




Cultivating Care: Behaviourally Informed Conservation Strategies to Safeguard the Future of the Sulawesi Crested Black Macaque (*Macaca nigra*)

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Received: 15 March 2023 / Accepted: 11 July 2023
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Abstract

Primate conservation is a behavioural challenge and as such requires behaviourally informed solutions. We provide a case study, applying social science principles and concepts to address primate conservation challenges. Selamatkan Yaki is a conservation programme focused on the Critically Endangered, Sulawesi crested black macaque (*Macaca nigra*) in North Sulawesi, Indonesia. A holistic strategy of education, capacity building, and community-based conservation draws upon a blend of insights from multiple social scientific disciplines alongside direct research with communities in the area exploring their cultural histories, behavioural drivers, and relationships with nature. We outline a series of five approaches based on behavioural concepts and describe the benefits, impact, and shortfalls of our methods. We illustrate how the resultant systematic stepwise strategy aims to address some of the key issues of primate conservation management in an innovative way. By incorporating sociopsychological principles and deeper understandings of behavioural science into primate conservation programmes, practitioners may broaden the interpretation, communication, and application of research findings with the potential to maximise the effectiveness of threat reduction campaigns and interventions.

Keywords Behaviour change · Conservation psychology · Ethnography · Primate conservation · Social norms · Social practice theory · Social science

Handling Editor: Jerome Micheletta

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Importance of the Social Sciences for Primate Conservation Efforts

The majority of primate conservation challenges are the result of human behaviours. A growing consensus recognises that achieving conservation outcomes is fundamentally about changing behaviour (Ehrlich & Kennedy, 2005; St John *et al.*, 2014; Schultz, 2011). Application of rules and regulations and material incentives as social levers have been shown to be insufficient, while providing information alone rarely translates into changes in behaviour (Kollmuss & Agyeman, 2002; Owens, 2000). Addressing the barriers, motivations, and social context of actors' target behaviours needs to become the primary focus for effective programme design (Bujold *et al.*, 2020). Conservation psychology advocates that human behavioural change is necessary to achieve reductions in threats to endangered species and habitats (Clayton & Myers, 2015). Furthermore, it is increasingly recognised that greater attention needs to be paid to the philosophical perspectives and assumptions that underlie social research and how preconceptions and worldviews may influence methods and outcomes (Evely *et al.*, 2008). Moon and Blackman note that “*Biodiversity conservation research and application has changed from a strong natural science focus to a “meta-discipline”*” (2014:192). However, the integration between the social and natural sciences has been limited, in part because of the barrier caused by major philosophical differences in the perspectives between these research areas (Moon *et al.*, 2019). Furthermore, growing attention is being paid to address a lack of appropriate multidisciplinary training of conservation practitioners, limited awareness, and uncertainty of the scope and purpose for biodiversity conservation. Bennett *et al.* (2017) distil these barriers into four distinct categories: ideological, institutional, knowledge, and capacity, which represent limitations to meaningful integration of the social sciences into conservation.

With the growing consensus for the benefits of multidisciplinary and holistic approaches, the conservation sector urgently requires natural resources managers to frame conservation problems, such as illegal hunting, from more diverse and pragmatic perspectives to better understand the needs, motivations and values of the target individuals and societies (Anderson, 2001; Bennett & Roth, 2019; Chua *et al.*, 2020). While acknowledging that these are not novel discourses (Murphree, 1993; Mascia *et al.*, 2003), and that critiques of fortress conservation and paternalistic conservation development programmes endure (Jones & Horwich, 2005; West *et al.*, 2006), more attention is now being paid to alternative modes and models for both delivering and assessing effective primate conservation and to the voices of those living alongside habitats and species of conservation concern. The science and policy frameworks that support holistic conservation planning are experiencing an upsurge in application (Evans, 2021; Sanborn & Jung, 2021). Through greater uptake and refinement of integrative multidisciplinary approaches, global sustainability issues, including biodiversity conservation problems, may be more effectively addressed.

The emergence of ethnoprimateology, the combining of primatological and anthropological practice, and the viewing of humans and other primates as living in integrated and shared ecological and social spaces is becoming an increasingly popular approach to primate research (Fuentes, 2012). Case studies from primate

conservation projects demonstrate how the integration of biological and social methods can help us to understand the sustainability of human–wildlife interactions and thus promote coexistence (Setchell *et al.*, 2017). Waters (2014) demonstrated how inclusion of shepherds in research activities and gaining an understanding of the reasons for their negative behaviour toward the macaques fostered changes in their attitudes towards a culture of Barbary macaque conservation.

