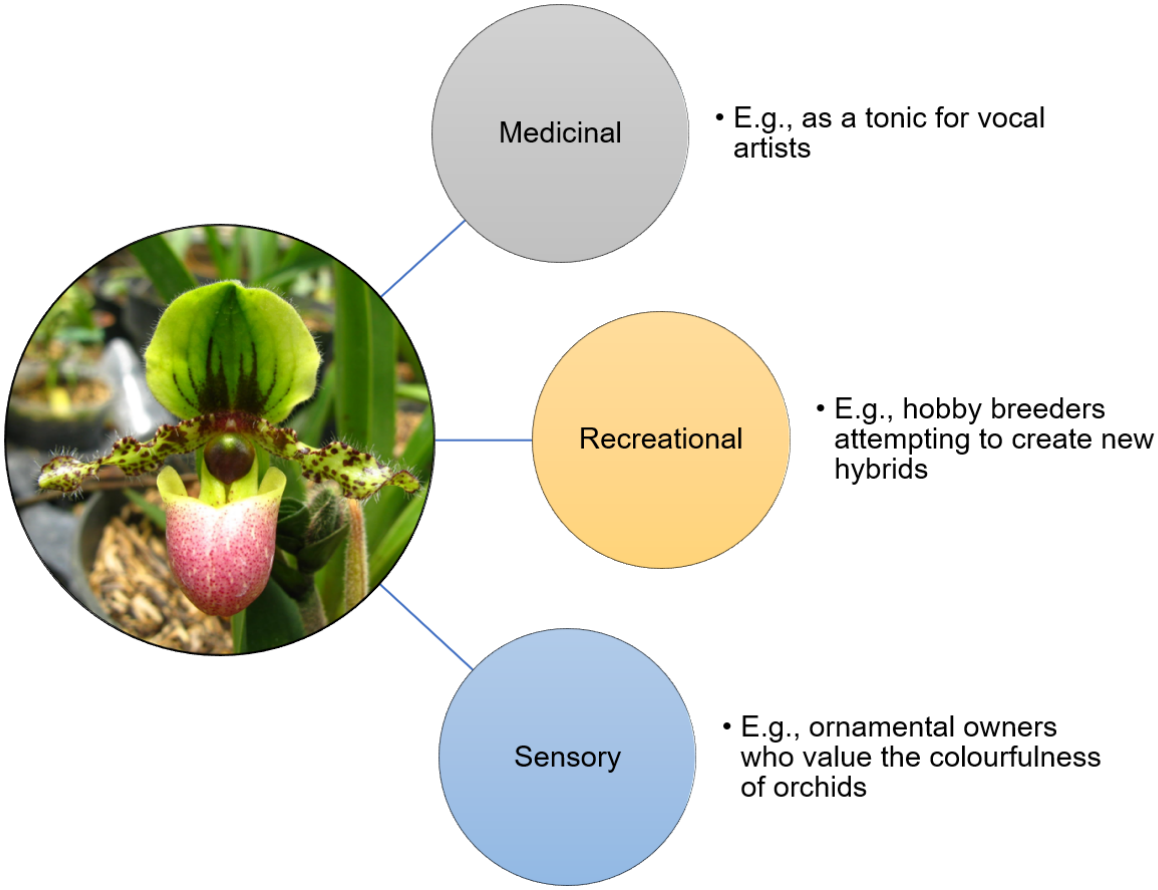

Figure 3-5. Medicinal, recreational, and sensory motivations associated with the purchase of wild-sourced orchids (Liu et al., 2014; Hinsley *et al.*, 2017; Williams *et al*., 2018)

3.7 Typology applications

There are two key ways that our typology could contribute to the conservation of illegally traded species. First, it allows the segmentation of target consumers by motivation. In social marketing, for instance, segmentation is used because people with comparable attributes generally respond similarly to different messaging strategies (Nisbet and Scheufele, 2009; Graham and Abrahamse, 2017), allowing for more focussed and efficient interventions (as opposed to a traditional “one size fits all” approach). Demand reduction interventions in conservation rarely attempt this step (Greenfield and Veríssimo, 2018), but when they do they frequently classify people by demographic variables such as age and gender. Segmentation based only on demographics, however, largely neglects the psychographic profiling of customers that can provide more useful information (Lin, 2002). The health sector has recognised the value of psychographics for connecting with target audiences (Boslaugh *et al.*, 2005) and there are strong parallels with the design of behaviour change interventions in conservation, for example, the use of the COM-B model in understanding undesirable consumer behaviours (Atkins and Michie, 2013).

Such segmentation is also important to the design and enforcement of legal-regulatory frameworks targeting consumers. For example, the effectiveness of enforcement measures is may differ across motivations. Further, the willingness of officials to enforce laws that contradict their own deep-rooted beliefs should also be considered when designing interventions, as evidence suggests that imposing strict laws that conflict strongly with prevailing social norms may backfire (Acemoglu and Jackson, 2017). These broader examples underline the importance of identifying the main motivations amongst consumers in each market as part of baseline research. Where possible, motivations may even be quantified using economic concepts such as utility theory (Goodstein and Polasky, 2014). However, it is important that such work accounts for researcher/practitioner bias, especially when

conservationists are from a different culture to the target audience. Thus, it is key that conservationists undertaking consumer research to understand the audience's perspective and motivations collaborate with local actors.

A second application for our typology is in the design of new research and novel interventions. For instance, it could be adopted when evaluating the success of addressing different motivations for consumption, and identifying the most influential motivators for specific groups (Burgess, 2016; Thomas-Walters, 2017). Another as-yet unexplored avenue for future research is the potential for shared messaging strategies, or whole interventions, targeting products that are purchased by the same consumer group due to the same motivations (Burgess, 2016). For example, if there is a key consumer group that desires both ivory and rosewood for their aesthetic qualities and the prestige associated with owning them, it could be that one intervention could successfully target both behaviours, or the same strategy could be used consecutively on the same group to target each behaviour. The former approach is supported by related research on behavioural spillovers, which has shown that changing one behaviour can sometimes lead to alterations in other, similar behaviours (Truelove *et al.*, 2014). Harnessing shared motivations to address consumption of multiple products within a single intervention would be of enormous value in conservation, where funds and resources are often limited (Bottrill *et al.*, 2008; McDonald-Madden, Baxter and Possingham, 2008).

3.8 Limitations and next steps

Resources did not permit a global survey of consumers, so we instead relied on the judgements of those with substantive knowledge of the consumer demand and the wildlife trade when developing this typology. A wide array of experts with different disciplinary backgrounds and experience were able to reach a consensus on its structure and contents. However, applying the typology in formative research involving actual actors in the wildlife

trade is a vital next step. There are two options that would be of immediate use to expand upon and validate the typology.

Firstly, a previous review of the existing literature and unpublished data regarding the nature of the demand for threatened wildlife in Viet Nam applied the motivational clusters from Burgess's 2016 paper to pinpoint key motivations and behaviours associated with demand for pangolin, elephant and rhinoceros species (Burgess, 2016; Thomas-Walters, 2018). This enabled the identification of possible initiatives to influence target consumers, and highlighted evidence gaps that should be addressed for an evidence-based and result-based approach to reducing demand. Having independent researchers use this current typology in a review of the literature on selected wildlife products would demonstrate whether reviewers consistently identify the same motivational categories, and how the typology applies to different product types and contexts. This would strengthen our belief in the applicability and usefulness of the typology.

Secondly, we would benefit from developing a psychometric scale that could be used in consumer surveys to identify predominant motivations. A common scale would reduce erroneous interpretation of findings and maintain data quality when measuring consumer motivations, but the scale would first need validation and reliability testing to be recognised as an appropriate research tool (Coaley, 2014; Whitehouse-Tedd et al., 2020). Construct mapping and factor analysis would help ensure it has internal consistency and temporal stability, and content, construct, and criterion validity.

3.9 Conclusion

By mapping out motivations, conservation practitioners and researchers will elucidate the complexity of both individual wildlife product usage, and the wildlife trade overall. This underlines the importance of consumer research, which is lacking for most demand reduction

interventions (Greenfield and Veríssimo, 2018). Our analysis provides a broad, globally-applicable typology that can underpin the development of a common language for wildlife trade research, making it easier for practitioners and researchers to identify relevant previous studies containing lessons that could inform potential future interventions. Thus, it is an important step towards producing a more systematic approach to designing effective demand reduction interventions.

Chapter 4: Challenges in the impact evaluation of behaviour change interventions: The case of sea turtle meat and eggs in São Tomé

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4.1 Abstract

Robust impact evaluations are needed for conservation to learn and grow as a field. Currently we lack a large body of evidence on the effects of behaviour change interventions in social-ecological systems. By uncovering mechanistic relationships and establishing causality we can refine future programmes to enhance likelihood of effectiveness. Although a range of sophisticated methodological approaches to evaluation have been developed, conceptually linking project outcomes with conservation impacts remains difficult in complex systems. For example, sea turtles are one taxon in which unsustainable harvesting has been a particular problem. There have been a number of campaigns to reduce demand for sea turtle products, but we still have little evidence documenting their outcomes. Over an eight year period, a number of conservation efforts to protect sea turtles took place on the island of São Tomé, Central Africa. This included a conservation marketing campaign aimed at reducing the consumption of sea turtle meat and eggs. Campaign activities spanned traditional mass media advertisements as well as community events, such as cooking contests. There were also concurrent law enforcement and beach patrols, both potential deterrents to poachers. This is one of few demand reduction evaluations that has assessed both human behaviour and biological conservation outcomes. It benefited from an advantageous setting for evaluation, as nesting sea turtles are relatively easy to monitor and the island's small size and geographic isolation increased the detectability of potentially confounding factors. We found a decrease

in self-reported sea turtle egg consumption and a decrease in poaching of adult sea turtles. However, multiple unforeseen difficulties arose which complicated attempts at causal attribution. We were hampered by spatial spillovers, design effects from the sensitive questioning technique, concurring law enforcement, and changes in biological monitoring efforts. These challenges highlight the difficulties faced by practitioners seeking to apply impact evaluations in the field. We reflect on what this means for future impact evaluations of behaviour change interventions in conservation. Our recommendations include combining multiple outcome measures to triangulate hard-to-measure behaviours and theory-based evaluation methods to explore causal impacts.

4.2 Introduction

In a world of limited resources and pressing environmental problems, improving the efficiency and effectiveness of conservation interventions is vital (Baylis et al., 2016). We need a robust body of evidence documenting the impact of different programmes that we can draw on when designing future projects. However, studies of conservation effectiveness are often of poor quality or have a narrow focus (see, for example: Baylis et al., 2016; Josefsson et al., 2020; Thomas-Walters et al., 2019; Veríssimo & Wan, 2018). A rigorous impact evaluation should provide credible evidence by using an appropriate counterfactual to establish causal attribution (Adams et al., 2019; Ferraro, 2009). This can be accomplished through a range of methodological approaches.

Randomised control trials (RCTs), for example, are considered by some to be the gold standard for determining if there is a cause-effect relationship between an intervention and any outcomes (Backmann, 2017; Kvangraven, 2020). They are not always feasible or desirable to implement however, and researchers have also developed a variety of alternative quasi-experimental designs that use techniques such as propensity score matching or regression discontinuity to control for observed and unobserved covariates (Ferraro, 2009; Margoluis et al., 2009; Schleicher et al., 2019).

Unfortunately, using these techniques to uncover mechanisms and establishing causality can be particularly difficult in socio-ecological systems (Preskill, 2009; Veríssimo et al., 2017). Many conservation issues, from the illegal wildlife trade to climate change are “wicked” problems, characterised by their complexity, dynamism, and intractability (Knight et al., 2019). This greatly complicates evaluations, which may have to deal with uncontrollable variables, multiple spatial and temporal scales, and ecological thresholds leading to nonlinear change (Hildén, 2009; Margoluis et al., 2009). Furthermore, while the stated goal may be to protect

wild species or ecosystems, interventions frequently need to target human behaviours (Amel et al., 2017). Evaluators are then faced with the challenge of extrapolating from project outcomes (e.g., compliance with sustainable fishery management practices) to actual conservation impacts (e.g. recovery of fish populations; McDonald et al., 2020). This requires interdisciplinary expertise, with knowledge of both social and biological processes and a detailed understanding of conceptual linkages within complex systems (Ferraro et al., 2019; Margoluis et al., 2009).

While there has been considerable research into both impact evaluation best practices and barriers to conducting evaluations, there is little guidance available for practitioners in how to deal with difficulties that may arise in the field (Curzon & Kontoleon, 2016; McIntosh, 2019). Implementation failures are unfortunately common, but this should not discourage future researchers. Here we describe a case study of an evaluation of a behaviour change intervention project that faced multiple challenges, and reflect on what we as academics and practitioners can learn from the experience.

4.2.1 Case study: Sea turtle consumption in São Tomé

Demand for wildlife products is a key driver of the exploitation of wild populations of flora and fauna (Rosen & Smith, 2010). The dominant approach to combating the illegal wildlife trade has been to restrict the supply of wildlife products, through interventions such as trade bans and anti-poaching measures (J. Phelps et al., 2014). However, there is now an increasing focus on demand-side interventions, with the aim of reducing the market value of illegal wildlife products by influencing consumers to voluntarily change their purchasing behaviour (Thomas-Walters et al., 2020; Veríssimo & Wan, 2018). One biological group in which unsustainable commercial trade has been a particular problem is sea turtles (Donlan et al., 2010; Frazier, 2003). Due in part to this harvest they have experienced extirpations and population declines

in coastal areas globally (Mancini & Koch, 2009; Nada & Casale, 2011). The illegal trade is driven by widespread demand for sea turtle meat and eggs (Campbell, 2003), and so demand reduction interventions could potentially play an important conservation role. Yet despite multiple campaigns about the plight of sea turtles dating back at least two decades, there have been no published evaluations of their effectiveness (Graff, 1996).

São Tomé is an island off the coast of Central Africa where sea turtles have experienced severe poaching pressure. There are four species known to nest here, each threatened with extinction according to the IUCN Red List of Threatened Species (Castroviejo et al., 1994). In 2014, the Santomean government approved national legislation (Decreto-Lei n.8/2014, of 28 April), criminalising the possession, trade and transportation of sea turtles (Vieira et al., 2016). Consumer research shows a large-scale demand for sea turtle meat in both rural and urban communities, and a high demand for sea turtle eggs in rural communities. Sea turtle meat is seen as a delicacy by many residents, and it is easily accessible (Veríssimo et al., 2020). In 2003 the non-governmental organisation Mar, Ambiente e Pesca Artesanal (MARAPA) established a conservation project called Programa Tatô (https://www.programatato.org/) to monitor sea turtle populations and aid in their conservation by assisting with law enforcement. This has been an independent organisation since 2018.

4.3 Methodology

4.3.1 Conservation efforts

Starting in 2016, Programa Tatô began an on-going conservation marketing campaign aimed at reducing the consumption of sea turtle meat and eggs in São Tomé. The campaign was called Tataluga - Mém Di Omali, which means “Sea Turtle – the mother of the sea” in the local Forrô dialect. Its design and the programme logic model was based on a study of consumer profiles, motivations and preferences conducted in 2015 (Veríssimo et al., 2020). Campaign

activities included community events, such as cooking contests to promote alternative food products, theatre performances and an association football championship, and mass media components such as billboard advertisements and television and radio jingles (Figure 4-1). Implementation of the demand reduction-intervention occurred at the village level. Five coastal fishing communities were assigned to receive the full intervention, while a further three served as the comparison and were exposed to only the mass media activities. The campaign brand aimed to associate sea turtles with motherhood, hoping to stimulate an emotional bond between the local people and sea turtles. The overall aim was to lessen poaching pressure on sea turtle populations by changing the social norms and attitudes of people living alongside the sea turtles, thus reducing consumption behaviours.

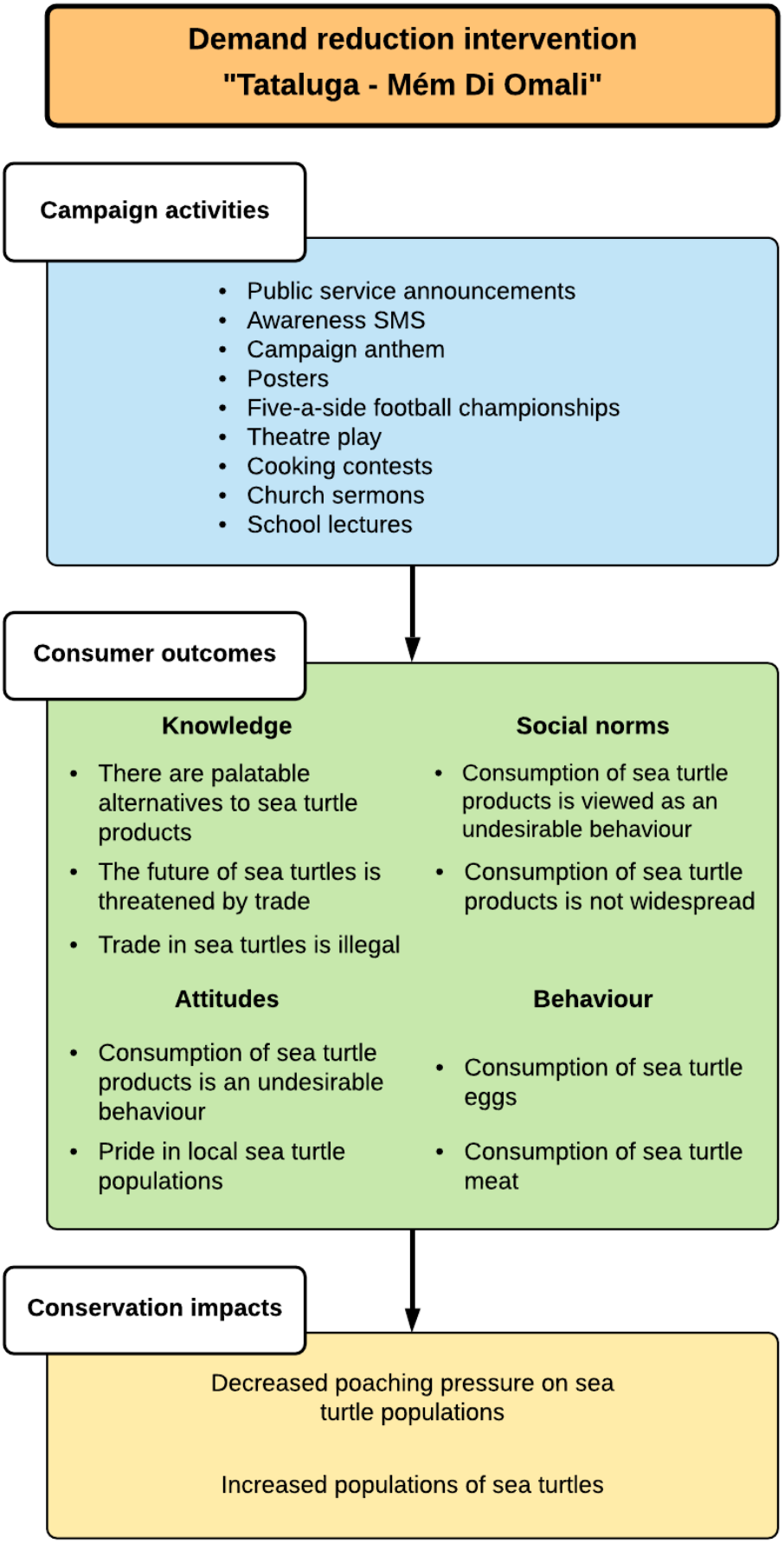
Demand reduction intervention
"Tataluga - Mém Di Omali"
Campaign activities
Public service announcements
Awareness SMS
Campaign anthem
Posters
Five-a-side football championships
Theatre play
Cooking contests
Church sermons
School lectures
Consumer outcomes
Knowledge
There are palatable alternatives to sea turtle products
The future of sea turtles is threatened by trade
Trade in sea turtles is illegal
Social norms
Consumption of sea turtle products is viewed as an undesirable behaviour
Consumption of sea turtle products is not widespread
Attitudes
Consumption of sea turtle products is an undesirable behaviour
Pride in local sea turtle populations
Behaviour
Consumption of sea turtle eggs
Consumption of sea turtle meat
Conservation impacts
Decreased poaching pressure on sea turtle populations
Increased populations of sea turtles

Figure 4-1. 'Tataluga - Mém Di Omali' programme logic model, demonstrating the conceptualised pathway for the expected impact of the campaign activities on sea turtle populations.