Many conservation interventions have been designed to foster positive attitudes with the goal of shifting environmentally destructive behaviours (Bennett *et al.*, 2005; Lee & Priston, 2005; Sigit *et al.*, 2019; Steinmetz, *et al.*, 2014). However, many fail to comprehend the complex pathways to enable changes in behaviours, with efficacy monitoring often lacking sufficiently robust study design to accommodate the interplay of social factors (St John *et al.*, 2014). Seeking alterations in attitudes and subsequent behaviours is inherently challenging, with both cognitive processes acting against change (e.g., neo-phobia; Ernsperger & Stegen-Hanson, 2004) and the presence of motives against change (Batson *et al.*, 1997; Hobson, 2002). Recent reviews explore why primate populations continue to decline, highlighting the challenge of integrating science into policy and practice (Oxley *et al.*, 2022). We recognise first the importance of considering the counterfactual (increasingly used to establish the difference between the results of conservation action and the outcome if no action had been taken) in that without the existing integration of social sciences into conservation, primate populations may be in further decline (Coetzee *et al.*, 2021; Santika *et al.*, 2022). Second, we acknowledge how the paucity of evidence reported from in situ conservation projects limits our ability to assess the efficacy of different methods across varying sociocultural situations, and the ability of other practitioners to adapt and upscale approaches (Junker *et al.*, 2020).

With this article, we explore this notion while attempting to address the identified gap in our understanding of the benefits that conservation projects may gain from adopting certain tools and techniques from the social sciences. We present a case study by applying core behaviour change principles and concepts to address primate conservation challenges and demonstrate the strategic influence of these approaches.

Biodiversity Conservation in North Sulawesi, Indonesia

Sulawesi is the largest island in the biogeographically unique region of Wallacea, which totals a land mass of 347,000 km². Separated from the rest of Indonesia by Wallace's Line, the flora and fauna of Wallacea have evolved to represent a high degree of endemism. As such, this area has been designated as one of the 34 global biodiversity hotspots (Myers *et al.*, 2000). Hunting for consumption is a primary threat to biodiversity in Sulawesi (Rejeki, 2018; Latinne *et al.*, 2020). Typical drivers for bushmeat consumption range from subsistence hunting and nutrition (Fa *et al.*, 2005) to demand as a luxury commodity with cultural or traditional ties associated with recreation and health (Duffy & Verges, 2009; Ripple *et al.*, 2016). The

province has a high nutritional and caloric intake; hence, bushmeat consumption is usually not associated with subsistence or sustenance (O'Brien & Kinnaird, 2000).

Distributed throughout the Minahasa and Bolaang Mongondow regencies of North Sulawesi, *M. nigra* is currently listed as Critically Endangered on the IUCN Red List (Lee *et al.*, 2020) due to a population decline of more than 80% since the 1980s (MacKinnon and MacKinnon, 1980; Sugardjito *et al.*, 1989; Palacios *et al.*, 2012; Johnson *et al.*, 2020). According to Indonesian law, it is illegal to hunt, kill, or trade protected species, and *M. nigra* is listed under the law concerning the preservation of wild plants and animals (Law Number 5 year, 1990; Government Act Number 7 year, 1999). Awareness-raising and enforcement of these laws have been inadequate in preventing wildlife offtake and trade, with some interviewed vendors and hunters suggesting the risk of enforcement was too low to discourage hunting and trading illegally (Latinne *et al.*, 2020; Lee *et al.*, 2005).

A recent study of the bushmeat trade in North Sulawesi (Bailey *et al.*, 2022) complements other studies (Clayton & Milner-Gulland, 2000; Latinne *et al.*, 2020; Sheherazade & Tsang, 2015), demonstrating that while the amount of bushmeat sold has reduced in the past decade, some species are still harvested at high rates. The main challenges to prevent illegal trade are lack of effective law enforcement in traditional markets and lack of stewardship to protect local wildlife. Despite indications of pro-environmental values and potential for greater care, predominant norms persist where animals are typically not valued beyond their role as a source of food or income (Bailey *et al.*, 2022; Hilser, 2021). This underlines the importance of understanding the behavioural motivations that underpin the practices of hunting, trade, and consumption.

Strengthening Primate Conservation Efforts with Social Science Approaches

In North Sulawesi, a local conservation programme Selamatkan Yaki (Indonesian for “Save the macaques”) serves as an example of the use of behaviourally informed conservation strategies to enhance the delivery of biodiversity conservation approaches. The programme endeavours to protect the remaining populations of Sulawesi crested black macaques (*M. nigra*) through a holistic strategy informed by concepts, theories, and tested methods from behaviour change science, namely the process of understanding and influencing human behaviour through scientific research and interventions (Rare and BIT, 2019).

The purpose of Selamatkan Yaki is to understand and mitigate the impacts of social practices that are threatening the species (hunting, trading, and consumption of bushmeat) by shifting local identities of consumption to pride for the unique wildlife: thus, cultivating a culture of care. Two main working units focus on protected area management, which includes ecotourism, community patrols and forest conservation forums, and education, which includes multiple advocacy and outreach projects empowering local ambassadors (role models) to foster positive change in their communities. A dedicated local team of conservationists utilise an extensive and influential network of volunteers, ambassadors, and partners, including an alliance of local conservation NGOs and formal partnerships with government

institutions, community forums, and numerous other stakeholders. The local communities that Selamatkan Yaki works with are representative of the people inhabiting the native range of *M. nigra* in North Sulawesi, which is known for its diverse ethnic and cultural communities, each with its own unique traditions, languages, and customs. Specifically, these include the Minahasa people, who are the largest ethnic group in North Sulawesi, who inhabit the Minahasa region, which includes the city of Manado, the provincial capital and who are predominantly Christian with a long history of trade and seafaring. Further south are the Bolaang Mongondow people who primarily reside in the Bolaang Mongondow regency of the province, who have their own language, and are known for their unique cultural traditions and agricultural practices.

A social-ecological, system-wide approach includes monitoring of macaque populations through occupancy modelling (using camera trapping across the *M. nigra* range), ethnographic studies, and longitudinal research into attitudes, awareness, and behaviours of local communities. Taking this multidisciplinary approach allows us a robust understanding of how to contextualise social and environmental problems and roll out innovative solutions. The central benefit of which is being able to test directly what works and gain insights to develop bespoke strategies for change. This has been a journey of exploring efficacy of methods from other locations where evidence exists, although in reality, humbly accepting inefficiencies at times while adapting as best as possible to refine new approaches. We recognise that while our data monitoring and evaluation of methods are still in the process of interpretation at the time of writing, with insights from research findings ongoing, gaps remain in the depth of the evidence from our own approaches. Researchers found that despite intensive efforts to study primates and the extensive threats that they face, less than 1% of primate studies evaluated conservation effectiveness (Junker *et al.*, 2020). We echo those authors' call to develop evidence-based strategies for conserving primates effectively. We do not claim that the behaviourally informed approaches described in this paper are a solution for all conservation challenges or universally advantageous across socio-cultural contexts. We share only our reflections on some of the benefits that we have gained as a small, nonprofit, conservation organisation working in Indonesia.

The Selamatkan Yaki approach has been informed by knowledgeable experts specialising in various scientific disciplines and then through extensive review of the literature and trials of certain methodologies. These findings, alongside those uncovered from trialling social science approaches outlined in this paper, have informed a systematic stepwise threat reduction strategy to help support the implementation of the *M. nigra* Species Action Plan (Hilser *et al.*, 2014). While numerous lessons from the social sciences have been applied by our programme, the main theories and approaches adopted by Selamatkan Yaki over the past decade of operations have included ethnography, community based social marketing, fostering intrinsic motivation, cooperative behaviour adoption, and social practice theory. While differing in their scientific and conceptual foundations, as well as in the eventual delivery of actions, these approaches have built upon one another and proved to be complementary. Each approach has been selected in consultation with the programme's scientific advisors and co-developed by the local team based upon specific socio-cultural conditions on the ground. We now

describe each of these approaches in detail and how we have integrated them into the programme's strategic conservation approaches.

Ethnography

Ethnography is commonly regarded as “*writing about particular groups of people, that is to say ethically, culturally or socially defined groups,*” whereas ethnographic studies may offer “*an interpretive and explanatory story about a group of people and their sociality, culture and behaviours*” (Madden, 2010:15). An ethnographer immerses themselves in a group for an extended period of time, observing behaviour, listening to conversations, and asking questions. Hilser (2021) conducted an immersive ethnographic study involving participant observations, interviews, and focus groups to explore the social and spiritual histories of the Minahasan and Bolaang Mongondow ethnic groups in four rural communities in North Sulawesi, Indonesia. Particular attention was paid to the individualistic elements of attitudes, values, and beliefs, along with the social norms and perceived behavioural control governing these variables. The research demonstrated how belief systems and social norms control the expression of certain attitudes and values, identifying highly prosocial communities with empathic tendencies and care-giving values, illuminating latent potential for conservation advocacy. Expression of these values was found to be dependent on several loci of control, particularly normative pressures of close communal living and religious doctrine. Through this research, Hilser suggests that the key to understanding the values that underpin behavioural motivations are the links between the pro-social (the strong social ties and helpfulness, empathy and mutual aid systems; e.g., Neaman *et al.* (2018)) and pro-environmental (looking after nature) behaviours. While it does require investment of time and resources, ethnography goes beyond traditional evaluative methods to offer a more nuanced, idiosyncratic narrative for a deepened understanding of connectedness to nature and the cultural roots of human behaviour, relevant to primate conservation challenges.

Community-Based Social Marketing

Social marketing is the integrative sociological process which “*uses marketing principles and techniques to influence target audience behaviours benefiting society as well as the individual.*” (Lee & Kotler, 2011:42). The approach has been widely implemented since the early 1970s to tackle social issues, such as community development and public health, and now is increasingly occupying a prominent place in environmental development programmes. Several authors highlight the potential for social marketing to emerge as a modern and effective tool not only for creating behaviour change but also for enhancing human well-being and welfare (Lefebvre, 2011; Phills *et al.*, 2008).

An increase in academic and governmental support with a wide range of empirical research has facilitated social marketing's growth as a discipline (McKenzie-Mohr, 2000). Despite this, it is limited by a number of issues. This includes confusion over its role and the potential for incorrect application of its principles

(Robinson & Robertson, 2010). One common criticism of social marketing is that extensive consumer and market research is rarely undertaken in advance of implementation, creating a gap between the rhetoric and reality of social marketing practice (Stead *et al.*, 2007).