In addition to these demand-side activities, there were significant deterrents to the poaching of sea turtles. For example, increased law enforcement of the sea turtle trade ban, and associated media coverage of seizures. There were also beach patrols to collect data on sea turtle nesting and poaching rates. Finally, in April 2017, Programa Tatô supported the establishment of an organisation called "Queremos ter um futuro com destino" ("We want a future with destiny"). Its aim was to help the main sea turtle traders in the capital's municipal market start an alternative, legal business, thereby breaking one of the links in the trade chain.

4.3.2 Evaluation design

Eight villages were surveyed between May and October 2016, before the start of the demand-reduction intervention, and then again two years later between May and August 2018. Full details on the development of the survey instrument can be found in Veríssimo *et al*., (2020). To reduce researcher bias, the questionnaires were conducted by the Santomean NGO Monte Pico, an institution with no association to Programa Tatô or sea turtle conservation. We attempted to visit each village household once and female or male respondents were identified pseudo-randomly, depending on whether the house number was even or odd. The number of households with an eligible respondent at home and willing to participate ranged from 73 to 490 per community, or ~69% of the total population (further details in 4.8.1). The questionnaire covered socio-demographic characteristics, consumption of sea turtle eggs and meat, and attitudes and social norms around sea turtle conservation and trade (4.8.2). Informed consent was given verbally, and respondents were able to withdraw at any point. The anonymity of participants was fully protected, and the questionnaire was approved by the College of Life

and Environmental Sciences (Penryn) Ethics Committee at the University of Exeter (reference 2017/1755), United Kingdom.

Consumption of sea turtle eggs and meat was measured using the unmatched count technique (UCT). This has been widely used in social science to uncover the prevalence of a diverse range of sensitive and/or illegal behaviours, including logging (Wilfred et al., 2019), bushmeat poaching (Nuno et al., 2013), and dangerous driving (Sheppard & Earleywine, 2013). Survey respondents are randomly allocated into two groups: control and treatment (Hinsley et al., 2019). They are both shown the same list of non-sensitive statements, with the addition of the sensitive behaviour of interest for the treatment group list only. Each individual is asked how many, but not which, items apply to them. Prevalence of the sensitive behaviour can then be estimated by calculating the difference in means between the two groups. Treatment status for the UCT was assigned pseudo-randomly based on the time of the day. If the watch of the surveyor marked an even number of minutes, the respondent was assigned to the treatment, if it was odd the respondent was assigned to the control. UCT questions were preceded by a non-sensitive training question about household occupations. To analyze the UCT data, we used generalised linear models fitted with card type (sensitive item present or not) to estimate consumption prevalence over the previous 12 months pre- and post-intervention. The coefficient estimate for the interaction between survey date and card type was used to calculate the effect size for any changes in behaviour in the two treatment conditions (Holbrook & Krosnick, 2010).

Due to the difficulties in accurately assessing covert illegal behaviours we also tracked biological monitoring data over the same time period. Members of Programa Tatô regularly patrolled the beaches on São Tomé during the sea turtle nesting seasons. From 2012-2015 beaches in four of the eight study communities were monitored daily. These four communities

were all areas where Programa Tatô worked, and received the full intervention. From 2015 onwards, every single beach in all of the study communities were monitored daily. Patrollers counted the number of sea turtle nests, and estimated the number of harvested sea turtles based on drag marks through the sand. We conducted repeated measure ANOVAs in R v4.0 to measure any changes. Sea turtles are known to naturally experience interannual nesting variation, so we would not expect to see a direct impact of decreased poaching of adult sea turtles on nest counts over a period of just eight years (Broderick et al., 2003; Whiting et al., 2014). However, both of these outcomes are positive indicators for the success of local populations, and are therefore worth monitoring.

4.4 Results

4.4.1 Demographics

In the initial survey, prior to the campaign, 1160 survey respondents were approached. In the second survey 1493 survey respondents were approached. This translates to between individual 73 and 490 households per community. Although community boundaries are somewhat fuzzy, a conservative estimate puts the proportion of households surveyed per community at 69%. Most of the nonresponses were due to the absence of residents when the households were visited. 168 respondents (6% of total sample size) did not provide answers to some of the socio-demographic questions and were removed from further analysis, for a total of 2496 respondents (1141 from the pre survey and 1355 from the post survey). The average age was 38, with a gender ratio of 38:62 male/female.

4.4.2 Attitudes and norms

Overall, attitudes and norms regarding the conservation of sea turtles shifted in several significant ways after exposure to both the full intervention and the mass media-only activities. In the full intervention communities, there was an increase in agreement about the need to

criminalise sea turtle trade, and less people thought sea turtle meat was readily available in the market. However, respondents were more likely to view sea turtle consumption as important to Sãotoméan culture and as a necessary food source for the island. Social norms around the prevalence of consumption and trade also increased. Other attitudes and social norms did not change. Respondents who had been exposed only to the mass media activities were more likely to say that participants in the trade should face punitive measures from the law, while beliefs that sea turtles are an important source of protein and part of Santomean culture increased. Social norms around the prevalence of sea turtle supply and consumption almost universally decreased.

4.4.3 Behavioural outcomes

In the full intervention communities we found no significant difference between the pre- and post-survey estimated for the prevalence of sea turtle meat consumption (**Error! Reference source not found.**). However, the consumption of sea turtle eggs significantly decreased from 40% to 11% (-0.3 +/- 0.14). The longitudinal nature of the study in combination with the sensitive questioning technique limited the type of statistical analysis we could do, preventing us from exploring heterogeneous outcomes between subpopulations, e.g., the intervention and comparison communities.

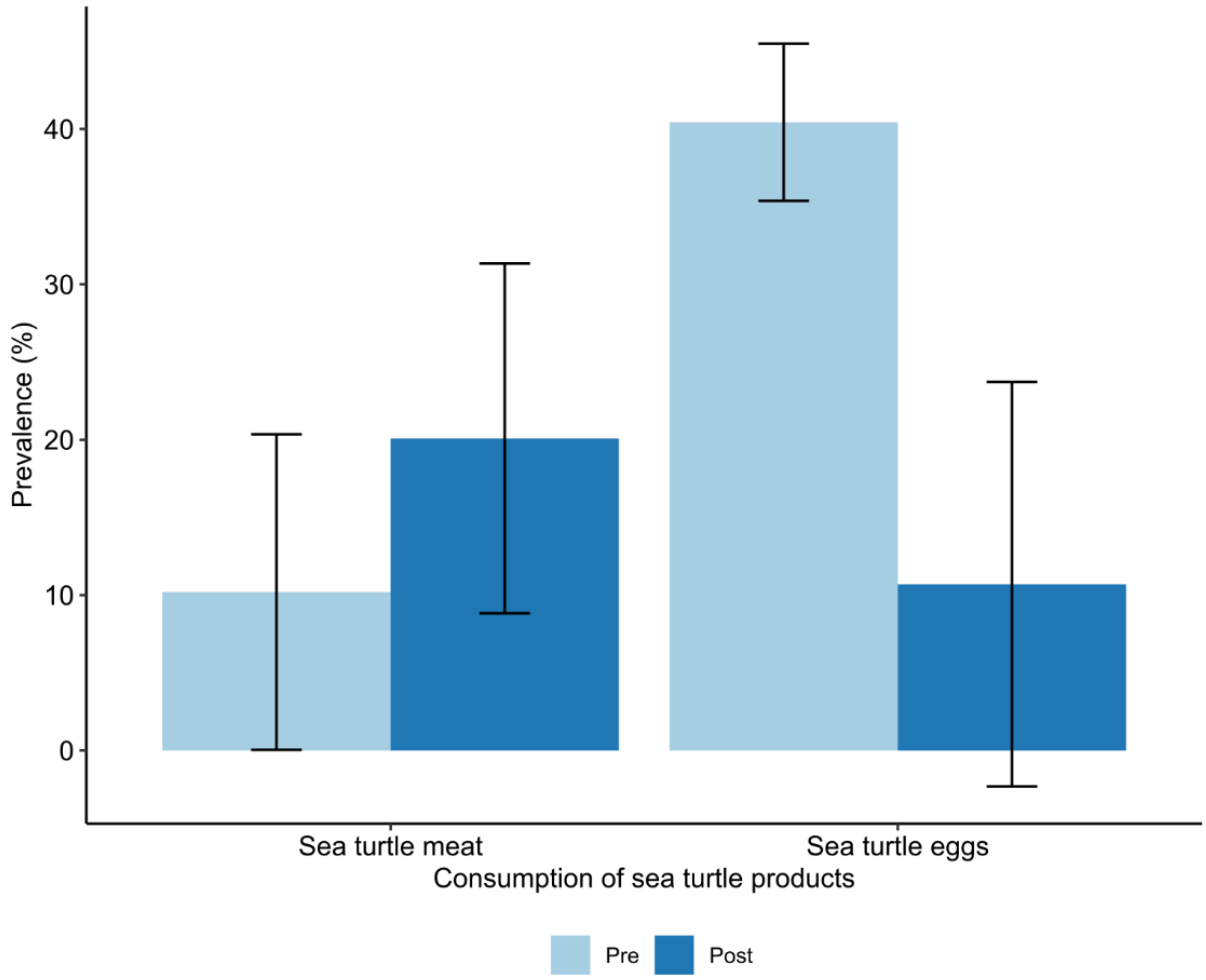

Figure 4-2. Changes in estimated prevalence (SE) of sea turtle meat and egg consumption amongst citizens exposed to the full social marketing intervention before and after the study.

The results were not so simple in the mass media only communities. We examined whether the UCT resulted in design effects that could reduce the validity of the sensitive behaviour estimates. As described by Blair and Imai (2012), design effects occur when the response behaviour to the control items is affected by introducing the sensitive item. We used a statistical test for these effects with the “list” package of the software R (Blair et al., 2018). Unfortunately, statistical analysis of the unmatched count technique results revealed design effects in the post-intervention mass media only communities, affecting the validity of the behavioural estimates (Blair & Imai, 2012). Essentially the presence of the sensitive item (e.g., “sea turtle meat”) in the list of control items biased overall responses, with participants

underreporting the numbers of species they consumed. This led to paradoxical negative percentages of behavioural prevalence, an issue that can also occur with other specialised questioning techniques (Fairbrass et al., 2016). Due to these design effects we are unable to determine whether consumption behaviour in the mass media only communities changed. One possible explanation for the over-sensitivity in responses to questions regarding sea turtle consumption could be the campaign activities altering social acceptability of consumption post-intervention. However, this also raises questions about the reliability of responses to the attitude and social norm sections where direct questioning was used (4.8.3).

4.4.4 Conservation impacts

At first glance, results from the biological monitoring data appeared positive. The nesting season on São Tomé is September to April with a peak between November and February (Vieira et al., 2016). As beaches in the mass media only communities were not patrolled regularly prior to the 2015, we focussed on just the four full intervention communities for which we had daily monitoring data. The number of sea turtles harvested decreased over the study period ($p < 0.001$), while the number of sea turtle nests recorded on nesting beaches increased ($p = 0.04$; **Error! Reference source not found.**). Closer inspection however revealed that the decrease in poaching began before the start of the campaign. We know that there were no other concurrent demand reduction campaigns or sea turtle conservation work that could have contributed to this. There were also no macroeconomic shocks that could explain the change at the national level, as indicated by GDP varying little during the period of the intervention (The World Bank, 2018). We gathered additional data to search for further possible confounders, highlighting on Figure 4-3 when the trade ban was first enacted, the demand reduction intervention was implemented, and systematic enforcement of the ban began.

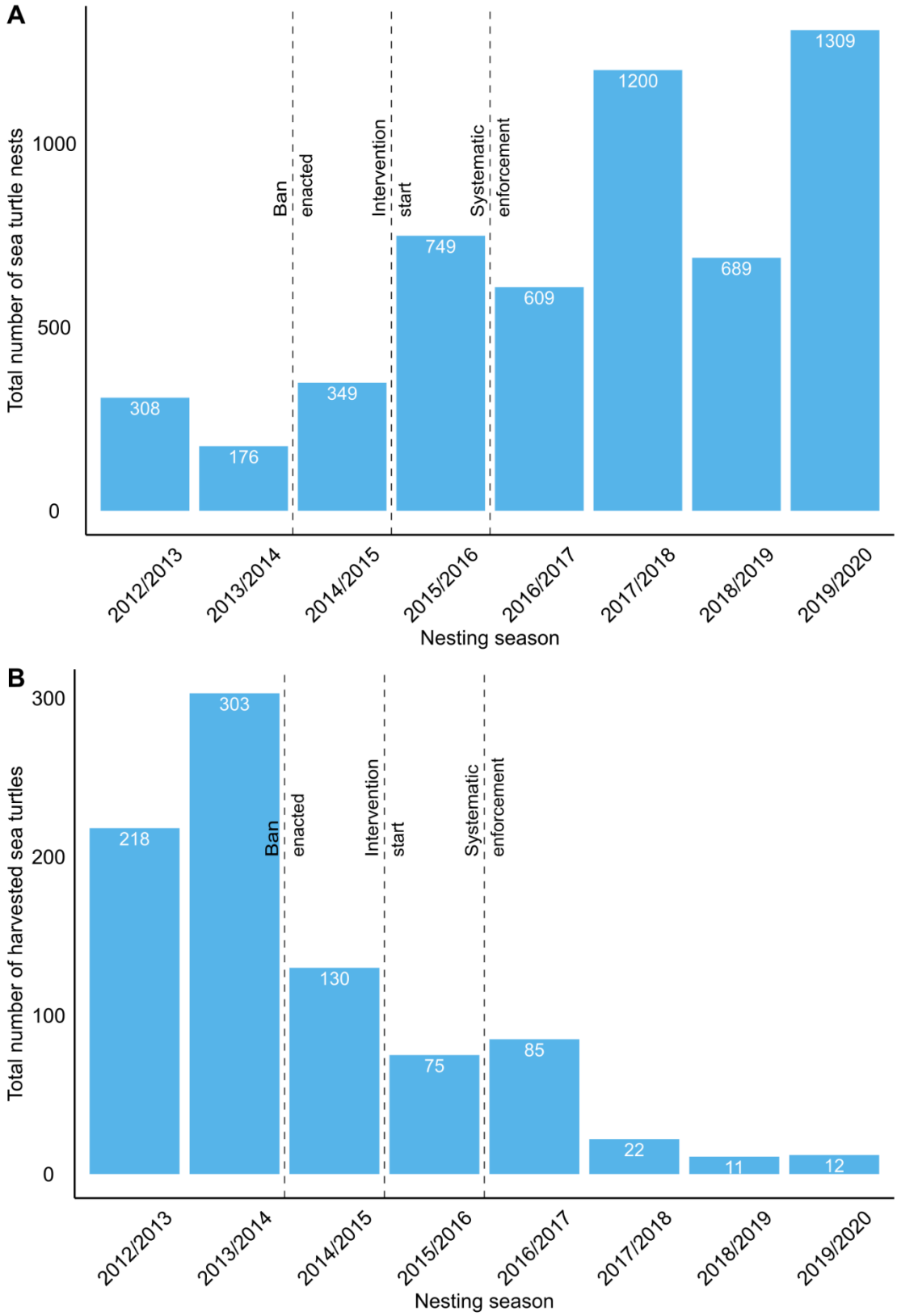

Figure 4-3. Number of sea turtle nests (A) and harvested sea turtles (B) on beaches across São Tomé, by nesting season. Dotted lines denote when the ban consuming sea turtles was

first enacted, when the demand reduction intervention began, and when enforcement of the ban became systematic.

Although the law criminalising the trade of sea turtles was enacted in 2014, initially it went unenforced and many citizens were not even aware of its existence (Vieira et al., 2016). To address this, Programa Tatô organised a National Workshop on Sea Turtle Law Enforcement Strategies with key stakeholders in April 2015. The first confiscation of traded sea turtles followed the next year, and systematic enforcement began with a mass seizure of sea turtle meat at the capital's municipal market in November 2017 (4.8.4). The lagging enforcement by law officials and presumably growing awareness of the illegality is a likely confounder of the poaching data. By raising the salience of illegal sea turtle trade amongst communities, the campaign may have prompted officials to invest more resources into preventing poaching. Indeed, after the intervention respondents in all communities were more likely to say that participants in the trade should face punitive measures. While this would be an indirect success for the campaign, it complicates our understanding of the mechanisms of any conservation benefits. Thus, we are unable to disentangle the impacts of consumer behaviour change from changing law enforcement.

It is difficult to separate the impacts of the demand- and supply-side interventions. For example, the very act of Programa Tatô employees walking the beach to monitor sea turtle nests may have had a deterrent effect on any would-be poacher. If the effort put into monitoring had remained the same through the study period this could be ruled out as a potential confounder. However, records kept by monitors show a steady rise in the number of hours spent patrolling beaches (**Error! Reference source not found.**). This increase was initiated by rangers in response to rising mortality at the nesting beaches (Vieira et al., 2016). As well as acting as a confounder, it is possible that the increase in time spent patrolling could be associated with a higher detection probability for nests. This increase, as well as potential

interannual variability in nesting numbers, undermines our confidence in the meaningfulness of the nesting data (Sims et al., 2008). This is not a concern for the poaching data, which decreased in spite of the additional time spent searching.