Community-based social marketing (CBSM) for sustainability builds upon the core principles of social marketing while attempting to address its shortfalls. The principles and steps indicated within the CBSM approach are potentially very useful in behaviour change projects for conservation problems. However, despite this CBSM is relatively underused within conservation programmes compared with the wider sphere of sustainability (Green *et al.*, 2019).

Selamatkan Yaki has adopted various CBSM principles, which have been shown to be effective in other social and environmental projects (McKenzie-Mohr, 2011). The programme has integrated the key concepts from CBSM to enhance the delivery of campaigns to protect *M. nigra* (Table 1). Working toward the objectives in the *M. nigra* Species Action Plan (Hilser *et al.*, 2014), our conservation actions have subsequently been more organised, systematic, and potentially more effective in their implementation. The Behaviour-Centred Design (BCD) approach developed by NGO RARE (Thulin, 2020) blends behavioural science with design thinking, which helped to guide our team and key stakeholders in the development of innovative solutions to the cooperative challenge of hunting, trade, and consumption of wild meat from protected and endangered species. While we have found CBSM useful for developing simple tools and methods for outreach, we recognise shortfalls in the approach in centring solely on the individual's attitudes, values, or beliefs (Hargreaves, 2011), lacking attention to the structural considerations at play. Robinson and Robertson (2010) advise against uncritically adopting the marketing approach to sustainability and suggests that behavioural trends are often intractable, engraved into society by a powerful combination of institutional, technological, and social factors. Additionally, as with traditional marketing mechanisms, caution should be taken given the adaptability of the systems and diverse nature of the audience along with their values and social constructs (Baines & Harris, 2011). Equally, Hargreaves (2011) and others (Shove, 2010), argue that the CBSM approach “...serves to legitimize, rather than challenge, a whole range of unsustainable social conventions.” These structural limitations became apparent when developing our strategies and as we began to draw from an increasingly diverse knowledge base from the social sciences to incorporate sociological foundations. This helped to guide us toward identifying more appropriate metrics for understanding how key behaviours are positioned within society and the mechanisms of behavioural change, essential to fostering sustainable human-nature relations. The diversification of our approaches is described below; initially we retained a focus on socio-psychology, supporting the development of the next central concept which focuses upon fostering intrinsic behavioural motivation.

Fostering Intrinsic Motivation

Intrinsic values are the guiding principles and broadest motivations that perceive nature to have worth in its own right, independent of people's benefits (Schwartz,

Table 1 Community-Based Social Marketing principles and approaches adopted by Selamatkan Yaki conservation programme

Principle	Component	Details	Application
Social norms	All activities	Presenting insights from sociodemographic surveys alongside trusted and influential community representatives, to demonstrate to people what the rest of the community is doing (i.e., that most people support the conservation work and want hunting to stop, protecting nature is popular, whereas trade and consumption of endangered species is not)	Tactical framing in local radio broadcasts, presentations, school talks, conservation forums, traditional market gatherings and printed media
	Materials	Branding designed to be popular at different levels of society with particular focus on youth	Consistent messaging of collective commitment to nature protection and cessation of wild animal consumption on billboards and printed materials
	Language used	Standardizing the framing of messages; avoid stating that the consumption of bushmeat is common, instead state that it is the exception and a socially unacceptable practice; avoid stating that it is special or elite	Internal process of checklist criteria for framing including effective communication approaches (Underhill <i>et al.</i> , 2020); reviewing social media and any local or international publications for choice of words
Commitment	Communications	Incremental commitments; through multiple contact points	Telephoning influential spokespeople and role models; placement of stickers; signing of petitions etc
	Petitions/ pledges	Pledges proven to be particularly valuable for encouraging commitment; work with emotions, responsibility, and accountability	Public signing of declaration during multistakeholder workshops to develop wildlife trade mitigation strategy; pledges by influential bushmeat markets sellers and management to prevent sale of protected species; pledge board (whiteboard)
Prompts and reminders	Co-creation	Direct design, involvement and active participation of local community members in as many activities as possible	Co-development of strategies and approaches, films, commissions for designs, focus group discussions
	Campaign	Regular repeated, accessible messages of key campaign message at central attention points	Installing signs at traditional markets, from large signs stating illegality to smaller reminders; frequency and repetition of social media messaging
	Radio talks	Highly popular radio stations provide access to thousands of listeners, and regular advertisement slots can help repeat and prompt specific messages	Prompting people to avoid buying or consuming bushmeat through messaging on popular radio channels

Table I (continued)

Principle	Component	Details	Application
Social diffusion	Ambassador permeation	Importance of local influence through role model approach, inspiring others to follow actions; includes youth champions (“Yaki ambassadors”), government representatives, hunters and religious leaders	Using ambassador approach with community role models, spreading conservation message (two-step approach) by ambassadors going “door to door” and facilitating community dialogue

1992). People are more likely to be intrinsically motivated to act pro-environmentally when they strongly endorse biospheric values (Dietz *et al.*, 2005). Research that supports the importance of encouraging the intrinsic value of nature is congruent with advocating a biospheric worldview that finds intrinsic value in all of nature. Integrated within Selamatkan Yaki's wildlife trade mitigation strategy, a behaviour change strategy adapted from Steg (2016) aims to encourage biospheric and collective values, empower, and motivate people to act pro-environmentally through the following stages:

1. ***Change costs and benefits of behaviour*** – make “good” behaviour (supporting pro-environmental, nature protecting actions) more attractive and “bad” behaviour (related to undesirable social practices, such as hunting, trade, and consumption of bushmeat) less attractive (Lynes *et al.*, 2014). Frame messaging to associate stopping illegal wildlife trade and pro-environmental behaviour with communal pride, increase media attention on health risks to increase the sense of personal, avoidable risk.
2. ***Reduce cognitive effort*** – use prompts, reminders, and infographics where people make the decision to trade bushmeat (Duffy & Verges, 2009) and visible signage in markets explaining laws, protected species, and health risks. Install billboards at each market and signage in public places, such as transport hubs and road intersections, visibly expresses the commitment of North Sulawesi to stop illegal wildlife trade. Develop a memorable campaign brand to feature in all activities to help familiarity and normative associations.
3. ***Provide information and feedback on costs and benefits*** – tailor information to appeal to buyer's values (Everard *et al.*, 2016; Goldstein *et al.*, 2007). Identify and appeal to key values surrounding consumption with messaging encouraging individualistic and community universalism-type values.
4. ***Take advantage of people's need to be consistent*** – through commitments, people are more likely to do the action promised to be consistent (Stone & Focella, 2011). Show how certain actions are not in line with values and provide alternatives. Encourage consistency by publicly sharing visible commitments using testimonials, photographs, and branded merchandise.
5. ***Social influence strategies*** – use of social diffusion and descriptive norms showing that “bad” behaviour is not acceptable to others. Engage key stakeholders, including law enforcement and governmental departments, to encourage collaboration, identify roles and responsibilities, and secure commitments (Lapinski & Rimal, 2005).

While empirical analysis is ongoing for the evaluation of this five-stage approach's impact, it has been central to addressing the objective of reducing the prevalence of bushmeat consumption and associated social norms, with particular focus on legally protected species traded within traditional markets. As for CBSM, this approach is similarly limited to a predominantly individualistic focus, and we found the challenge of adopting such an approach involves identifying indicators for the monitoring of impact for each of these five stages. This aside,

we benefited greatly from gaining new perspectives in understanding behavioural motivations, particularly with regard to incorporating barrier removal as a fundamental component of the strategic threat reduction approach.

Theory of Cooperative Behaviour

Building on the RARE CBSM approach developed in the early years of the programme (2013 to 2016), Selamatkan Yaki incorporated further insights from RARE's Centre for Behaviour and The Environment. Within the programme's Wildlife Trade Mitigation Strategy, the intrinsic motivation approach described above further evolved following a reflexive process within the team and involving consultation and input from other stakeholders, such as market heads, traders, community leaders, and government representatives, across tourism, trade, and education departments. This took place across several collaborative and co-creative workshops as part of the campaign development, with the goal of bringing in direct knowledge, expertise, and buy-in from those involved and supporting notions of collaborative governance. From this initial consultation process, we recognized that as we were working together with specific target groups (i.e., hunters, sellers, and bushmeat traders), that a cooperative behavioural approach would be well aligned.

While working closely with the relevant local government authorities, the main focus was on working directly alongside hunters, traders, and buyers themselves to encourage motivation for change from the bottom-up rather than through regulatory directives or the threat of punitive measures through enforcement. The core principle is that our problem is a shared cooperative dilemma; while one hunter, seller, or buyer may benefit from profit from the hunting of endangered species, the species are becoming so rare that they will eventually become extinct, and that any livelihood associated with this is as such unsustainable, a tragic outcome for wildlife, but also for the community.

Behavioural science has revealed a series of key beliefs that, when changed, can move a community to act cooperatively (Cowling, 2014; Thulin, 2020). RARE combined research insights with the experiences of environmental practitioners to develop the three-phase Theory of Cooperative Behaviour Adoption to help guide groups and communities to shift towards these cooperative outcomes. We outline the three stages and how we have adopted the steps in a key stage of our wildlife trade mitigation strategy, known as the Market Seller Certification (MSC):

1. Generating collective demand

For a community to demand change collectively, it means that the members of that community hold two key beliefs: (1) they believe that everyone should change their behaviour, because it is the right thing to do; and (2) they also believe that enough people in their community are willing to change. Therefore, through the community gatherings, we try to convince everyone involved: all sellers, and authorities, and eventually (later) all buyers of those two beliefs. While collectively demanding change is the critical first phase in the process of changing to a cooperative outcome, alone it is insufficient to result in behaviour change. This

is because, even if people want the change, they will only be willing to change to a cooperative behaviour if they believe those around them will change as well.

2. Coordinating a shift in behaviour

Coordination can only be achieved if all the members come to the conclusion that everyone around them will be changing their behaviour at the same time. By changing this belief, and there being sufficient collective demand from Phase 1, the community will change their behaviour. However, this new norm will be unstable. Any shock to the community might be enough to drive them back to the uncooperative behaviour, so we needed to ensure that all hunters and traders, and eventually buyers, believe that everyone else also wants to stop selling and consuming protected bushmeat. We then worked together with them all to move those behaviours away from selling and consuming protected and endangered bushmeat. We approached this through several social gatherings to build rapport and trust in the traders and reassure them of the intentions of the campaign, including inspiration from prominent individuals from the community, acting as both youth and governmental ambassadors for Selamatkan Yaki.