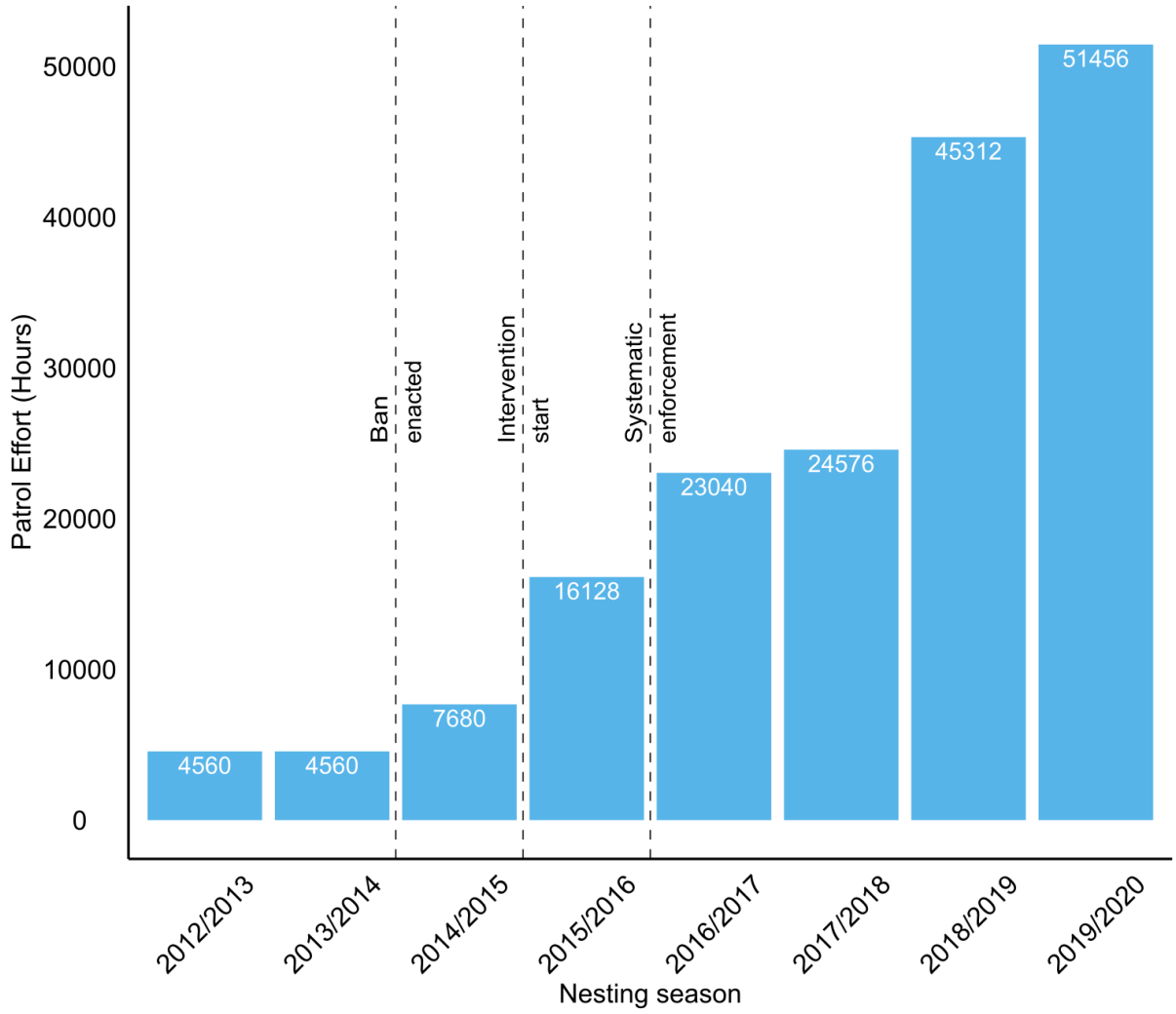

Figure 4-4. Number of hours spent patrolling beaches in the full intervention communities across São Tomé, by nesting season. Dotted lines denote when the ban consuming sea turtles was first enacted, when the demand reduction intervention began, and when enforcement of the ban became systematic.

4.4.5 Overall theory of change

Theories of change can help create a broader understanding of the intervention context and causal pathways by requiring researchers to explicitly represent changes in inputs, outcomes, and impacts (Adams et al., 2019; Baylis et al., 2016). They have been used successfully to understand the effects of conservation campaigns (Salazar et al., 2019). In this theory of change we hypothesise mechanistic relationships that are conceptually likely but for which we either did not test or had unreliable data (**Error! Reference source not found.**). This includes the potential deterrent effect of unforeseen increases in law enforcement and beach patrols on poaching rates. Many of the norms and attitudes the intervention targeted did not change, perhaps because they were already favourable to sea turtles, but respondents did develop negative attitudes towards the consumption of sea turtle products. However, we cannot confidently attribute this to the campaign, as media coverage of sea turtle seizures could also be responsible for changing attitudes. The cyclical feedback loops within the system are notable. For instance, lowered poaching rates could cause lower availability of sea turtle products, which may lead to decreased consumption. A reduction in demand for sea turtles could again negatively impact poaching.

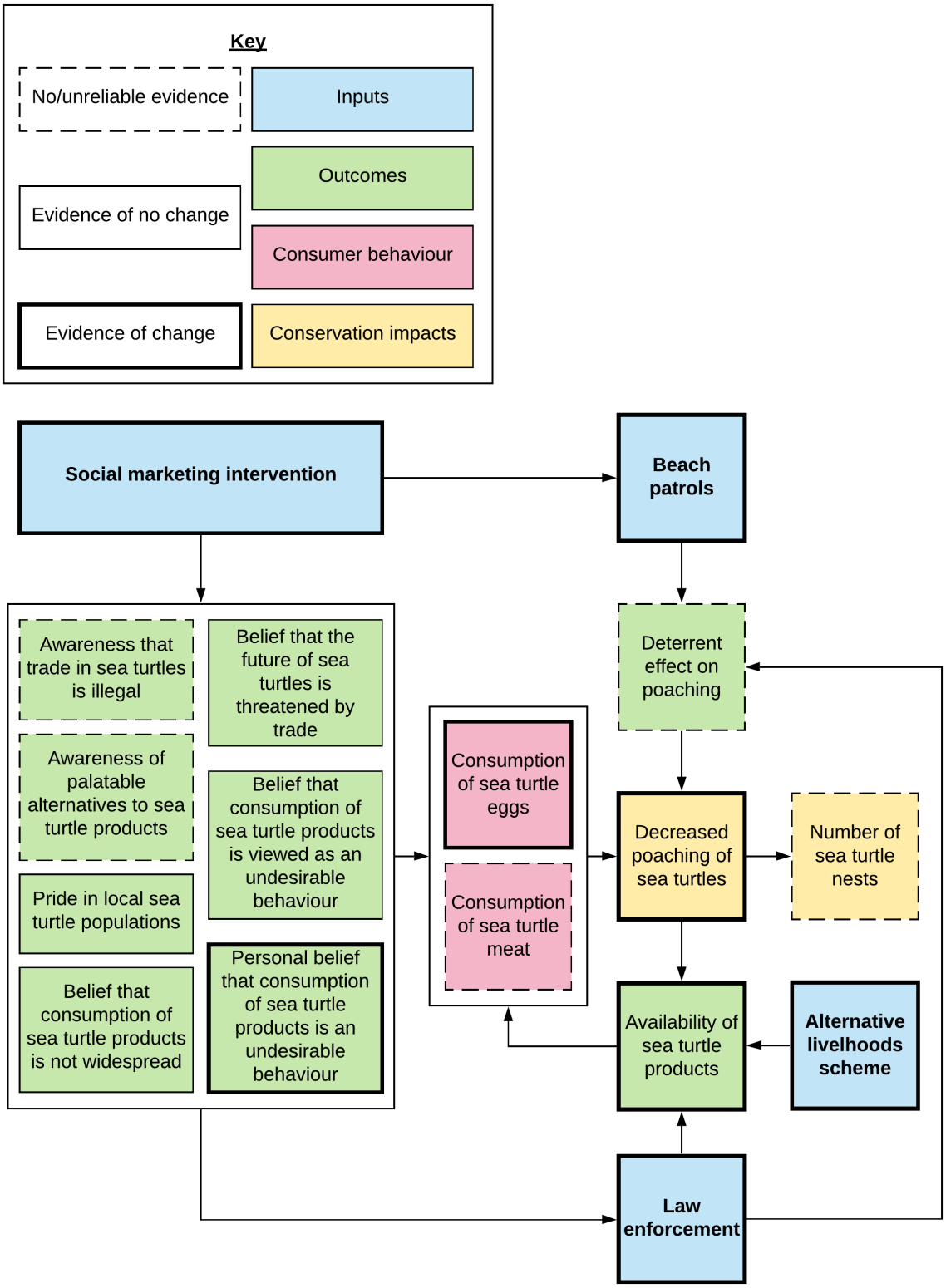

Figure 4-5. Overall theory of change for the change in poaching levels between 2012 and 2020, linking inputs and outcomes to consumer behaviour and conservation impacts.

4.5 Discussion

4.5.1 Advantages of study context

There were several factors present in this study setting that could facilitate causal inference. São Tomé is both geographically small and isolated, allowing us to track spatial spillovers from ecological processes and behavioural responses (Baylis et al., 2016). For example, Programa Tatô is the only NGO focussed on sea turtle conservation in São Tomé, so we were confident that no external conservation campaigns were conducted concurrently. We also knew that the NGO had established strong links with key stakeholders, working since 2003 with national and local enforcement agencies as well as the Ministry of Environment. They have employed a number of residents from the local communities, whom they have been working with for many years, and have developed alternative livelihoods for former sea turtle traders.

The purpose of demand reduction campaigns is to relieve poaching pressure on threatened species by changing consumer behaviour, but few evaluations actually measure conservation impacts. In part, this is because the locations of consumer bases and harvesting sites are often geographically separated. Due again to the small size of our study location, we were able to track both consumer behaviour and conservation impacts. In addition, we benefited from the fact that during the nesting season female sea turtles are more easily accessible, whereas monitoring most animal populations is difficult and resource-intensive (Gardner et al., 2008; Sims et al., 2008). Nest counts on beaches are relatively inexpensive, do not require much expertise, and have a low sampling error (Warden et al., 2017; Whiting et al., 2014). The detectability of nests is high, and it is possible to conduct a comprehensive survey of the annual nesting population. Although this does not include all demographic levels (e.g., juveniles or males), it is a useful indicator of population abundance (Whiting et al., 2013). It is also comparatively easy to detect poaching activity for adult sea turtles. Their large size means they need to be dragged away rather than carried, leaving obvious marks in the sand that can be spotted during daily beach patrols, regardless of weather conditions (Lino et al., 2010;

Summers et al., 2018; Troëng & González, 1998). Despite these advantages however, there were several challenges we faced when it came to causal inference.

4.5.2 Challenges in implementation and analysis

When designing project evaluations, random allocation of subjects is a simple yet effective tool to minimise bias. It theoretically establishes a robust counterfactual by controlling for both confounding factors that affect how subjects respond to the intervention, and unequal probabilities in the likelihood of being treated (Gertler et al., 2016; Pynegar et al., 2019). However, partnering with practitioners often complicates subject allocation. Prioritising the likelihood of project success over robust evaluation designs may involve building on existing relationships. This was the case with our project, where the NGO required that we assigned villages nearest to the largest nesting beaches to the intervention, as these were the ones where they had a history of working and had forged social connections. This means that the two groups of subjects, those in the target villages versus the comparison villages, were not necessarily comparable on key attributes. Initial questionnaire data showed differing levels of consumption of sea turtle products between the intervention and comparison groups (Veríssimo et al., 2020). In particular, the intervention communities reported less sea turtle meat consumption but more sea turtle egg consumption, possibly as a function of their proximity to the largest nesting beaches and major egg sources. Additionally, those in the full intervention villages had already been exposed to environmental education messages about sea turtles in the past. This may have made the villagers potentially more resistant to change, or alternatively primed them and therefore increased their openness to change.

While the restricted size of the island meant we could track spillover effects, small geographies also make it difficult to contain interventions. The mass media messages were impossible to implement in a geographically-targeted way and so went island-wide. Those in the target

communities received the full intervention as planned, while contamination of comparison communities meant they essentially became a mass media treatment condition (Miteva et al., 2012).

Imperfect compliance in impact evaluations, a discrepancy between assigned and actual treatment status, is always a danger for researchers (Gertler et al., 2016). Mass media is often used in conservation campaigns as it is a cheap way of reaching a wide audience, but it is difficult to control the audience composition (Veríssimo et al., 2018). In this situation, the unintended exposure of all study participants to the mass media portions of the campaign limits what we can say about the effectiveness of the campaign. Without an appropriate control it is much harder to determine whether changes are due solely to the full intervention and/or mass media messaging, or due to changes in other external factors during the study period.

4.5.3 Lessons learnt

Despite the advantageous context, our ability to infer causality was impacted by serious difficulties. We were hampered by spatial spillovers, design effects from the sensitive questioning technique, concurring law enforcement, and changing monitoring protocols. Although we can reliably report on changes in outcomes in communities exposed to the full intervention, namely a decrease in self-reported sea turtle egg consumption and in sea turtle poaching, we were unable to confidently attribute these changes to any one factor. This encapsulates some of the difficulties faced by practitioners attempting to apply impact evaluation in the field. It also demonstrates the usefulness of theory-based approaches such as process-tracing, which can help weigh the evidence supporting the relative contribution of different factors to changes in conservation outcomes (White, 2009; White and Phillips, 2012).

One clear lesson that emerges is the value of triangulation between independent data sources. Impact evaluations should be approached with the mindset that you are seeking to disprove your hypothesis, rather than confirm it. At every stage of the evaluation it is important to consider rival explanations for your findings (Ferraro, 2009). This may require gathering more data than would be needed to make a convincing case for the success of an intervention. If we had compared poaching rates against only the first year preceding the start of the demand reduction campaign, then it would have been easy to attribute the decline to our work. By including data from the widest time period possible we were able to spot a pre-existing trend, and investigate potential confounders. This led us to acquire seizure reports and beach monitoring protocols, and develop a more nuanced theory of change which included these additional inputs (**Error! Reference source not found.**).

We used qualitative interviews to help develop the survey instrument, but they could also have provided valuable insights throughout the evaluation (Abu-Taleb & Murad, 1999; Drury et al., 2011). For example, regular semi-structured interviews or focus groups may have highlighted attitudes towards increasing law enforcement, refining our theory of change and helping us evaluate the relative contributions of different factors (Audrey et al., 2006; J. Reynolds et al., 2014). Continued monitoring in this form can also feed into adaptive management of a campaign, enabling the refinement of ongoing messages and approaches to increase overall impact (Audrey et al., 2006; Murtagh et al., 2007). Theory-based evaluations which incorporate qualitative data gain greater ability to examine the context in which any changes take place (Stem et al., 2005).

The unmatched count technique has not yet been used in a longitudinal study (Hinsley et al., 2019). We had to be explicit about the theoretical assumptions it relies upon to ensure the method of statistical analysis was valid for our purposes (Blair & Imai, 2012; Nuno & St. John,

2014). This is how we identified the design effects biasing the sea turtle consumption estimates in the mass media only communities (Blair & Imai, 2012). Unfortunately, many questioning techniques can fail in differing ways (Moshagen et al., 2014). Collecting additional data does have a cost (e.g., time, money, the goodwill of participants), but combining more than one questioning technique within a survey could compensate for individual limitations. There may be large standard errors and potential design effects with the unmatched count technique or the risk of bias with direct questioning (Nuno & St. John, 2014). Researchers and practitioners working on sensitive behaviours would benefit from investing more research into alternative sensitive questioning techniques such as the ballot box method, which do not require significantly larger sample sizes in order to avoid large standard errors (St. John *et al.*, 2010; Bova *et al*., 2018). Further, multiple indicators like self-reports and biological monitoring data are useful to help us triangulate changes in hard-to-measure variables like illegal behaviours (Veríssimo et al., 2017).

The difficulty in moving from behavioural outcomes to conservation impacts should not discourage future researchers. Instead it should catalyse greater effort into developing approaches to bridge that divide. For example, using structural equation models to explore pathways between different factors in a theory of change can help better understand the linkages between different indicator types (McDonald et al., 2020). We must remember that conservation is not just about documenting biodiversity declines; it ought to help safeguard it also (D. R. Williams et al., 2020). While human behaviour is at the centre of all key threats to biodiversity, addressing those threats should not stop at measuring behavioural trends but should look into understanding if and how specific interventions benefit the species we are trying to protect (Veríssimo et al., 2017).

4.6 Supplementary information

4.6.1 Questionnaire - translated from Portuguese

Date: _____

Community: _____

House Number _____

When house number is even interview male head of household (18+), otherwise interview female(18+).

[**Introduction to obtain informed consent**] *""My name is _____ and I am a member of the Associação Monte Pico based in Monte Café. I am conducting a questionnaire in the fishing communities in São Tomé and I would like to ask you some questions. The questionnaire takes about 10 minutes. You don't need to know how to read or write, it's just a conversation.*

If you decide to participate in this study, this information will be confidential. Can I continue with the questions?"

[If not, write the person's approximate age and gender and finish the questionnaire here]

Gender: Male _____ Female _____

Age: 0-15 _____ 16-30 _____ 31-45 _____ 46-60 _____ 60+ _____

[If yes, write interview start time] **Start time:** _____

Section A: Sociodemographic information

1. **Gender:** Male _____ Female _____

2. **Age:** _____

3. **Education** Up to which year did you study? [Choose an option]
   a) 1st to 4th year
   b) 5th to 9th year
   c) Highschool: 10th to 12th year
   d) Bachelors and above
   e) Illiterate

4. **What is your main occupation? [Choose an option]**
   a) Agriculture
   b) Shop Keeper/Street seller
   c) Fisherman/ Street seller
   d) Taxi driver
   e) Student
   f) Other: _____

5. **Religion:** [Choose an option]

Catholic ☐ Adventist ☐ Evangelical ☐ Reino de Deus ☐ Maná ☐

6. **Household Wealth.**

[Read aloud] Which of these do you own?

Radio ☐	TV ☐	Mobile phone ☐	Landline ☐
Fridge ☐	Bicycle ☐	Motorcycle ☐	Car ☐
Farm ☐	Boat ☐	Computer ☐	Generator ☐

7. **Media**

[**Trust in media**] On a scale of 1 to 5, where 1 means “I completely distrust” and 5 means “I completely trust”, indicate how you feel about the following media:

TV

Completely distrust	*1*	*2*	*3*	*4*	*5*	*Completely trust*

Radio

Desconfio totalmente	*1*	*2*	*3*	*4*	*5*	*Confio totalmente*

Newspapers

Desconfio totalmente	*1*	*2*	*3*	*4*	*5*	*Confio totalmente*

[**Trust in social actors**] On a scale of 1 to 5, where 1 means “I completely distrust” and 5 means “I completely trust”, indicate how you feel about the following groups of people?

Teachers

Desconfio totalmente	*1*	*2*	*3*	*4*	*5*	*Confio totalmente*

Police

Desconfio totalmente	*1*	*2*	*3*	*4*	*5*	*Confio totalmente*

Friends

Desconfio totalmente	*1*	*2*	*3*	*4*	*5*	*Confio totalmente*

Religious leaders

Desconfio totalmente	*1*	*2*	*3*	*4*	*5*	*Confio totalmente*

Politicians

Desconfio totalmente	*1*	*2*	*3*	*4*	*5*	*Confio totalmente*

Community leaders

Desconfio totalmente	*1*	*2*	*3*	*4*	*5*	*Confio totalmente*

NGOs

Desconfio totalmente	*1*	*2*	*3*	*4*	*5*	*Confio totalmente*

Section B: UCT training

[**UCT instructions for practice round**] I will show you a card with the name of several professions. I will read the name of each profession and then I would like to know how many of these professions have been practiced by members of your immediate family in the past year? Please do not say the names of the professions, just say how many.

[Show the training card. Read the names and ask:]

9. How many of these occupations have been done by members of your family in the last year? [Choose an option]

1 2 3 4 5

Section C: UCT cards (Look at watch in minutes number is even apply Treatment, otherwise apply control)

Card: Treatment _____ / Control_____

[Main UCT] I will show you some cards with the name and image of several animals. Again, I will read the name of each animal and then I would like to know how many correspond to what is asked. Please don't say which ones, just say how many.

[Show card A. Read names and ask:]

10. How many of these types of animal have you eaten in the last 12 months? [Choose an option]

1 2 3 4 5

[Show card B. Read names and ask:]

11. How many of these types of animal do you consider to have a flavorsome meat? [Choose an option]

1 2 3 4 5

[Show card c. Read names and ask:]

12. How many of these types of animal do you eat more than once a month? [Choose an option]

1 2 3 4 5

[Show card D. Read names and ask:]

13. How many of these types of animal have you seen in the market in the last year? [Choose an option]

1 2 3 4 5

[Show card E. Read names and ask:]

14. All these animals lay eggs. Which of these types of animals have you eaten the eggs of in the last year? [Choose an option]

1 2 3 4 5

Section D: Attitudes

15. [Read aloud] On a scale of 1 to 5, where 1 means “fully disagree” and 5 means “fully agree”, indicate how you feel about the following sentences:

a. Sea turtles will never disappear from ST.

Fully disagree 1 2 3 4 5 *Fully agree*

b. It is important to make the fishing and sale of sea turtle illegal

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

c. Sea turtles are part of the natural heritage of ST

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

d. Eating marine turtle is part of the culture of ST

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

f. The government of ST should do more to protect sea turtles

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

g. Those who eat sea turtle should be fined

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

h. Those who fish sea turtle should be arrested

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

i. Sea turtle meat is easy to find in the market

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

j. Without access to sea turtle meat some households will go hungry

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

k The best way to protect sea turtles is to arrest those who fish them

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

Section E: Social Norms

16. [Read aloud] Now, I'm going to read a few more sentences. On a scale of 1 to 5, where 1 means "fully disagree" and 5 means "fully agree", indicate how you feel about the following phrases:

a. Most people in my community eat sea turtle meat

Fully disagree 1 2 3 4 5 *Fully agree*

b. Most people in my community eat sea turtle eggs

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

c. Most fishermen in this community fish sea turtles

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

d. Most street sellers from this community sell sea turtle meat.

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

e. Most people I care about only eat sea turtle meat in special occasions

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

f. Most people I care about believe sea turtle meat is tasty

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

g. Most people I care about prefer sea turtle eggs to chicken eggs

Discordo totalmente 1 2 3 4 5 *Concordo totalmente*

[Read aloud] Thank you very much for your willingness to answer this questionnaire.

[Write interview end time] **End time:** _____

4.6.2 Police enforcement records

Date	Site	Intervention
08/12/2015	Angra Toldo	Female Green sea turtle Release
04/01/2016	Messias Alves	Female Leatherback Sea Turtle Release
21/12/2016	City of São Tomé	Juvenile Green Sea Turtle car apprehension
02/12/2016	Praia Grande	Female Hawksbill sea turtle Release
11/01/2017	Municipal Market	Sea Turtle Meat apprehension
15/03/2017	City of São Tomé	2 adults Green Sea Turtle car apprehension
08/08/2017	Porto Alegre	Male Olive Ridley Sea Turtle Release
26/09/2017	City of São Tomé	Female and Male Olive Ridley Sea Turtle Release
18/12/2017	City of São Tomé	Female Hawksbill sea turtle Release
27/11/2018	City of São Tomé	Female Olive Ridley Sea Turtle Release
02/11/2019	City of São Tomé	Female Olive Ridley Sea Turtle Release
19/12/2019	City of São Tomé	Female Olive Ridley Sea Turtle Release
20/09/2019	City of São Tomé	Female Olive Ridley Sea Turtle Release
24/01/2019	City of São Tomé	Female Olive Ridley Sea Turtle Release
10/02/2020	City of São Tomé	Female Olive Ridley Sea Turtle Release
10/03/2020	City of São Tomé	Female Olive Ridley Sea Turtle Release

Chapter 5: Understanding the market drivers behind changing demand for ivory products in Japan

5.1 Abstract

With fears that there are expanding markets for certain taxa, reducing demand for wildlife products has been recognised as an important global priority (CITES Secretariat, 2017; Esmail et al., 2020). However, consumer demand is a complicated phenomenon and we lack a sufficient evidence base to help understand the mechanisms through which it may be reduced. As with many conservation issues, it can involve many interacting biological, social, political and socio-economic factors, operating at a range of scales and time periods (Knight et al., 2019; Margoluis et al., 2009). The demand for elephant ivory is an excellent illustration of the gaps in our current knowledge. Although the domestic Japanese ivory market is one of the most famous examples of demand reduction, we have limited insights into how consumer behaviour and attitudes influenced ivory sales. This is partly because post-hoc evaluations of such complex systems are difficult when relying solely on traditional quantitative methods. We used General Elimination Methodology and semi-structured interviews with key stakeholders to provide a richer understanding of consumer behavioural change in Japan. We identified the two biggest market drivers, the CITES international trade ban and the economic recession, as well as a range of minor drivers and enabling conditions. These included respect for government authority, the passive nature of demand for ivory, and a general cultural shift away from conspicuous consumption. We also ruled out purported influences that are unlikely to have had an impact, such as pressure from eminent figures. This case study highlights the potentially important role of theory-based qualitative evaluations in conservation (Salazar et al., 2019). Utilising this approach more widely will help us move away from facile debates about whether a single intervention caused a particular outcome, instead recognising that there are likely to be multiple contributing factors driven by interactions between different

actors (Birnbaum & Mickwitz, 2009; Curzon & Kontoleon, 2016). In doing so, we can challenge current simplistic narratives and gain a more nuanced understanding of conservation interventions.

5.2 Introduction

Wild species have a long history of being traded and used by humans, but there is increasing conservation concern about over-exploitation of vulnerable wildlife to supply commercial trade (’t Sas-Rolfes et al., 2019; Hughes, 2003). As well as threatening the future of many species, illegal and/or unsustainable trade in wildlife may undermine local livelihoods, damage the broader stability of ecosystems, and potentially contribute to the emergence of new zoonotic diseases (’t Sas-Rolfes et al., 2019; Rosen & Smith, 2010). Although many trade chains are sustainable, curtailing exploitative markets is a major conservation issue (Challender et al., 2015; Golden et al., 2014).

Conservationists and policymakers can intervene at various points of the trade chain to address unsustainable trade in wildlife, including the supply of products, transactional arrangements, or consumer demand (’t Sas-Rolfes et al., 2019). With fears that there are expanding markets for certain taxa, reducing demand has been recognised as an important global priority (CITES Secretariat, 2017; Esmail et al., 2020). Influencing consumer behaviour to reduce this demand may be achieved by voluntary (e.g., social marketing interventions) or coercive (e.g., trade bans) means (Felbab-Brown, 2017; Wyatt, 2013). However, consumer demand is a complicated phenomenon and we lack a sufficient evidence base to help understand the mechanisms through which it may be reduced. The quantity of a wildlife product demanded and the price it fetches are influenced by a range of market drivers, from legislation to cultural trends (Gao & Clark, 2014; Ribeiro et al., 2019; Salazar et al., 2019; UNEP, 2019) . We can begin to disentangle these drivers by conducting more case studies in which demand has been altered.

The demand for elephant ivory is an excellent example of the gaps in our current knowledge. Ivory has been traded globally for centuries, and despite considerable controversy, media

coverage and conservation efforts, it continues to hold significant socio-economic and cultural value (Martin 1985; Barbier et al. 1990; Martin & Stiles 2003). The problem stems from the fact that poaching for ivory has caused a dramatic decline in elephant numbers in Africa and Asia, leaving many regional populations severely threatened (UNEP et al. 2013; Thouless et al. 2017). The international community responded in 1989 by severely curtailing the international trade, but legal domestic markets persist in some countries (CITES 2017; Sakamoto 2017). This includes Japan, the largest ivory consumer country in the 1980s, which played an important role in driving the demand (Kitade & Toko, 2016). However, recent analyses indicate a reduction in this consumer demand for ivory products (Kitade & Toko, 2016; Kurohata, 2020), which has been attributed to various market drivers, including the international trade ban, campaigns by NGOs aimed at consumers and an economic recession (Kitade & Nishino, 2017, 2018; Stiles et al., 2015). This uncertainty is partly because there are no systematic studies of the multiple possible drivers and their interactions, and we lack longitudinal consumer surveys from the time of peak ivory imports to the present day.

This means we have limited insights into how consumer behaviour and attitudes influenced ivory sales in Japan, despite it being one of the most famous examples of demand reduction (UNEP, 2019). This is partly because post-hoc evaluations of such complex systems are difficult when relying solely on traditional quantitative methods, particularly if baseline data are unavailable. Fortunately, theory-based qualitative approaches are well-adapted to this type of context (Stern et al., 2012), and these evaluation methods can be used to examine the assumptions underlying the causal chain from inputs to outcomes (White, 2009; White & Phillips, 2012). This is because they aim not just to establish whether a certain factor had an impact, but to identify the causal mechanisms that enabled outcomes, making them a methodologically rigorous alternative to the traditional counterfactual impact design (Befani & Mayne, 2014; Lemire, 2010; Scriven, 2008).

General Elimination Methodology is one such theory-driven post-hoc qualitative evaluation method. It has been used in several conservation contexts to substantiate causal claims (Patton, 2008; Salazar et al., 2019; Scriven, 2008), systematically identifying and then ruling out alternative causal explanations of observed results. Here we use General Elimination Methodology and semi-structured interviews with key stakeholders to answer two key research questions; 1) how has the level of demand for ivory products in Japan changed since 1983, and 2) what were the market drivers behind any change?

5.3 Methods

5.3.1 Study context

Elephant ivory has been valued by consumers in Japan for over a thousand years, with records of its use dating back to the 7th Century (E. B. Martin, 1985). During the Edo period (1603-1868), raw ivory imports increased incrementally and the traditional ivory carving industry was established (Kitade & Toko, 2016; E. B. Martin, 1985). With the socio-economic development of Japan over the following 150 years, ivory use spread to a wider demographic and at its height Japan's ivory industry was one of the largest in the world (Ishihara et al., 2010; Kitade & Toko, 2016). For example, between 1979 and 1989, it represented 32% of the world trade and the annual production value of ivory-related industries had an estimated worth of US$145 million (Kitade & Toko 2016).

During this period of growth, ivory was crafted into a diverse range of products (E. B. Martin, 1985). Initially, the items produced were both high-end and practical in nature. For example, luxury netsuke, a traditional toggle on a kimono, were often intricately carved into decorative shapes (Kinoshita, 2010). Use waned when the Japanese moved to more Western-styled clothing in the late 19th century, but they remain a collectable art piece. Other products included hair accessories and combs, or parts for traditional musical instruments such as the

shamisen (Kitade & Nishino, 2017). However, the overall quantity of ivory carved was not very large due to its high cost. This changed with the socio-economic boom that started in 1960 (E. B. Martin, 1985). Entire tusks of ivory were used as decoration in homes, and it became a popular material for traditional signature-seals named hankos (Ishihara et al., 2010).

Imports of raw ivory peaked in 1983 and then declined substantially. The annual production value of ivory and related industries in 2014 was 13% of what it was in 1989 (US$19 million, down from US$145 million), and data from the Elephant Trade Information System indicates the Japan is no longer a destination for significant illegal ivory flows (Ishihara et al. 2010; Vigne & Martin 2010; Kitade & Toko 2016; Kitade 2017; Sakamoto 2017). Further evidence comes from a drop in ivory association membership, an important industry practise among master carvers and traders (Sakamoto 2017), and consumer surveys that also indicate a low interest in purchasing ivory (IFAW 2008; Kitade & Toko 2016). For example, the Tokyo and Osaka Federation of Ivory Arts and Crafts Associations had 64 and 30 member companies respectively in 1980, but by 2013 this fell to only 30 and 5 member companies respectively (Kitade & Toko 2016). Shortly before the peak in ivory imports, Japan became a party member to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the foremost multilateral treaty regulating wildlife trade. Significant changes in legislation followed (Figure 5-1). In 1989 CITES listed elephant ivory on Appendix 1, preventing international trade unless a permit was issued to demonstrate import and/or export was not for primarily commercial purposes and would not be detrimental to the survival of the species (hereafter referred to as the ‘trade ban’ for simplicity’s sake). Japan was, however, permitted to receive two one-off sales of ivory, in 1999 and 2008. At the same time, the government of Japan introduced various forms of domestic legislation to regulate aspects of trade in endangered species. Control of the domestic ivory industry came under the Law for the Conservation of the Endangered Species for Wild Fauna and Flora, enacted in 1993.

External actors have claimed that both the legislation and its enforcement have not been stringent enough (Environmental Investigation Agency, 2015).

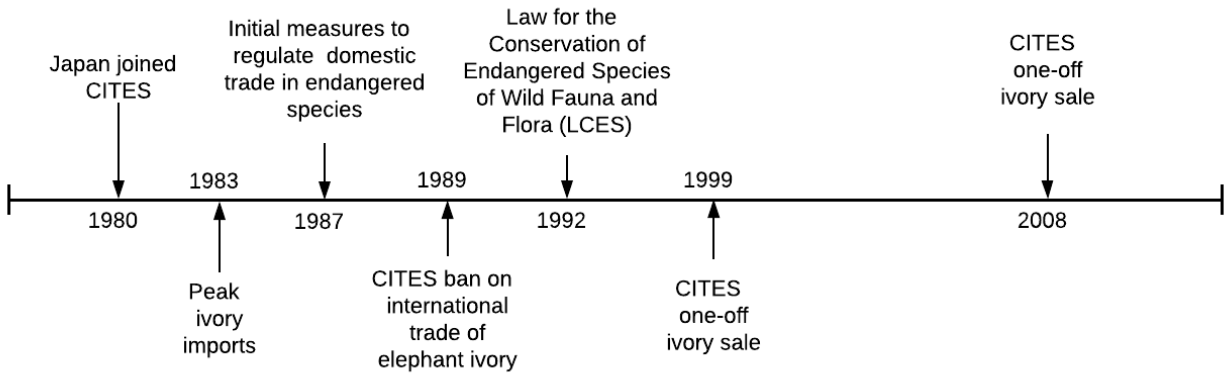

Figure 5-1. Timeline of important events and legislation relating to the ivory trade in Japan.

Prior to the 1989 ban vast quantities of ivory were imported to Japan, much of which was stockpiled (Martin, 1985; Kurohata, 2020). The exact amount of ivory currently circulating within Japan is uncertain, and loopholes in the registration of this ivory to the CITES management authority potentially provides the opportunity for fraudulent trade and import to occur (Kitade & Toko, 2016; Sakamoto, 2017). Thus, some authors have expressed concern that Japan has the potential to become a source or transit country for the international ivory trade, with multiple reports of illegal export of raw ivory to China (CITES, 2016; Kitade & Nishino, 2017). In addition there is evidence that there has been a market shift to online retail platforms, which have been implicated in the illegal as well as domestic trade (Kitade, 2017). This is just the latest significant shift in Japan's ivory industry, reflecting changes in the country's economic, cultural and political structures, as well as fluctuations in consumer demand.

5.3.2 Identifying potential market drivers

The first step in General Elimination Methodology is to identify all the possible causes of the outcome of interest, which in our case is the decline in demand for ivory in Japan. To do this, we reviewed the relevant literature and noted any events, conditions or other contributing factors which were cited as having had an impact on the ivory market in Japan. We search for any mention of Japan's ivory market in the literature, with focus on the words 'demand', 'market' and any of their derivatives. We began by searching Google Scholar and Web of Knowledge using the terms "Japan & ivory". As much of the research on the Japanese ivory trade appears in non-peer-reviewed literature (Calver et al., 2017), we also employed the method of 'backward citation chasing' or 'citation searching' to find additional studies or reports, using the extensive research of Kitade & Toko (2016) as a starting point. The advantage of citation searching is that it is not limited to keywords or indexing and enables one to identify parallel topics (Cooper et al., 2017). This was especially relevant to our study due to the complexity of the subject matter and the length of the time period we were interested in (Hinde & Spackman, 2014). Once we had collated all the possible causes, we refined an initial list of over 50 market drivers into a list of 35 based on similarity (Table 5-1).

Table 5-1. Potential market drivers identified to have had an influence on the domestic ivory market in Japan from 1983 to present day.

Market Drivers	
• CITES international trade ban of ivory	• Awareness of elephant population status
• Japanese economic recession	• Pressure from eminent people
• Unpredictable supply of ivory	• Change in retail outlets

- Ivory as investment commodity
- Demand reduction campaigns
- CITES 1999 one-off sale of ivory
- CITES 2008 one-off sale of ivory
- Negative national media attention
- Negative international media attention
- Awareness of illegal wildlife trade
- Awareness of elephant poaching crisis
- Demographic changes in Japan
- Substitute material for ivory
- Introduction of law on domestic trade
- Luxury/prestige status symbol of ivory products
- Change in law enforcement of international trade
- Pressure from conservation NGOs on government
- Ivory as a traditional gift
- Market shift to online outlets
- Marketing from ivory industry
- Fashion trends
- Awareness of animal welfare
- Popularity of ivory
- Tradition of ivory embodying good luck
- International demand for ivory
- Legacy of historical traditional of use of ivory
- Japan's involvement with CITES
- Digitalisation of paperwork
- Governments' involvement in ivory industry
- Change in international socio-economic climate
- Unknown quantity of domestic ivory stockpile
- Change in law enforcement of domestic trade

5.3.3 Participant sampling

We carried out an initial stakeholder analysis to identify key informants and used a purposive sampling strategy to ensure representation across three variables: sector, trade stance, and nationality (Grimble, 1998; Robinson, 2014). We sought stakeholders from industry, government, academia, and conservation non-government organisations (NGOs), with both pro- and anti-trade stances, and both Japanese and foreign nationals. Trade stance was evaluated based on publications, the organisation they work for (e.g., industry = pro-trade, IFAW = anti-trade, and the participant's views shared during the interview. Participants with experience of, or active involvement in, the Japanese ivory trade were recruited in an iterative process throughout the study until theoretical saturation was reached; that is additional interviews did not present any additional themes and categories (Thomson, 2011).

5.3.4 Interview process

We used a semi-structured interview process to reduce interviewer influence (Newing et al., 2010), the guide for which is available in the Supporting Information (5.7.1). This question sheet was piloted with two volunteers prior to use. The initial section of the interview covered personal information and professional expertise. The first research question asked interviewees about consumer demand for ivory in Japan in 1983, consumer demand presently, and whether there had been a change in consumer demand. Interviewees were encouraged to speak freely about their understanding of demand and the situation of the ivory industry in Japan over that time period. To answer the second research question, we provided interviewees with a question sheet listing the 35 potential market drivers identified previously. Interviewees were asked to systematically go through this list and state whether they thought each market driver had had an impact on consumer demand. They were able to answer ‘Yes’, ‘No’ or ‘Unsure’, and explained the direction of a causal impact in discussion with the interviewer. They were also asked to list any additional drivers that had not been included.

Interviews were conducted by phone (4), Skype (15), and in person (11). Three interviews were aided by an interpreter who spoke both English and Japanese fluently. All interviews were recorded, and then transcribed using the online transcription service Temi (www.temi.com), with corrections done subsequently by hand. We obtained informed consent from all interviewees. They were provided with an information sheet and signed a consent form prior to participation in the study. This research was approved by the Imperial College Research Ethics Committee (2018–01416450–MORKEL-Bvdb) and the University of Kent Research Ethics Advisory Group (14-PGR-18/19).

5.3.5 Data analysis

Our theoretical approach was primarily inductive, in which detailed readings are used to derive themes through interpretations made from the raw data, but it was aided by abductive inference (Adu, 2019; Charmaz, 2000; Elo & Kyngäs, 2008). In other words, we moved back and forth between the data and pre-existing theories in the literature (e.g., Ishihara et al. 2010; Vigne & Martin 2010; Kitade & Toko 2016; Kitade 2017), making comparisons and interpretations to find explanations for changes in demand (Thornberg, 2012).