3. Strengthening the new norm

This strengthening is done through activities that lead community members to adopt two final key beliefs if they were to violate the new norm: (1) they believe that others in the community would find out; and (2) those others would not accept any excuse for violating the norm. The key is the persistence of the new norm (of not selling/consuming bushmeat) by the majority of people and to avoid behaviours returning to business as usual after the campaign.

As an example of this approach, 11 traders signed a public pledge on a large permanently displayed banner stating, “Traders in Tomohon Market are proud of not selling protected and endangered species.” The support from the Minahasa Regency local government was shown by the attendance of the representatives from the mayor of Tomohon, the North Sulawesi Regional Police, Head of the North Sulawesi Natural Resources Conservation Agency (BKSDA), and representatives from related government departments, including Health, Trade, and Tourism and heads of the Tomohon market. Removal of the “Extreme market” sign at the Tomohon market in May 2021 represented a commitment to a shift in identity from consumption to care, with commitment from the tourism department to stop promoting bushmeat consumption. A large campaign then followed across all local media platforms and social media, including prompts and reminders in the markets (billboard listing protected species and market commitments) and strategically framed messaging through regional and international media channels with regular stories featuring the market sellers and their testimonies.

While proving challenging to maintain regularity of contact with the hunter and trader groups to preserve the collective demand for change, and similarly constrained by certain positivist limitations of attitudes, values, and beliefs of the individuals involved, this approach has effectively built on the previous two as described above. The approaches have increasingly gravitated toward greater focus on groups, normative influence, and the collective outcomes of their behaviours. With the aspiration to better understand the structural dimensions to our conservation challenge,

the next approach has complemented those previously outlined through a greater focus on social practices.

Social Practice Theory

Social practice theory is a social science framework developed to describe how individuals in societies shape and are shaped by their cultural environment. Recognising units of inquiry and analysis based on social activities and their elements and carriers, it attempts to articulate the ways in which identity and individual agency rely on and produce cultural forms (Reckwitz, 2002). Whilst conventional, individualistic, and rationalist approaches to behaviour change centre the analysis on the individual actor, social practice theory turns attention towards social practices: the social and collective organisation of cultural entities that shape individuals' perceptions, interpretations, and actions.

Practices are defined broadly as “*embodied, materially mediated arrays of human activity centrally organized around shared practical understanding.*” (Schatzki, 1996). The enactment of practices is the routinised way in which people move, objects are handled, subjects are treated, things are described, and the world is understood. Individual behaviours are primarily performances of social practices. Practices are useful metrics for understanding how key behaviours are positioned within society and the mechanisms of change in these behaviours, essential to fostering sustainable human-nature relations.

In viewing conservation challenges through a social practice lens, the focus is no longer solely on participants' attitudes, behaviours, and choices but instead, also how the practices, such as hunting are formed, reproduced, maintained, and then ultimately how they may be challenged and, in some instances phased out. Applying Shove and Pantzar's (2005) assimilation of the three components of practices can contextualise the conservation issues observed as most central to the conservation problem from a practice perspective:

1. **Images:** meanings and symbols, such as the mystic symbology of hunting, the father-son normative inheritance and cultural significance of hunting practices
2. **Skills:** forms of competence and procedures related to hunting techniques; knowledge (including traditional ecological knowledge; Berkes, 2012) and wisdom
3. **Stuff:** materials and technologies, availability of guns and traps, and places to trade

Both images and skills are represented within nonmaterial culture, whereas the “stuff” takes the form of material culture (though overlap exists). The cessation of illegal or unsustainable hunting as a practice involves making or breaking links between these assemblages. Recognising the target individuals as practitioners, who indirectly, through the performance of various practices, draw on resources, interventions may be more systemically and structurally oriented than other approaches (Tables II, III). The traditional policy approaches to sustainability problems usually include first innovating technology, then shifting consumer choices, and finally

Table II Problem framing related to hunting viewed through traditional policy and individualistic approach

Problem framing	Innovating technology	Shifting consumer choices	Changing behaviours
Intervention target	Improvements in law enforcement skills, technology, equipment (e.g., camera traps, drones)	Reduce demand, reduce disapproval (injunctive) social norms, demonstrate negative personal and environmental impacts	Promote intrinsic values and positive attitudes towards nature, and descriptive social norms against illegal hunting

Table III Problem framing related to hunting viewed through social practice theory approach

Problem Framing	Recrafting practices	Substituting practices	Changing how practices interlock
Intervention target	Discourage illegal hunting by encouraging other legal trade; generate pride in sustainable legal hunting or other social practices and shame for hunting of endangered species; change cultural significance of hunting (e.g., father > son tradition)	Provide alternative sustainable livelihoods (e.g., productive agricultural systems; ecotourism; encourage and market local craftsmanship); promote other non-animal food sources and disincentivise illegal hunting as a practice	Approach the channels of communication and logistics between illicit economies, such as trade networks, or between hunters and traders and their transport links; help to shift the relationships between traders and buyers of bushmeat

trying to change behaviours (Røpke, 2009; Table II). A practice approach reframes the problem by looking at the interchange and cohesiveness between practices (Warde, 2005; Table III). Adoption of this approach does not necessitate a total revamp of a strategy; many of the practices may already be addressed by different approaches, but a greater awareness can help to conceptualise the problem at multiple scales, crucially understanding problems and solutions through both sociological and socio-psychological lenses.

Practice theory approaches simply help to redefine and organize strategies more effectively, by understanding how threats to species of conservation importance exist and are perpetuated beyond the individuals involved. We anticipate that if applied alone the principles of social practice theory would be limited in conservation value and lack sufficient operational detail in terms of the behavioural dynamics at play during the direct application of threat reduction interventions. Whereas adopting this perspective alongside the other conceptual approaches outlined supports a holistic understanding of conservation needs and dynamics, as well as the ability for the pragmatic compartmentalisation of interventions and their targets. Management benefits may be gained by considering which common sets of activities affect the environment and how and in what ways the individual attitudes, values, and beliefs of the agents that they recruit (the carriers of change) govern how these practices are reproduced, recrafted, and interconnected.

Key Insights and Application

After a decade of Selamatkan Yaki's conservation work in collaboration with other stakeholders, *M. nigra* is now a well-known, popular icon and representative of local conservation efforts (evidenced by features in local radio and TV shows, at religious and political events, and represented in local, district, and other strategic development plans), alongside being recognised nationally as a priority species by the Indonesian Ministry of Environment and Forestry. Key achievements include national adoption of a Species Action Plan (Hilser *et al.*, 2014); capacity building of local guides and Forest Conservation Community Forums; extensive education activities, including initiating a provincial conservation curriculum development and empowering local Yaki ambassadors to spread more sustainable social norms throughout communities across the province; sustainable livelihood approaches reducing pressures on the forest and generating community benefits; and a comprehensive wildlife trade mitigation strategy that involves the adoption of numerous collaborative activities to reduce the hunting, trade and consumption of illegal bushmeat (Bailey *et al.*, 2022). Positive trends in awareness, attitudes, behaviours, and social media analytics reveal substantial shifts in indicators of public awareness and perception of the species (SY-EPASS, 2017a, b), reflecting a growing conscientious community motivated by shifting nature-related norms.

The roadshow role model, as part of the wildlife trade mitigation strategy, has built on the lessons from social norm theory, social diffusion, and cooperative motivation to empower hunters to become influential spokespersons, reaching out to more than 100 wildlife hunters in three districts from a total of 19 villages in the

North Sulawesi Province since 2021. The representative hunters lead social events and focus groups in multiple villages across the province to discuss key aspects of hunting and campaign for other hunters to avoid hunting protected species. Hunters are given the opportunity to sign a public declaration of pride, stating they no longer hunt protected species, further expanding their normative influence.

The strategic responses to the impacts of our programme have been both proactive, anticipating impacts of the measures, and reactive, responding to key performance indicators, as well as other evaluative measures, where capacity has allowed (Table IV). The central concepts and approaches outlined throughout this paper have culminated in an integrated theory of change, a systematic stepwise approach which aims to illustrate the mechanisms and logic of an intervention's impact. Drawing these strategic approaches together, we developed a multifaceted strategy for Selamatkan Yaki, bolstered by insights from the ethnographical research (Hilser, 2021) and targeting key individual agents at specific societal leverage points (Meadows, 1999). This strategy is modelled on the pride campaigns developed by RARE who use the flagship species concept (Walpole & Leader-Williams, 2002) to develop species pride campaigns empowering local partners. These campaigns often attempt to curb illegal wildlife trade (Biggs *et al.*, 2017). To normalise a grounding of social science in biodiversity conservation, RARE, together with the Behavioural Insights Team (BIT), developed a comprehensive toolkit (Rare and BIT, 2019) which outlines a socially oriented and structurally relevant theory of change reflecting the three profound drivers of human behaviour: motivating, socializing, and easing change (as outlined below).

Inspired by this toolkit, we developed a bespoke strategy to address the key issues of conservation management related to the aforementioned practices. This stepwise process of behavioural change draws together all concepts and theories utilised by the programme and builds on key insights from sociodemographic, attitudinal, and ethnographic fieldwork conducted in the region:

Step One: Motivate the Change

- Develop campaign messages to focus on intrinsic, prosocial framing and positive, affective relationships with nature, promoting self-efficacy and empathic connections to wildlife and place; normalise prosocial education.
- Nurture caring and compassionate dispositions by directly and publicly reminding people of these distinguishing characteristics; tailor messages to be personally relevant and locally construed; build upon indigenous wisdom, preserve traditional ecological knowledge.
- Frame campaign messages around communal, universal value types and promote identities of pride in the unique wildlife (particularly in younger generations); make the issues of species loss and habitat depletion relevant and socially important.
- Address barriers to change, particularly cognitive biases and the value-action gap by tactical messaging and local empowerment; focus on cognitive and normative biases related to hunting, trade, and consumption of