We analysed the transcripts concurrent to data collection and did not predefine the coding framework. Instead, it emerged in an iterative process, as we cycled repeatedly between reading, focused coding, reflection, and rereading (Adu, 2019; Tie et al., 2019). We identified relevant information in the transcripts on a line-by-line basis and generated new codes and categories as our understanding evolved. The codebook we developed is available in the Supplementary Information (5.7.2). All coding was conducted by a single author (LTW) in NVivo 12 Pro (QSR International).

We tallied the proportion of each stakeholder group (e.g., whether NGO or anti-trade) who selected ‘Yes’ when asked whether a specific market driver had impacted consumer demand. This question sheet data allowed us to consider whether there were clear differences between stakeholder groups in the importance they placed on different market drivers. When ratings given by stakeholder groups differed, we used the qualitative data in the coded transcripts to help us understand why perceptions differed.

5.3.6 General Elimination Methodology process

Based on the analysis of the stakeholder interviews and data gathered from the literature review, we compiled a list of possible causes for the reduction in demand. We then constructed potential causal pathways for each of these possible causes, listing the events and enabling conditions that would need to be present for the cause to have an effect (Scriven, 2008). Once these potential mechanisms were established, we assessed the absence or presence of the factors deemed necessary for each possible cause to impact demand. We qualitatively measured the strength of the evidence available for each cause from weak to strong, based upon the existing scientific literature, the number of references from difference interviewees/stakeholder groups and the reasoning supplied. Where evidence for the intervening mechanisms was absent, we eliminated the possible cause from our evaluation. We refined the remaining causes into an overall theory of change, assessing the likely impact of each one to identify the major and minor drivers of change with a complex contribution analysis.

5.4 Results

We interviewed 32 stakeholders between June 2018 and January 2020. As one interview session encompassed three members from the same organisation, this equalled 30 interviews in total.

Respondents were generally pro- or anti-trade, few were neutral (Figure 5-2). Representatives from two major government departments agreed to be interviewed about the ivory trade, as did members of the netsuke and hanko industries. We were able to interview NGO staff who had been campaigning on Japan's ivory market for over 20 years, and academics with research expertise in both the domestic and international trade. More than half of those we interviewed were Japanese, and many had lived through the events discussed below.

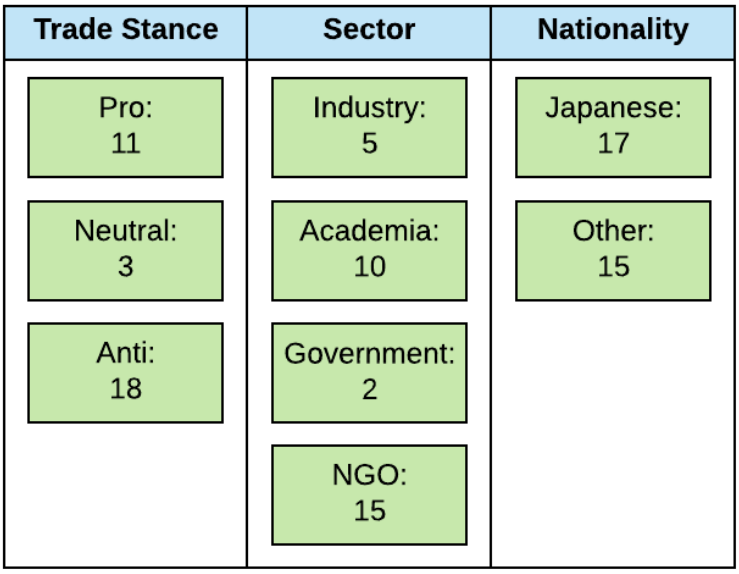

Figure 5-2. Key characteristics of respondents, showing the distribution of trade stance, sector, and nationality.

5.4.1 Change in demand

Our first key research question was to investigate whether there had indeed been a reduction in demand for ivory products, as suggested by many sources and the available data (Kitade & Toko, 2016; Kurohata, 2020). Consumer demand reflects the quantity of ivory that consumers are willing to purchase at specific price points, so a reduction in demand means consumers are willing to buy fewer ivory products at every price point. Market surveys conducted by TRAFFIC show a reduction in the availability and sale of a variety of ivory

products, both legally and illegally (Kitade & Nishino, 2018). In addition, the price of worked ivory has decreased since the CITES ban (Kurohata, 2020). The interview data were in accordance with the available quantitative data. Respondents were nearly unanimous that demand had decreased, for all products.

> **R11** *However we're not buying as much ivory volumes compared to the eighties. […] The demand has diminished. There'd been a reduction from 80% demand in the eighties when there was a conscious culture discriminating against individuals that didn't use ivory stamps versus the 10% of the population still purchasing ivory products presently.*

The change in demand since 1983 has not been entirely uniform. There are some niche consumer bases which maintain a certain level of demand. For example, older generations value the ivory products they possess, but have little desire to purchase more except as an occasional luxury.

> **R02** *These older people probably do value and treasure their ivory products, such as ornaments for display; so they'd look after it, and keep it, and I don't think they'd really consider getting a new one… Maybe for elderlies that are living primarily on pension, they might just treat themselves to an ivory-made in-kan as a luxury product or something.*

5.4.2 Mapping possible causes

The different factors that may have led to a reduction in demand for ivory products fell into four thematic areas: economic, legal, normative, and cultural. These causes evolved beyond the potential market drivers identified at the beginning of the study, as a detailed analysis of the data transformed our understanding of the causal pathways. In addition, we separated out the factors that were likely to increase the demand for ivory products, such as marketing

campaigns from the ivory industry. Although some were important market drivers, they failed to counteract the prevailing conditions that led to a reduction.

5.4.3 Economic

Based on the literature search and interview data, we identified a range of possible causes within the economic sphere that could have led to a reduction in demand for ivory products. These included an economic recession, changes in retail outlets, and the availability of substitute materials (Figure 5-3). Following an economic bubble, Japan experienced a severe recession that started in the early 1990s (Powell, 2002; Siddiqui, 2009). Respondents strongly agreed that this had far-reaching implications, including a general cultural shift away from conspicuous consumption (Ciniselli, 2013). Consumers had less discretionary funds for large, expensive ivory products, but they also generally had less desire to make those types of purchases, as the status associated with gratuitous displays of wealth waned. In a reinforcing fashion, as fewer people were seen purchasing and using ivory products, social norms around their use changed.

> **R19** *The economic recession impacts the majority of consumer's ability and willingness to spend on goods and services, especially luxury goods and services.*
>
> **R31** *So basically you get into a situation where once the bubble bursts, people want to buy it less. You're not going to have people who already have ivory who are buying it. Again, it's new people coming in, younger generations coming in who have less money, who see older generations buy ivory hankos, but they don't have the money to get that, nor do they see sort of that as being fashionable. So I personally think that, I mean sort of knowing Japanese mentality as well, I think that, it was quite a bad thing to kind of flaunt your wealth. There was a massive contrast between the eighties and the nineties in Japan in terms of that sentiment.*

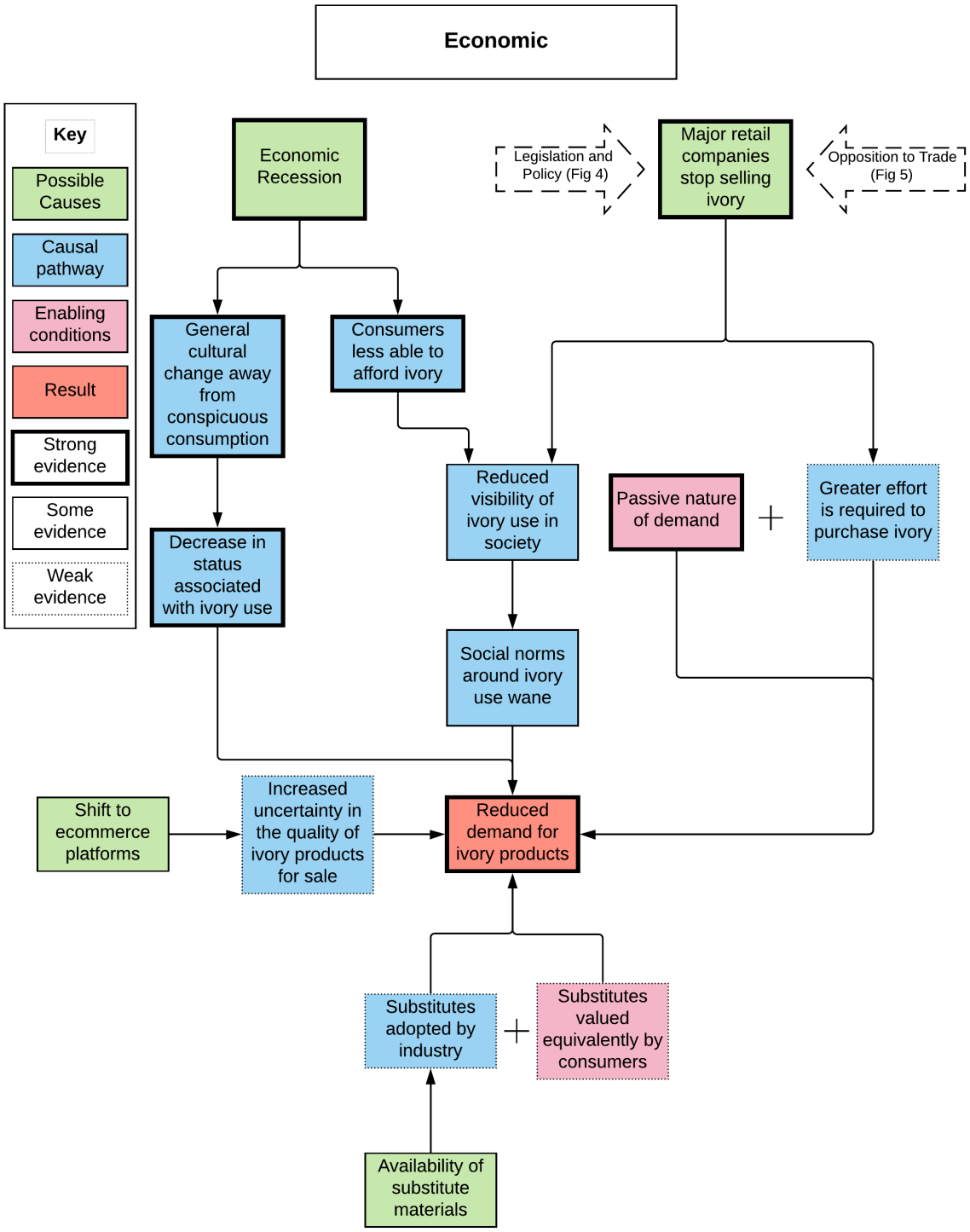

Figure 5-3. Theory of change for economic factors that could potentially have led to a reduction in demand for ivory products in Japan.

Since the 1980s retail outlets for ivory changed substantially, including a shift to e-commerce platforms and decisions by many brick-and-mortar stores to stop stocking ivory products (Japan Times, 2018; Kitade & Toko, 2016; WildAid, 2019). The growing availability of ivory online may have had mixed effects on demand, and respondents expressed uncertainty about this driver (Figure 5-3). E-commerce could have made it easier to buy ivory products, and minimised any potential stigma from face-to-face purchasing. However, this would mainly have applied to planned purchases, rather than impulse buys while browsing in brick and mortar stores. Some respondents suggested that the possibility of being defrauded may have dampened demand for ivory products, though there was little evidence to show this was a major concern.

> **R11** *Online marketing hasn't increased the number of consumers compared to the eighties when there were more consumers. However, the potential access to ivory is much larger and thus the potential purchase demand could increase as a result of online marketing. As opposed to you having to go all the way to a shop, you can just purchase online, which is a shorter span between the time that you decide to buy and point of sale*.

Major retail stores such as Aeon and Ito-Yokado have stopped selling ivory products, and even online ecommerce giants such as Rakuten Ichiba and Yahoo Shopping have already followed or pledged to do so (Japan Times, 2018; WildAid, 2019). These decisions were spurred on by factors such as the confusing bureaucracy imposed by the domestic legislation and pressure from those opposed to the ivory trade (both explored further below). Reduced availability in major stores would have increased the effort needed to acquire ivory. It will also have reduced the visibility of ivory use in society generally, and thus social norms. Respondents characterised consumer demand for certain ivory products, e.g., accessories, as passive (Figure 5-3). Browsing shoppers may have bought ivory products that were on display, but most consumers lacked the motivation to make a special effort to find them.

> **R08** *Items, products such as accessories, made by ivory have become less and less popular in the stores and they've been replaced with other materials, accessories made from other materials. And people would buy those ones. They don't care so much about ivory. If such articles are not sold in the stores, people just give up, then they don't care so much about buying ivory.*

Depending on its purpose, there are a range of other materials that can be carved in the place of ivory. These include but are not limited to titanium, crystal, buffalo horn, plastic, mammoth ivory, and woods such as mahogany or boxwood. They vary in terms of price, status, and durability. Whether they are accepted by businesses and customers as alternatives to ivory depends on the specific product. For instance, respondents were firm that ivory is considered to be the best material for bachi (large plectrums) for shamisens, a traditional Japanese musical instrument. This usage accounts for only a small portion of the market, however.

> **R05** *Yes, but I've heard that instrument plucks have to be ivories. They've tried using alternatives, but it just breaks apart. The shamisen plucks.*

Laser-engraved titanium hankos occupy a similar price and prestige bracket to hand-carved ivory hankos, but the smaller, traditional businesses may have been unable and/or unwilling to invest in the needed equipment to provide them (Figure 5-3). Netsuke carvers show a greater willingness to use alternative materials such as boxwood, even if ivory is still desirable.

> **R40** *One thing I would like to add is that, of course, I understand the value of ivory, and the problems. And netsuke is not just about ivory. And even if there won't be ivory anymore, I will continue to make netsuke from other materials.*

5.4.4 Legal

Both international and national legislation had the potential to impact ivory demand (Figure 5-4). The CITES international trade ban was a major driver that came up repeatedly. The government did eventually enforce the import ban, and a culture of respect for government authority negatively affected public perception of ivory use. How this implicit trust in the government impacted demand for ivory overall is not clear cut however, and some respondents thought consumers could have interpreted the presence of legal products in stores as a governmental endorsement of the trade.

> **R31** *The CITES international trade ban of ivory. I think that definitely had an impact. I would say Japanese people are quite orderly. […] There's a certain level to which the law is held in regard to, and I think in Japan it's quite, it's quite strict. You'll see that in drug use for example. There is drug use in Japan, but it's so shunned upon. So there's quite, the public perception of the law is quite strong. So I think, yeah, the international trade of ivory ban was definitely influential.*

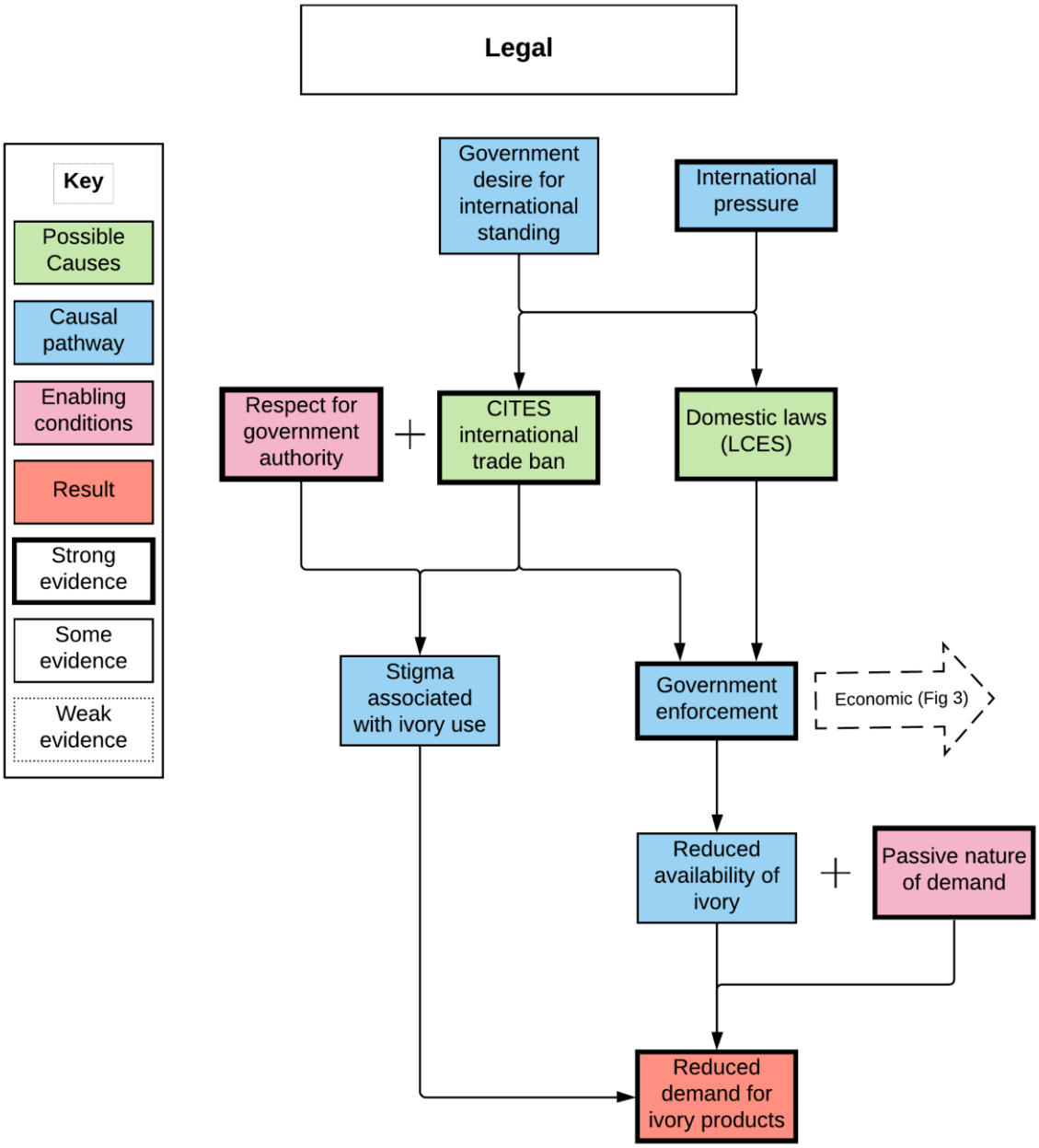

Figure 5-4. Theory of change for legal factors that could potentially have led to a reduction in demand for ivory products in Japan.

Pressure from the international community helped prompt the enactment of national laws regulating the domestic ivory market, and later amendments which further strengthened this legislation (Mak & Song, 2018; Sand, 2018). The confusing bureaucracy imposed by the domestic legislation has been criticised, with some members of the conservation community

concerned about loopholes (Environmental Investigation Agency, 2015), but it likely contributed to the decision made by many large retailers to stop stocking ivory products. In this way it may have been partially responsible for reducing the availability of ivory in the market, which could have lessened consumption due to the passive nature of demand (Figure 5-4). However, it is also possible that seeing registered ivory items available for sale reinforced consumer trust.

> **R46** *About regulations, and involvement of government. I think it's not directly affected purchasers' demand, but I think it does affect or change the behaviour of people in the ivory industry or shoppers, so involvement of governments in the dissemination of regulations will change their behaviour, and it may change the retail outlets. So it will affect. But again, in this case, it may increase or decrease demand. Both is possible.*

5.4.5 Normative

Consumers of ivory may have been negatively influenced by a range of sources, including NGOs, the media, and eminent people (Figure 5-5). NGOs aimed to change behaviour by increasing the public's awareness of the trade and their empathy towards elephants. If consumers had developed negative attitudes towards the illegal wildlife trade in ivory and believed that the ivory market in Japan contributed to elephant poaching, then they may have decided to boycott its products. Some respondents thought it was very likely that NGO campaigns combined with media coverage of the ivory trade did improve consumer knowledge, but there is little evidence to support claims that this led directly to behaviour change. NGOs did however successfully exert pressure on several retail giants to change their policies regarding ivory, which could have had indirect impacts by reducing the visibility and availability of ivory products.

> **R16** *Firstly, those kinds of international negative campaign affected a lot on big department stores in Japan at that time. So it becomes more and more difficult for*

them to sell ivory products because it's a kind of shame to be selling those kinds of things. Automatically the market has been shrunk.

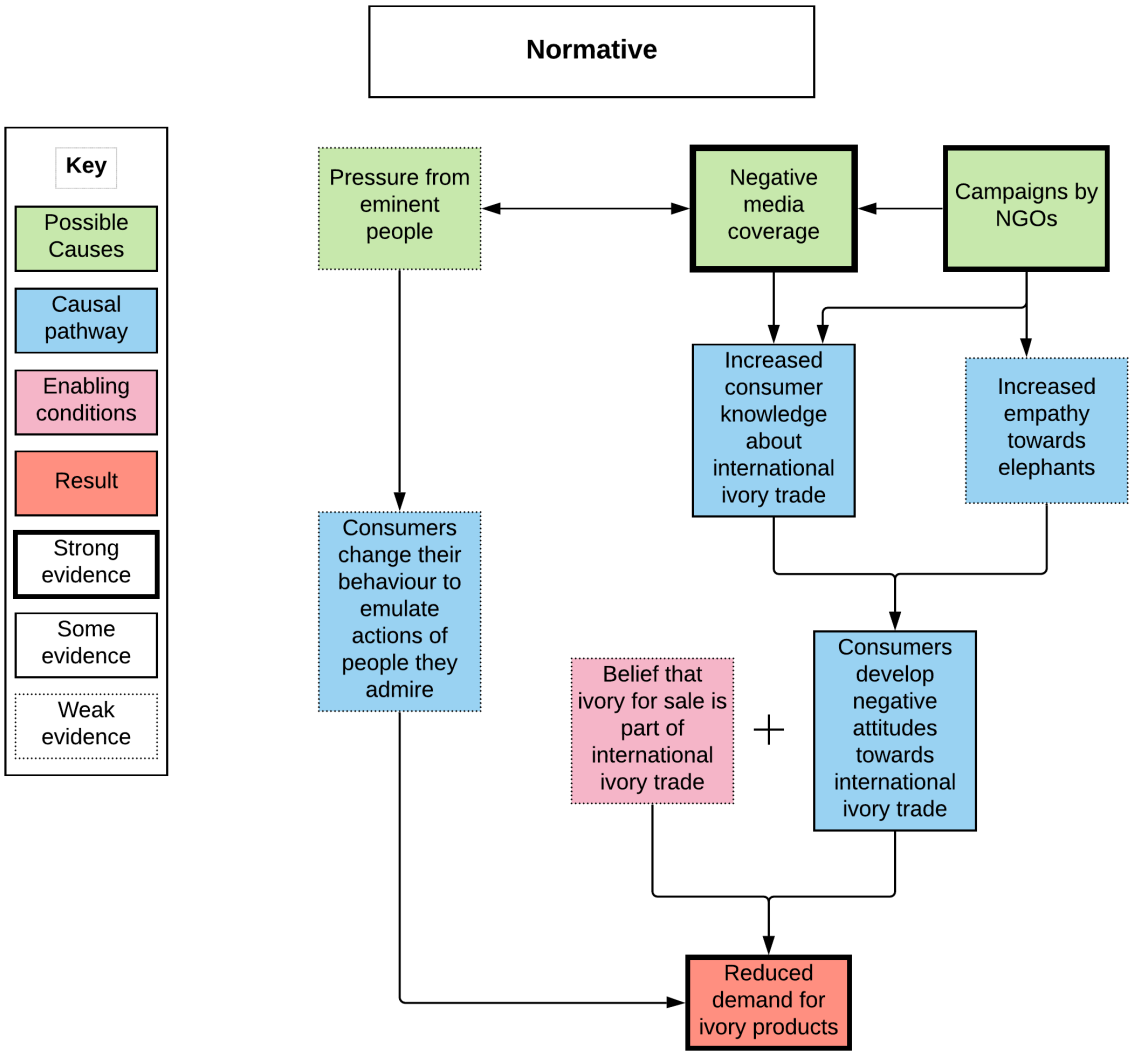

Figure 5-5. Theory of change for normative factors that could potentially have led to a reduction in demand for ivory products in Japan.

Most Japanese people only follow national media outlets, so respondents considered the extensive international media coverage on the ivory trade unlikely to have impacted consumers directly. National media often pick up stories from international outlets however,

and there has been extensive and frequently emotive reporting, particularly in the years following the CITES trade ban. There is a large degree of uncertainty associated with the impact of this media coverage on consumers. Respondents thought that audience segments may have been differentially affected. Amongst those more susceptible to this coverage were younger generations, policymakers, and those who were already uninterested in ivory.

> **R02** *I think yes; I'm not sure about the degree of impact, but I do think there will be people [who are] exposed to the media and feel that they shouldn't purchase it. Whether these people wanted it in the first place is another issue. They may not have had any interest, but they'll be aware of it from the news.*
>
> ***R19*** *So it may be because in Japanese society, I think they primarily get their news from Japanese language media, not necessarily English language media. So if you're talking about influencing an individual Japanese consumers, I don't think that has played a factor in influencing consumers, but if you are teasing them out [different stakeholder groups], say policy makers in Japan, I think then negative international media attention has an influence on policy makers, but not on consumers.*

Studies have shown that people may emulate the behaviour of celebrities, including eschewing certain products such as meat, but the impact of celebrity endorsers in conservation is not clear-cut (Cheng et al., 2007; Duthie et al., 2017; Phua et al., 2019). In this case, we found there was little evidence that eminent people in Japan chose to take the spotlight to pressure consumers to boycott ivory (Figure 5-5). One exception was a visit by HRH Prince Philip where he openly spoke out against ivory consumption while meeting with the prime minister (Kitade & Toko, 2016). Few respondents considered this significant, although one felt it may have had an impact on policymakers who were concerned about Japan's international reputation.

5.4.6 Cultural

Over the past four decades many aspects of Japan's society have changed (Figure 5-6**Figure 5-6**). Between 1970 and 2005 there was a steep decline in Japan's birth-rate, leading to a progressively aging population. This demographic decline has been linked to a decrease in consumption generally, and respondents also associated it with reduced demand for specific ivory products (Ciniselli, 2013). For instance, hankos are a standard "coming-of-age" gift that older relatives may give to young adults, and ivory has often been promoted as a desirable material. As the number of people in each generation decreased, the quantity of hankos needed could also have decreased. Respondents were unsure whether this change in itself would have been enough to lead to a decrease in ivory hanko sales however.

> **R10** *When I check the sales strategy of hanko retailers one of their main targets [are] parents or relatives or the young people who are becoming adult[s]. They promote ivory hanko to the parents and relatives to gift this to your children for becoming [an] adult. It's a kind of high prestige, hanko may ascertain the future of the children, or something like that.*

> **R44** *I think one of the things is just the demographic change [that influenced change of demand] because the hankos were basically given to young men when they reached a certain age as part of a rite of passage. Now because of Japan's aging population and low reproductive growth rate, the cohorts coming through to give the hankos to have dropped because of a demographic shift. Traditional demand, the traditional gift, it's just rapidly becoming less and less popular - one strong factor.*

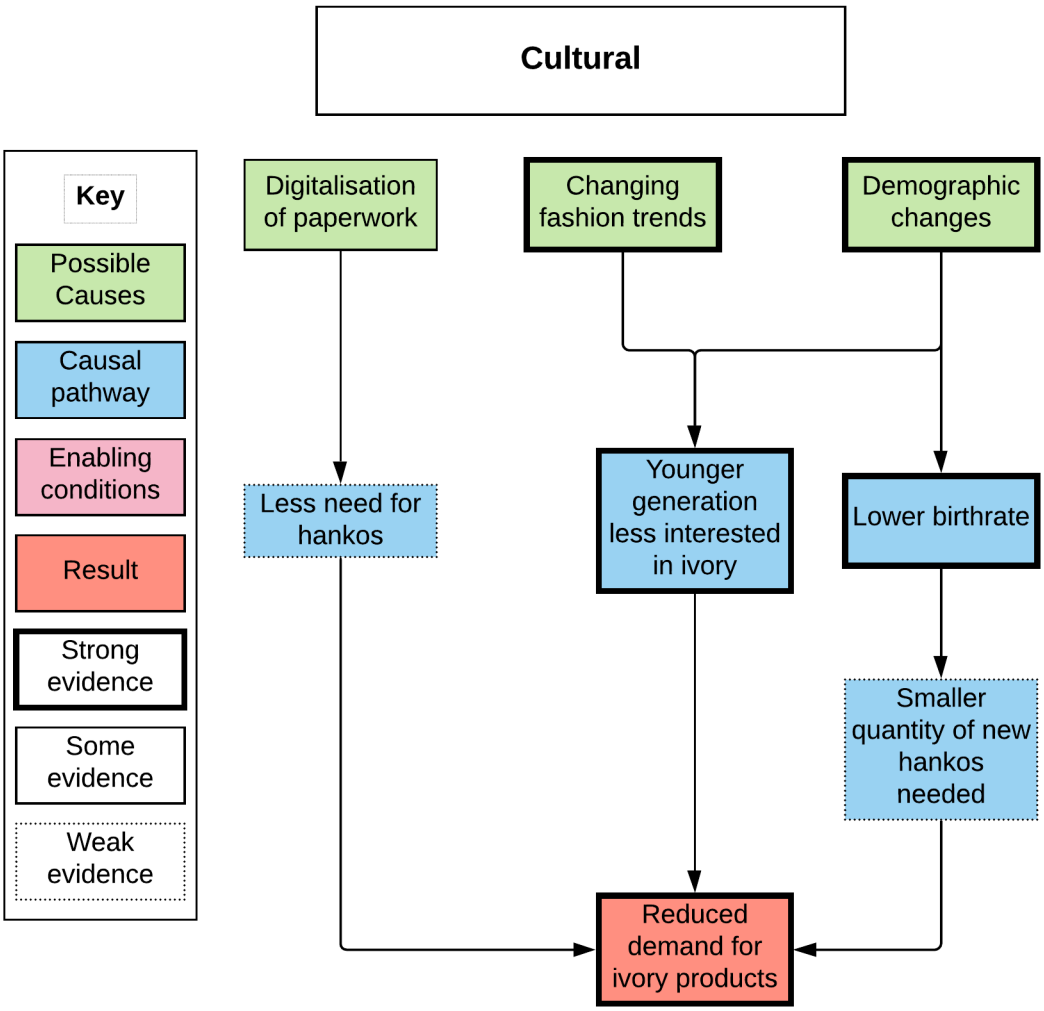

Figure 5-6. Theory of change for cultural factors that could potentially have led to a reduction in demand for ivory products in Japan.

Another factor that could have lessened the need for hankos is the digitalisation of paperwork. If physical signatures were no longer required for day-to-day business activities or major purchases like buying a car, then the average consumer would have no practical need for hankos and the entire culture of use could be lost. At the time of interviewing, respondents thought it was unlikely that digital signatures had become commonplace enough for them to have had a major impact on hanko sales (Figure 5-6). However, since the SARS-COV-2

pandemic, there have been reports of a much larger shift towards electronic signatures (I. Reynolds, 2020; Ryall, 2020).

> **R02** *I think that with the in-kan's [hankos], their demand is definitely affected. When more people use online methods, there is less of a need to stamp seals using in-kan's. So, although it's not limited to those made of ivories in particular, but in-kan's in general- I feel like their significance will begin to die out, and potentially even the art of carving in-kan's may be lost together too.*

A common theme emerged that, as well as being fewer in number, the younger generations had less interest in ivory products. This was mainly attributed to changing fashion trends, and a greater awareness of the plight of elephants in the illegal ivory trade (Figure 5-5 & 5-6). While the other factors explored in this paper may also have impacted the reduced popularity of ivory accessories amongst younger consumers, some respondents believed that was just a reflection of the cyclical nature of generational preferences.

> **R05** *The senior population contributes more strongly to the market demand for ivory. The younger population might be future ivory consumers. However, the immediate demand for ivory belongs primarily to the people above fifty years of age.*

> **R36** *And, for people who know anything about ivories, whether it be young people, the issue is that when young people are seen wearing accessories made of ivory, it doesn't leave a very good impression; as in, its treated in a similar way as animal fur clothing.*

5.4.7 Overall theory of change

Markets are complex systems, and it is important to recognise that the reduction of demand for ivory products was caused by multiple, interacting factors (Figure 5-7). Based on our analysis, the two biggest drivers were the CITES international trade ban and the economic

recession. When coupled with respect for government authority, the passive nature of demand, and a general cultural shift away from conspicuous consumption, we see profound effects on demand for ivory products in Japan. Without these enabling conditions interventions such as the CITES trade ban may have failed to impact consumer demand, and instead led to a thriving black-market trade like we see in other countries (Gao & Clark, 2014).

> **R20** *They're very fashionable in the eighties and then with the recession combined with the CITES ban, combined with the interest in emulating the west, we see that ivory had gone out of fashion. It's a combination of factors all happening at the same time.*

> **R32** *Around that time, the average price for ivory made stamps began increasing. This was further exacerbated around the time period that you've just mentioned- around the later 1980's when the imports of ivories were banned. This meant that the business had to run on what was currently in the domestic stockpile, so it was this resource scarcity that drove up the prices which ultimately lead to the final stamps at retail stores becoming more expensive. This, in combination with the falling Japanese economy caused the demand to decline.*

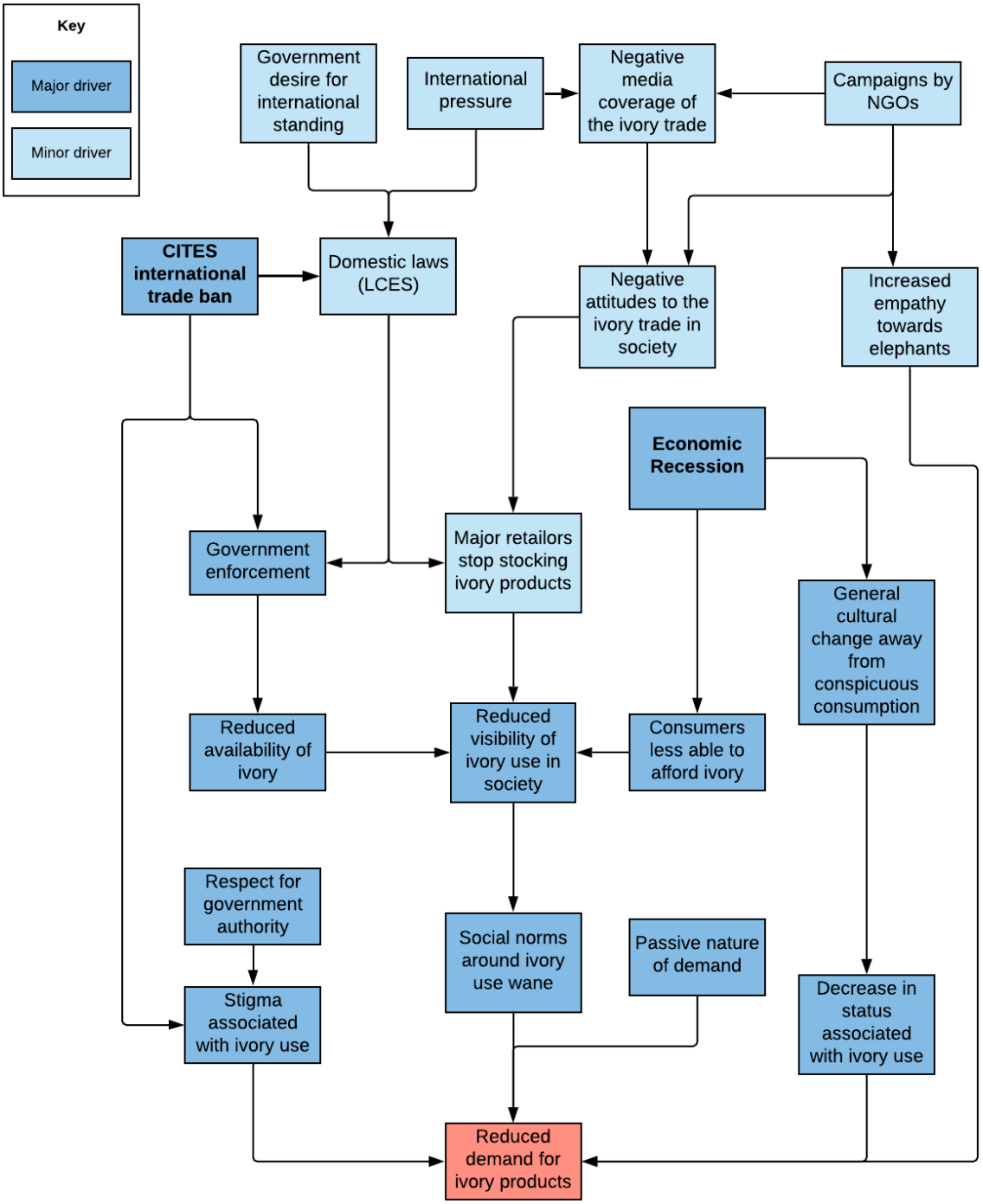

Figure 5-7. Overall theory of change, illustrating the major and minor drivers that led to reduced demand for ivory products in Japan.

While we cannot quantify precisely the impact of different market drivers, other factors likely had comparatively smaller or more indirect effects (Figure 5-7). Pressure from the media and NGOs may have changed the perceptions of at least some consumer segments, and also influenced major retailers. This is also the case for the enforcement of national legislation.

> **R16** *Yes, of course. Because at that time it was everywhere in newspapers. The consumers themselves are also aware. They must have felt like they were ashamed of buying this kind of thing. So in the beginning they thought is a kind of status of wealth but after negative way international media campaign, they started to feel ashamed of buying such kind of things.*

5.4.8 Positive drivers of demand

Although our focus was on understanding what factors had led to the reduction of consumer demand for ivory, we also considered drivers of demand (Figure 5-8). Major themes that emerged were the positive qualities associated with ivory, the endorsement of the ivory market by the government, and marketing from the ivory industry. Some of these have already been discussed in detail above, such as the role of the government in consumer attitudes.

> **R26** *First of all, as a country, the national policy is that ivory should be traded domestically. National policy is and has been for years that ivory should be traded internationally, and in support that policy government has actively supported the ivory trade domestically and internationally. Of course that impacts on the mindset and the demand of citizens.*

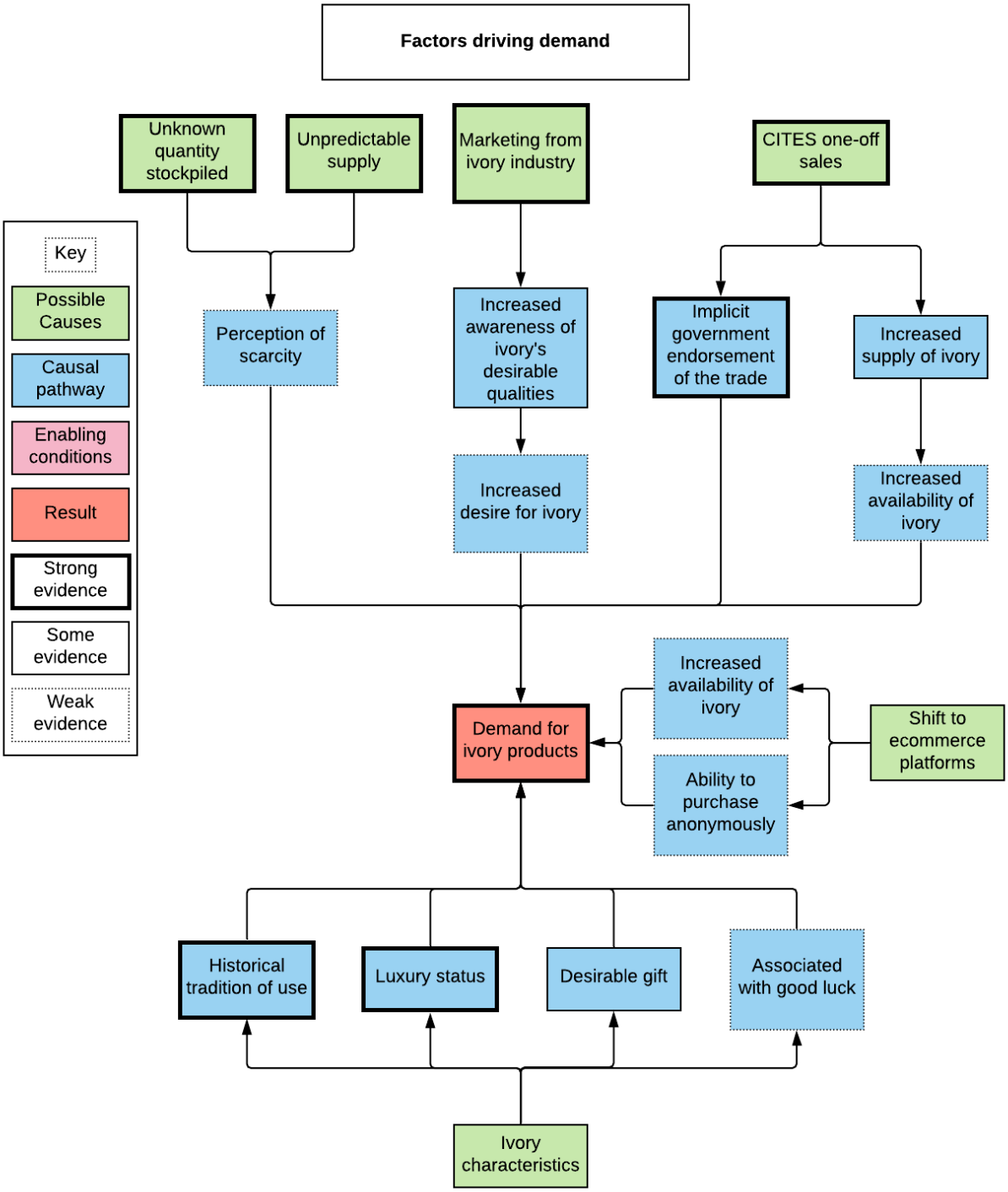

Figure 5-8. Theory of change demonstrating drivers that increased demand for ivory products in Japan.

Ivory undoubtedly has many desirable physical characteristics, including its durability and the ease with which it can be carved, but there are also immaterial qualities that make it desirable. In the 1980's it was strongly associated with luxury and prestige, bestowing status upon its owner. It was also considered a valuable and appreciated gift to give someone. These values may be a result, at least in part, of a sales strategy from the hanko industry, marketing it as a high-end product. These perceptions however seem to be declining, particularly amongst the younger generations.

> **R24** *And then, you know, even on the major newspaper they had a huge propaganda, um, you know, particularly ivory stamp hanko, basically, saying that if you have an ivory hanko your life becomes a happy and then this is a very precious value.*

5.4.9 Differences between stakeholder groups

There were few significant differences between respondents' perceptions of the factors affecting consumer demand for ivory. Considering the polarisation of attitudes towards the ivory trade (Biggs et al, 2017), this consensus suggests we can be confident in our analysis. Where opinions did differ, the disagreement was often qualitative in nature, e.g., the level of importance that should be ascribed to a specific driver. One factor about which stakeholder groups did disagree was media coverage. Industry members felt there had been far more negative media coverage and NGO campaigns, and that these did change consumer behaviour. This may be because the coverage was more salient to these stakeholders, who belonged to the very trade it attacked. Academics, policymakers, and industry members also felt that the media had misrepresented Japan's ivory market and its impact on elephants, a concern not shared by NGO representatives.

> **R32** *I feel that the way these groups release information about illegal trade or animal treatment using traps and such is almost problematic on a legal level. On top of this, the media portrays it in such a skewed way. It just seems to claim that ivories are bad.*

Respondents who held pro-trades attitudes were more likely to emphasise the importance of shifting fashion trends and changes in retail outlets, both physical and digital. Anti-trade respondents focused relatively more on factors that could be driving demand, such as the tradition of historical use and the status associated with ivory. They also thought that substitute materials and the implementation of the CITES trade ban played a bigger role in reducing consumer demand than did the pro-trade respondents.

5.5 Discussion

We have been able to tease apart the varying drivers that have impacted demand for ivory in Japan over the past 35 years by rigorously and systematically applying General Elimination Methodology. We identified the two biggest drivers, the CITES international trade ban and the economic recession, as well as a range of minor drivers and enabling conditions. Purported influences that are unlikely to have had an impact, such as pressure from eminent people, have been ruled out.

One important finding is the lack of evidence that concerted campaigns directly affected consumer demand. There is increasing interest from conservationists and policymakers in demand-side interventions that focus on shifting individual behaviour through approaches such as social marketing and environmental education programs (Veríssimo & Wan, 2018). Despite frequent media coverage, respondents were not aware of a large number of concerted demand-reduction campaigns aimed at ivory consumption. The consumer-facing interventions that did exist tended to be awareness-raising campaigns in the mass media, an approach that is unlikely to achieve actual behaviour change (Greenfield & Veríssimo, 2018; Kelly & Barker, 2016). However, these campaigns did indirectly contribute to a reduction in demand by placing pressure on major retailers to stop stocking ivory products.

5.5.1 The future of Japan's domestic ivory market

Although there has been an overall reduction in demand for ivory products, there were a number of counteracting forces (see 5.7.3). One important factor is support from the Japanese government, who are lobbied by the ivory industry and a small sector of the population to support the trade as an important cultural and economic product. The government is also resistant to letting national policy be dictated by foreign bodies. At the CITES CoP17 meeting, a Resolution was proposed that recommended the closure of domestic markets that are "contributing to poaching or illegal trade" (CITES Secretariat, 2017). Japan has firmly maintained that its domestic market does not fit this description, holding the stance that commercial trade, when carried out at sustainable levels, may help fund anti-poaching efforts and community-based conservation (Japan, 2016). Certainly, there is little evidence that elephants are currently being poached to supply the domestic trade, with few seizure records for imported ivory. Instead, "new" ivory entering the market tends to be whole ivory tusks, once used for decoration by older consumers, now being registered for sale with the government as they are inherited by family members who no longer consider them desirable (Ministry of Environment, 2018). This large quantity of stockpiled ivory, together with the low levels of demand, means that Japan is unlikely to close the domestic ivory market any time soon.

> **R02** *Yes. I think the general idea is that we don't want to entirely close down the market, so we're tightening the regulations, and lawfully carrying out procedures. We don't want to see illegal trades or the killing of elephants. By doing things under the law, we can continue ensuring this doesn't happen. This time we've amended the law, making it stricter than before, so we'd like to appeal to the public that things are carried out under proper management. Basically, ensuring that there is nothing bad coming in or going out of the country, and ultimately I don't think we're heading in the direction towards closing down the market at all.*

The continued existence of a domestic market does not seem to pose a conservation concern. However, the contravention of CITES through illegal exports of stockpiled ivory, particularly by Chinese tourists, may provoke condemnation from many in the international conservation community. If Japan wants to avoid further international criticism, there is an urgent need to tighten customs security.

> **R35** *So that means for Chinese going overseas to where they can buy ivory illegally, the Chinese currency goes so much further. And so if they go to Japan, the ivory prices in Japan remain low, much lower compared with China. And then if they buy that ivory and smuggle it back to China and sell it on China's market in RMB, the profit margin was huge. So that has created during that period, there has been quite a few large cases of ivory being smuggled from Japan to China and caught by, actually over a hundred cases, of this kind of smuggling ivory from Japan to China caught China's enforcement, none of them was caught by Japan. None.*

5.5.2 Wider relevance

This case study also highlights the potentially important role of theory-based qualitative evaluations in conservation (Salazar et al., 2019). Conservation issues often involve many interacting biological, social, political and socio-economic factors, operating at a range of scales and time periods (Knight et al., 2019; Margoluis et al., 2009). Theory-based impact evaluation methodologies can help establish causal attribution in cases where we lack baseline data or a credible counterfactual (White, 2009). They allow researchers to take a wider view of the system under investigation, to consider alternative mechanisms and investigate heterogeneity in perceptions amongst stakeholder groups (De Allegri et al., 2018). Quantitative data can then be incorporated into the analysis alongside richer, qualitative data (Leeuw & Vaessen, 2009). Adopting this new approach will help us move away from facile debates about whether a single intervention caused a particular outcome, instead recognising that there are likely to be multiple contributing factors driven by interactions between different

actors (Birnbaum & Mickwitz, 2009; Curzon & Kontoleon, 2016). In doing so, we can challenge current simplistic narratives and gain a more nuanced understanding of conservation interventions.

Our analysis highlights the importance of understanding the cultural context in which interventions take place (Waylen et al., 2010). Notably, we identified several facilitating conditions that enabled drivers to impact consumers. These included respect for government authority, the passive nature of demand for ivory, and a general cultural shift away from conspicuous consumption. Although present in Japan, they are not necessarily found in other countries to the same extent (Bergin et al., 2019). In addition, many of the drivers we identified, from increased media coverage to the economic recession, were not under the deliberate control of a single stakeholder and so would also be difficult to replicate in other nations. However, the CITES international trade ban had a major influence on demand, and pressure from the international community and national media did indirectly contribute to market changes. A theory-based evaluation approach illuminated the complexity of these interacting drivers, enabling us to make recommendations for the future of Japan's ivory market.

5.6 Supplementary Information

5.6.1 Interview guide

AT THE START OF THE INTERVIEW

Start recording audio

Thank the interviewee for participating in the study

Talk briefly about the purpose of the study, using information from the 'Information Sheet'

State that this interview is being recorded for analysis purposes.

Ask whether they have any questions?

Confirm that the interviewee has read, understood and signed the Consent Form and received the countersigned document.

Notify interviewee that there will be few prompts will be given during interview to avoid bias but encourage interviewee to speak freely, as in an informal discussion.

QUESTIONS

PART 1

SAY:

What year were you born?

Please describe your current profession?

What is your connection to Japan?

Please describe in what capacity you are involved in the trade of elephant ivory, presently and in the past?

PART 2

SAY:

Demand is an economic principle that describes a consumer's desire and willingness to pay a price for a specific good or service.

Was there a demand among consumers for ivory in Japan in 1983?

Prompt: Please describe the situation of the ivory market then and the consumers' demand for ivory.

Is there a demand among consumers for ivory in Japan presently?

Prompt: Please describe the situation of the ivory market presently and the consumers' demand for ivory.

Has there been a change in consumers' demand for ivory in Japan from 1983 to present day? In as much detail as possible, please describe the change in consumers' demand for ivory in Japan from 1983 to present day?

Prompt: What were the trends within the ivory market indicative of this change in the Japanese consumers' demand for ivory? Specific to certain products or in general.

PART 3

SAY: A market driver is a process, condition or resource that has an impact on the market. The domestic ivory market in Japan has been impacted by numerous market drivers from its peak in 1983 to present day.

Here given to you is a document with instructions. Please take your time to go through the document and complete the instructions.

Emphasise that you are interested in what the interviewee think was the influence that each of the market drivers had on the general Japanese consumer's demand for ivory.

5.6.2 Codebook

Name	Description	Number of Coding References	Number of Files Coded
Level of demand	(RQ1) Captures information relating to the level, strength, and extent of demand for ivory in Japan at any point since 1983	110	27
Current	(RQ1) Captures information relating to the current level, strength, and extent of demand for ivory in Japan	33	18
Increase	(RQ1) Captures information relating to an increase in the level, strength, and extent of demand for ivory in Japan since 1983	4	3
Reduction	(RQ1) Captures information relating to a reduction in the level, strength, and extent of demand for ivory in Japan since 1983	56	24
Market drivers	(RQ2) Captures information relating to the impact of market drivers on consumers demand for ivory in Japan since 1983	917	30
Alternatives	(RQ2) Captures information relating to possible alternatives to ivory (e.g., titanium, boxwood) and their impact on consumer demand for ivory in Japan since 1983	46	23
Attitudes to animals	(RQ2) Captures information relating to consumer attitudes towards animal welfare and conservation issues, notably elephants in the ivory trade, and their impact on consumer demand for ivory in Japan since 1983	55	18
Awareness	(RQ2) Captures information relating to consumer awareness of the ivory trade, nationally and internationally, and its impact on consumer demand for ivory in Japan since 1983	114	26
CITES one-off sales	(RQ2) Captures information relating to the 1999 & 2008 CITES approved one-off sales of ivory, and their impact on consumer demand for ivory in Japan since 1983	39	22

Culture	(RQ2) Captures information relating to cultural characteristics, and their impact on consumer demand for ivory in Japan since 1983	51	21
Demographic changes	(RQ2) Captures information relating to the change in the population growth rate, and its impact on consumer demand for ivory in Japan since 1983	57	23
Fashion trends	(RQ2) Captures information relating to changes in fashion trends, and their impact on consumer demand for ivory in Japan since 1983	5	3
General change	(RQ2) Captures information relating to wider cultural changes, and their impact on consumer demand for ivory in Japan since 1983	19	10
Ivory as gift	(RQ2) Captures information relating to the tradition of gifting ivory, and its impact on consumer demand for ivory in Japan since 1983	22	14
Ivory as lucky	(RQ2) Captures information relating to the traditional perception that ivory embodies good luck, and its impact on consumer demand for ivory in Japan since 1983	18	13
Ivory as luxury	(RQ2) Captures information relating to the perception of ivory as an item of luxury, and its impact on consumer demand for ivory in Japan since 1983	41	21
Ivory as necessity	(RQ2) Captures information relating to the perception of ivory as an item of necessity (e.g., for shamisens), and its impact on consumer demand for ivory in Japan since 1983	2	2
Ivory as status	(RQ2) Captures information relating to the perception of ivory as an item of status, and its impact on consumer demand for ivory in Japan since 1983	27	15
Tradition	(RQ2) Captures information relating to the legacy of historical traditional of use of ivory, and its impact on consumer demand for ivory in Japan since 1983	43	20
Economy	(RQ2) Captures information relating to economic concerns in Japan, and their impact on consumer demand for ivory in Japan since 1983	86	28

Investment	(RQ2) Captures information relating to ivory's potential to be an investment commodity, and its impact on consumer demand for ivory in Japan since 1983	16	13
Recession	(RQ2) Captures information relating to the economic recession, and its impact on consumer demand for ivory in Japan since 1983	43	26
International demand or changes	(RQ2) Captures information relating to international market and socio-economic climate, and their impact on consumer demand for ivory in Japan since 1983	39	17
Legislation	(RQ2) Captures information relating to legislation controlling the ivory trade, and their impact on consumer demand for ivory in Japan since 1983	122	29
Enforcement & regulation	(RQ2) Captures information relating to the enforced regulation of the ivory trade, and its impact on consumer demand for ivory in Japan since 1983	35	19
International	(RQ2) Captures information relating to international legislation controlling the ivory trade, and their impact on consumer demand for ivory in Japan since 1983	44	23
National	(RQ2) Captures information relating to national legislation controlling the ivory trade, and their impact on consumer demand for ivory in Japan since 1983	31	16
Paperwork	(RQ2) Captures information relating to a shift in administrative processes from using physical paper to digital formats, and its impact on consumer demand for ivory in Japan since 1983	25	15
Pressure	(RQ2) Captures information relating to efforts by various actors to affect demand for ivory, and their impact on consumer demand for ivory in Japan since 1983	231	28
Celebrities	(RQ2) Captures information relating to efforts by celebrities to affect demand for ivory, and their impact on consumer demand for ivory in Japan since 1983	15	12

	Demand reduction campaigns	(RQ2) Captures information relating to campaigns which tried to reduce demand for ivory, and their impact on consumer demand for ivory in Japan since 1983	29	20
	Industry campaigns	(RQ2) Captures information relating to pro-ivory industry campaigns, and their impact on consumer demand for ivory in Japan since 1983	43	21
	International	(RQ2) Captures information relating to efforts by the international community to affect demand for ivory, and their impact on consumer demand for ivory in Japan since 1983	19	10
	Media	(RQ2) Captures information relating to efforts by the media to affect demand for ivory, and their impact on consumer demand for ivory in Japan since 1983	81	26
	NGOs	(RQ2) Captures information relating to efforts by NGOs to affect demand for ivory, and their impact on consumer demand for ivory in Japan since 1983	39	18
Trade		(RQ2) Captures information relating to the trade opportunities of ivory, and their impact on consumer demand for ivory in Japan since 1983	107	26
	Availability	(RQ2) Captures information relating to the availability of ivory products for sale in Japan, and its impact on consumer demand for ivory in Japan since 1983	54	23
	Change in retail outlets	(RQ2) Captures information relating to changes in retail outlets for ivory (eg., decisions to stop selling products), and their impact on consumer demand for ivory in Japan since 1983	25	15
	Online shops	(RQ2) Captures information relating to the market shift for ivory to online retail outlets, and its impact on consumer demand for ivory in Japan since 1983	28	17
Properties of ivory		(RQ1&2) Captures information relating to perceived physical & immaterial properties of ivory	49	20
Uses		(RQ1&2) Captures information relating to specific products ivory is used for	90	25

Chapter 6: Discussion

In this chapter I discuss the contributions my thesis makes to the conservation literature, and where we need to go from here.

6.1 Contributions to knowledge

6.1.1 Set realistic expectations

Controlling unsustainable harvest of wild species is likely to be extremely difficult long-term unless consumer demand is also addressed. This does not make demand reduction a silver bullet however. My research demonstrates that even in more experienced and better resourced fields like public health, successful behaviour change is not guaranteed. Average effect sizes are small, and interventions can lead to unintended and undesirable outcomes (Firestone et al., 2017; Marteau, 2018; Snyder et al., 2004).

There are, of course, actions which may increase chances of success. In Chapter 2 I discussed how targeting specific audiences, doing formative research, using a behaviour change model to inform the design of interventions, and not unwittingly promoting a social norm around an undesirable behaviour can all be beneficial. Nonetheless, even high-quality campaigns frequently fail to move a significant portion of their audience (Firestone et al., 2017). Changing behaviour can be slow and expensive, and much of the current discussion in policy circles about demand reduction for illegal wildlife products may be overly optimistic. Recognising potential limitations is the first step to cementing the role of demand reduction in conservation, and ensuring it does not become another conservation fad (Redford et al., 2013).

Unrealistic expectations may extend to impact evaluations also. In complex socio-ecological systems it is not always possible to control for all confounding factors and establish a robust counterfactual, and the evaluation method must reflect these limitations (Ferraro, 2009). This is why we chose a qualitative theory-based impact evaluation approach to capture the complex dynamics of the Japan ivory market. Yet, researchers have attempted to quantify the effect of trade bans after they have occurred using publicly-available data on raw ivory prices and illegally killed elephant carcasses (Hsiang & Sekar, 2016). However, decisions made during the statistical analysis greatly affect the outcome of the study (Do et al., 2016). The appropriate weighting strategy for the data depends, in part, on the heterogeneity of treatment effects across time and landscape, and the accuracy of carcass classification is also influential (Burn et al., 2011). Given the tenuous statistical and theoretical assumptions such an analysis must rest on, expecting to accurately quantify the extent to which elephant poaching was affected by the CITES ivory listing is unrealistic.

6.1.2 The value of systems thinking

In Chapter 2 I critiqued the shift from one reductionist perspective (supply reduction) to another reductionist perspective (demand reduction) without a more comprehensive understanding of the problem. It is a mistake to view the wildlife trade from a reductionist viewpoint, dealing with links in the trade chain separately. By drawing parallels between two “wicked” problems, obesity and the trade in rhino horn, I have illustrated the importance of understanding systemic drivers and developing both upstream and downstream interventions (Figure 2-1). There are a range of social-environmental drivers, including moderators which impact the incentives for actors at each point in the trade chain. Correspondingly, a more holistic approach is needed, in order to tackle the trade at multiple 'systemic' levels.

In line with public health researchers, I have argued that success depends on complementing behaviour change with a strong policy framework and community empowerment, and systems thinking can help address the unintended consequences of conservation interventions in such complex situations (Laverack, 2017; Swinburn et al., 2011). The need for systems thinking is born from a growing understanding that partial responses are inadequate, and that a failure to appreciate feedback and dynamic interrelationships usually results in a failure to achieve the desired impact (Blair, Le, Thạch, et al., 2017; Mahajan et al., 2019).

As with demand reduction itself, I have not promoted systems thinking as a catchall solution to the illegal wildlife trade. Instead, it is a useful tool to recognise complexity and the potential for both positive and negative feedback. Incorporating systems thinking into future demand reduction interventions acknowledges that no one thing is going to 'work' in isolation, and a multifaceted approach is needed (Challender et al., 2015). This may be more complicated and costly, but developing a robust evidence base now will enable us to refine future interventions.

Chapter 5 is an example of systems thinking applied to impact evaluations. I looked at ivory demand within the wider system of Japan, exploring the impact of economic, legal, normative, and cultural drivers and how they relate to one another. The CITES international trade ban was able to impact demand because there was pre-existing respect for government authority and a general cultural shift away from conspicuous consumption. Recognising these enabling conditions explains why the ban did not instead lead to a thriving black-market trade. To do this, I drew upon the perspectives of a diverse array of stakeholders, from academic experts to industry leaders.

6.1.3 Embrace a range of evaluation methods

Academics have strongly advocated for impact evaluation in conservation (Baylis et al., 2016; Sharif et al., 2014). We recognise its role in developing an understanding of what strategies are effective in different contexts, and how this knowledge can be used to improve future conservation interventions. However, actual implementation of evaluations is still far from widespread (Curzon & Kontoleon, 2016).

In part, this could be due to time and resource constraints faced by practitioners, who may prioritise impact over evaluation. The complexity of conservation contexts is also likely to be a significant factor. Uncontrollable variables, multiple spatial and temporal scales, and ecological thresholds leading to nonlinear change can all complicate the design of evaluations (Hildén, 2009; Margoluis et al., 2009). It is frequently impossible to conduct "gold standard" randomised control trials, particularly when it comes to largescale interventions like trade bans which prevent randomisation of treatment units (Pynegar et al., 2019). Difficulties can also arise during the implementation of evaluations. This I highlighted in Chapter 4, when I discussed spatial spillovers, limitations from sensitive questioning techniques, and concurring law enforcement.

Further complications can arise when there are miscommunications between researchers and field partners. If field partners are not well-versed in evaluation methods but lead the implementation, they may make seemingly minor changes that significantly impact the analysis. For example, changing the number of control items in an UCT question. In our case the project partner in the Sao Tome project (Chapter 4) omitted one of the non-sensitive items for four of the UCT questions in the second survey. The question about the prevalence of sea turtle egg consumption remained unchanged, but the number of non-sensitive items on the other questions about sea turtle meat availability and consumption went from five in the first

survey to four in the second. This affected the type of statistical analysis we could do, limiting us to comparing separate estimates of the prevalence of sea turtle meat availability and consumption between the first and second survey but preventing us from modelling the sensitive behaviour with other independent variables. Consistent communication and high frequency checks between the research and implementation teams may help avoid complications like this (Karlan & Appel, 2016).

The research in this thesis has illuminated some of the common pitfalls in the evaluation of behavior change interventions aimed at conserving biodiversity. Based on this work, I developed recommendations for practitioners who may face these difficulties in the field. For example, it may be beneficial to combine multiple outcome measures to triangulate hard-to-measure behaviours, develop a theory of change which incorporates qualitative data to explore causal impacts, and build flexibility into the study design from the beginning.

Quantitative impact evaluation approaches such as RCTs or quasi-experimental designs allow researchers to control for exogenous variables and estimate treatment effects (Ferraro, 2009). However, they may struggle to cope with post-hoc evaluations of complex systems. Theory-based evaluations are more flexible. They can incorporate both qualitative and quantitative data, and are useful to establish causal attribution in cases where we lack baseline data or a credible counterfactual (Leeuw & Vaessen, 2009; White, 2009). They are better adapted to deal with the many interacting biological, social and political factors that operate in conservation contexts (Knight et al., 2019; Margoluis et al., 2009). My research in Chapter 5 demonstrates how theory-based evaluations enable researchers to take a wider view of the system under investigation, to consider alternative mechanisms and investigate heterogeneity in perceptions amongst stakeholder groups (De Allegri et al., 2018; Salazar et al., 2019).

Particularly in the illegal wildlife trade, establishing causality is a considerable challenge and can lead to controversial debates amongst researchers (E.g., see: Do et al., 2016; Hsiang & Sekar, 2016; Underwood, 2016). First, data on illegal trade is frequently not available, and where data has been collected it may have been inconsistently monitored across different countries and time (Cawthorn & Mariani, 2017; Phelps et al., 2010). Further, the illicit nature of the trade means there may be serious biases in seizure data, which are reliant on the effectiveness of enforcement activity, and survey data, which may be subject to social pressures (Gavin et al., 2010). Secondly, as discussed in previous chapters, demand may have regulatory, economic, and social drivers, all operating at different scales. Isolating the impact of a single intervention therefore becomes extremely difficult, especially when it cannot be isolated to specific treatment groups (see for example, the mass media campaign in Chapter 4 and the CITES trade ban in Chapter 5) and experimental designs not valid (Margoluis et al., 2009). Instead, it may be necessary to combine qualitative and quantitative data and research designs in an integrated framework, allowing for flexible and opportunistic data collection (Booth et al., 2020). This requires intimate knowledge of species- and country-specific trade chains to assign inferential weight to different data sources, and to assess the likelihood of there being alternative explanations for any findings.

6.1.4 Demand may have multiple drivers

The wildlife trade encompasses a diverse range of wildlife products used for a variety of purposes. Understanding what drives audience segments is key to designing targeted interventions. Approaches to reduce demand need to take into account this diversity of motivations and uses, yet prior to my thesis there was no standardised typology for motivations in the context of the wildlife trade. Although it is built upon previous work, validation by a broad array of stakeholders with global expertise is a significant step forward. The typology contributes to the literature by helping to create a common set of terms and will underpin work

to compare wildlife trade research around the world. It once again highlights the need for a diversity in demand reduction approaches.

In addition to the motivations of individuals, consumer demand is impacted by market drivers. These may take the form of various social, political, and economic structures. In Chapter 5 for example, I used General Elimination Methodology to systematically explore why Japanese consumer demand for ivory products had decreased. I identified the two biggest drivers, namely the CITES international trade ban and the economic recession. I also uncovered several facilitating conditions that enabled drivers to impact consumers. These included respect for government authority, the passive nature of demand for ivory, and a general cultural shift away from conspicuous consumption. Use of a theory-based evaluation allowed us to recognise the multiple contributing factors driven by interactions between different actors (Birnbaum & Mickwitz, 2009; Curzon & Kontoleon, 2016). Likewise, in conservation generally we need to challenge current simplistic narratives and gain a more nuanced understanding of behaviour change interventions.

In Chapter 4, I also highlighted interactions between different variables in the Santomean sea turtle trade. Over the time period studied, there was a demand reduction intervention, and increases in law enforcement and beach patrols. These likely had a deterrent effect on poaching rates, while villagers developed negative attitudes towards the consumption of sea turtle products. Amongst the mechanistic relationships I hypothesise, some are cyclical. For instance, lowered poaching rates could cause inaccessibility of sea turtle products, which may lead to decreased consumption. A reduction in demand for sea turtles could again negatively impact poaching. The possibility of feedback loops such as these again supports the need for systems thinking.

6.1.5 Understand cultural context

Past research on behaviour change strategies illustrates the effectiveness of tailoring messages to a specific audience, rather than using a “one size fits all” approach (Kotler & Lee, 2011; Martin, 2011). This also applies to cultural influences. Therefore, the two case studies included in this thesis had very different contexts. One focussed on wealthy urban consumers in an industrialised Asian country, the other poor villagers from an African nation on the UN Least Developed Country list (United Nations, 2018). Building a diverse evidence base is vital, as we cannot just assume that what worked in one context will replicate in another. For example, in Chapter 5 I identified the respect for law and the passive nature of demand as facilitating conditions, instrumental to the reduction in demand for ivory amongst Japanese consumers. In other countries such as America or China attitudes to the government may be more critical and demand for ivory more active, which could moderate the impact of interventions (Bergin et al., 2019).

6.2 Future research

6.2.1 Establish a robust evidence base through mixed methods approaches

Although the case studies chosen for this thesis are diverse, they still only number two. Establishing a robust evidence base to inform the development of future demand reduction campaigns will require many more evaluations of the relative effectiveness of different interventions and market drivers (Fisher et al., 2014). These would ideally make use of both quantitative and qualitative methods in order to produce both generalisable findings and rich insights (Bamberger, 2012; Bamberger et al., 2010; Margoluis et al., 2009). In particular, theory-based evaluations could be used post-hoc to explore what has driven demand in different markets, as they provide an opportunity to re-examine common “anecdotes” in conservation. For example, the dramatic rise in demand for rhino horn in Vietnam has been linked to rumours that it cured a prominent politician of cancer (Vu & Nielsen, 2018; Watts,

2011). This story is entirely anecdotal but is frequently repeated in policy circles and the grey literature.

An additional, often-overlooked, variable in conservation evaluations is time. We would benefit from more long-term case studies which monitor whether behavioural changes are sustained once the intervention has ceased (Brandon et al., 2017; Firestone et al., 2017; Garnett et al., 2015). We do not want just temporary reductions in the consumption of wildlife products. We need to explore what contributes to the maintenance of new behaviours, whether it is new infrastructure, social norms, or policies (David & Rundle-Thiele, 2019; Puzzolo et al., 2016). We may even find that follow ups with simpler treatments after a more intensive intervention can facilitate sustained effects (Grilli & Curtis, 2019). Further, choosing when to start and stop an evaluation can have a large influence on the conclusions you reach. For example, if we had included only one year of baseline data for the Sao Tome evaluation instead of three years, we would have missed the pre-existing trend of decline in sea turtle poaching. We may then have failed to consider other contributing factors, such as the ban.

6.2.2 Adopt research techniques from experimental economics

A relatively low-cost direction for future research would be more laboratory studies that draw on methods from experimental economics. For example, choice modelling, a stated preference method, could be used to understand which motivations for wildlife use (Chapter 3) are stronger in different audience segments, providing insight for the design of demand reduction interventions (Hinsley, Verissimo and Roberts, 2015; Shairp *et al*., 2016). Other techniques have far greater scope to control for confounding variables, and test specific messaging techniques in such a way that changes would be easily attributable to the treatment (Camerer, 2011). There is still much to explore about the efficacy of different imagery and narratives (Thomas-Walters et al., 2019). Of course, there would still be the need to examine

the external validity of any results (Batrinca & Treleaven, 2014). As has been emphasised in this thesis, cultural contexts matter. The extent to which experimental findings from artificial contexts are generalisable to field settings is not certain (Benz & Meier, 2008; Levitt & List, 2007, 2008).

6.3 Recommendations for practitioners and policymakers

In order to design effective interventions consumer research is necessary to understand motivations, select appropriate messaging techniques, and appeal to local values. In Chapter 2 I demonstrated that successful social marketing programmes were more likely to have used research to apply audience insights. Practitioners can use typologies such as the motivations typology I developed (Chapter 3) to tailor interventions — whether behaviour change campaigns, enforcement efforts or incentive programmes — to the specific context in which they will be used. Protocols such as implementation mapping can also be used to increase a programme's chances of success by grounding it in proven theory and evidence (Kok, 2014).

If environmental NGOs and/or their staff are from a different culture to target audiences then researcher/practitioner bias is a real concern. Interventions that are culturally insensitive can potentially damage trust and credibility with stakeholders (Margulies et al., 2019; M. Smith, 2018). Further, the way in which messages are framed may limit the target audience to only those who hold certain values, whether or not practitioners consciously realise it. In America for example, the moral framing in environmental communications is relatively narrow, focusing mainly on Western liberal values (Feinberg & Willer, 2013). This may be a reflection of the lack of cultural diversity amongst environmental NGO staff, and could unintentionally alienate audiences with differing political values (Taylor, 2015). Intentionally reframing moralisation in environmental discourse is one way to reduce political polarisation in conservation attitudes (Feinberg and Willer, 2013). Indeed, appealing to the values held by American conservatives

in climate change campaigns can greatly increase their effectiveness (Wolsko, Ariceaga and Seiden, 2016). Thus, I recommend collaborating with local actors when conducting consumer research to understand the audience's perspective and motivations.

The motivations typology presented in Chapter 3 is a step towards the creation of a common language for wildlife trade research. This would make it easier for practitioners to identify relevant work that has previously been undertaken to discover applicable lessons for future projects. To continue this effort, the creation of a systematic largescale database of wildlife products and interventions could benefit conservationists around the world. A centralised resource for interventions that have proven to be effective for similar products and motivations would likely require government investment, but we believe the payoffs would be substantial.

6.4 Conclusion

Governments, researchers and practitioners have been advocating for demand-side interventions, which seek to persuade target audiences to stop using products made from these sought-after species. However, there has been little research on the likely effectiveness of this new approach, so in this thesis I have drawn upon literature from different disciplines and used both quantitative and qualitative methods in diverse contexts. I call for caution when promoting demand reduction as an easy solution to illegal wildlife trade, and promote systems thinking as one approach to minimise unintended consequences when attempting to solve this type of complex problem. We need to embrace alternative evaluation methods to develop a robust body of evidence on the impact of demand reduction programmes. This will help underpin a more nuanced understanding of consumer demand and the motivations that drive it, giving us a better grasp of the mechanisms through which demand may be reduced.

Chapter 7: References

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Chapter 8: Appendix: Co-authored publications

8.1 Perspective: Targeted values: The relevance of classical Chinese philosophy for illegal wildlife demand reduction campaigns

Laura Thomas-Walters, Hubert Cheung, Tien Ming Lee, Anita Kar Yan Wan, and Yifu Wang

People & Nature - Accepted

Abstract: The illegal wildlife trade is a global conservation priority, prompting a rise in interventions aimed at reducing the demand for wildlife products. Research shows that designing campaigns to target the values held by a specific audience is an effective way to alter their behaviour. However, many demand reduction campaigns are grounded in the perspective of Western morality. This is problematic when the recipients of these campaigns frequently reside in East Asia, where they are exposed to the historical and cultural praxis of Confucianism and Daoism. This paper examines some of the central concepts of classical Chinese philosophy to see how they could be used by practitioners to design effective behaviour change campaigns in the future. Acknowledging that the East Asian cultural sphere has a long history of consumptive wildlife use, reflecting an instrumentalist and anthropocentric approach to wildlife, we still find potential for appealing to a relational ethic. There is a fundamental metaphysics that all of nature is unified, interconnected, and interpenetrating. Qi is the vital force of the universe that which links inorganic, organic and human life-forms, creating the basis for a profound reciprocity between humans and the natural world. We also consider some of the key virtues in Chinese philosophy, and how they could be interpreted through the lens of demand reduction for illegal wildlife products. This includes li, ritual propriety, and ren, the inner moral force which keeps us in balance. Finally, we cover influential scriptures, identifying many historical verses that are relevant to modern conservationists.

8.2 Review article: A scoping review into the impact of animal imagery on pro-environmental outcomes

Laura Thomas-Walters, Claire McNulty & Diogo Veríssimo

Ambio: June 2020

Volume 49, Pages 1135–1145

DOI: https://doi.org/10.1007/s13280-019-01271-1

Abstract: With the recognition that most global environmental problems are a result of human actions, there is an increasing interest in approaches which have the potential to influence human behaviour. Images have a powerful role in shaping persuasive messages, yet research on the impacts of visual representations of nature is a neglected area in biodiversity conservation. We systematically screened existing studies on the use of animal imagery in conservation, identifying 37 articles. Although there is clear evidence that images of animals can have positive effects on people's attitudes to animals, overall there is currently a dearth of accessible and comparable published data demonstrating the efficacy of animal imagery. Most existing studies are place and context-specific, limiting the generalisable conclusions that can be drawn. Transdisciplinary research is needed to develop a robust understanding of the contextual and cultural factors that affect how animal images can be used effectively for conservation purposes.

8.3 Perspective: Nature documentaries and saving nature: Reflections on the new Netflix series Our Planet

Julia P. G. Jones, Laura Thomas-Walters, Niki A. Rust, & Diogo Veríssimo

People & Nature: December 2019

Volume 1, Issue 4. Pages 420-425

DOI: https://doi.org/10.1002/pan3.10052

Abstract: 1. Netflix recently launched its high-profile nature documentary Our Planet. Voiced by Sir David Attenborough in English (with Salma Hayek, Penelope Cruz and other Hollywood actors voicing versions simultaneously released in 10 other languages), Netflix are making a clear play for core BBC territory. However, they claim that this is a nature documentary with a difference as it puts the threats facing nature front and center to the narrative.

2. We coded the scripts of Our Planet, and those of three recent Attenborough-voiced BBC documentaries, to explore the extent to which threats (and conservation action and success) are discussed. The only other series which comes close to the frequency with which these issues are discussed is Blue Planet II, but Our Planet is unique in weaving discussion of these issues throughout all episodes rather than keeping them to a dedicated final episode. However, although Our Planet sounds different to other documentaries, the visuals are very similar. Nature is still mostly shown as pristine, and the presence or impacts of people on the natural world very seldom appear. We discuss the potential consequences of nature documentaries erasing humans from the land/seascape.

3. We also discuss the mechanisms by which nature documentaries may have a positive impact on conservation. Despite links between information provision and behaviour change

being complex and uncertain, nature documentaries may, at least in theory, elicit change in a number of ways. They may increase willingness amongst viewers to make personal lifestyle changes, increase support for conservation organizations, and generate positive public attitudes and subsequently social norms towards an issue, making policy change more likely.

4. Netflix is certainly bringing biodiversity and the threats it faces into the mainstream, but the mechanisms by which viewing these representations translates to concrete behaviour change are poorly understood. Increasing interest in robust impact evaluation, integrating qualitative and quantitative methods, means the time is right to explore how both showing nature on screens and talking about the threats it faces, affects people in ways which might, ultimately, contribute to saving it.