Table IV Impact, evidence, and strategic response to five social science approaches adapted by Selamatkan Yaki for the conservation of *Macaca nigra*

Approach	Impact	Evidence	Strategic response
Community-Based Social Marketing	Increased social norms against consumption of bushmeat; increased awareness of community members reached by youth ambassadors; inhibitions placed upon consumption of bushmeat consumption and single use plastic usage by religious leaders via local religious directive	Number of ambassadors and their reach; testimonies from community members; community attitudinal surveys (SY-EPASS, 2017a); reports by community members of knowledge increases from campaign message prompts and reminders; hundreds of sermons mentioning local religious directive	Share testimonies with the public; increase scope and reach of local ambassador approach; embed need for prompts and reminders into all future campaign planning
Fostering intrinsic motivation	Shifting attitudes and commitment from hunters, traders and consumers of bushmeat; commitments to no longer hunt protected species; increased attention to traditional markets from government departments including trade and health departments	Signed declarations from over 100 wildlife hunters from 19 villages during role model roadshow; no increase in bushmeat of protected species sold from longitudinal research (Bailey <i>et al.</i> , 2022); trust in programme, receiving regular invitations to talk shows, events and national seminars. Recognized as credible, professional and beneficial regionally and nationally	Assess and adapt campaign message framing to associate stopping illegal wildlife trade and pro-environmental behaviour with communal pride; increase media attention on health risks to increase the sense of personal, avoidable risk; memorable campaign brand used across locations; appeal to key values surrounding consumption, and desire to be consistent in community engagement
Theory of Cooperative Behaviour	Shifting identity of two key traditional markets (Tomohon and Langowan) from “Extreme” to “Green”; shift in norms around trade of protected species; increased attention and collaboration with relevant government bodies (trade, health, tourism and education departments)	Removal of “Extreme market” sign at Beriman Tomohon market in May 2021; commitment from tourism department to stop promoting bushmeat consumption; traders signed public declaration of commitment to not sell protected species; extensive print, local and social media reach and impact	Upscale to other markets known as hotspots for trade in bushmeat; design and upscale approach alongside social media campaign to strengthen norms; use principles of cooperative behaviour and aim to generate collective demand for all future target changes in behaviour

Table IV (continued)

Approach	Impact	Evidence	Strategic response
Social Practice Theory	Practices of hunting, trade and consumption receiving increased attention by all related stakeholders, and understood beyond the individuals; sustainable livelihood approach developed and adopted in four villages; deepened cultural understanding of what sustains practices threatening <i>M. nigra</i>	Communities shifting from reliance on bushmeat and forest products, with sustainable livelihood approaches trialed and rolled out in four locations, including hydroponics, sugar palm cultivation and permaculture developments (SY-EPASS, 2017b); co-development of wildlife trade mitigation strategy by multiple stakeholders; human-wildlife interactions reported and coexistence approaches supported by numerous local communities	Upscale model of community conservation including sustainable livelihoods to other key strategic areas; encourage environmental citizenship (Dobson, 2010); target social practices to support a more comprehensive and structurally relevant viewpoint with which to view the conservation challenge; practice-based approach provides a non-prescriptive framework that may be used as input for future policy interventions
Ethnographic research methods	Detailed understanding of the cultural histories and relationships of local communities with nature; robust contribution toward the gap in our current understanding of the drivers and mechanisms of pro-environmental behaviours	Documented evidence of pro-social values and customs, such as traditions of mutual aid systems, and the preservation of communal values and traditional social customs; openness of communities to share and connect during ethnographic fieldwork (Hilser, 2021)	Address barriers to change, particularly cognitive biases and the value-action gap by tactical messaging and local empowerment; harness positive cultural traditions and shared social and environmental responsibility; develop a more responsible citizenry by promoting the linkages between place attachment to local natural resources and pro-environmental behaviour

bushmeat in developing campaigns to promote a shift away from hunting, particularly of protected species.

- Work together with communities to provide normative and life-affirming incentives to act more pro-environmentally and inhibit environmentally destructive practices, particularly through religious association; promote preservation of old cultural customs and normalise religious plurality to support sacred reverence; increase access to outdoor space and promote health and wellbeing benefits.

Step Two: Socialize the change

- Promote norms related to the infrequency (descriptive norm) and disapproval (injunctive norm) of consuming protected species; remind people of openness to change and normative shift toward more conscientious human-nature relationship.
- Support the continued traditions of mutual aid systems and the preservation of communal values and traditional social customs and systems, likely to encourage pro-environmentalism.
- Make campaigns publicly visible and accessible for all; launch local and national media campaigns to validate and strengthen norms and environmental identities.
- Encourage environmental citizenship (Dobson, 2010) and localised enforcement regulations by increasing local participation in protected area management (strong determinant of conservation attitude); harness positive cultural traditions and shared social and environmental responsibility.
- Use influential local role models to encourage social diffusion of pro-environmental behaviours via social media-led campaigns promoting values, norms, and environmental identities.

Step 3: Ease the Change

- Empower community members through sustainable livelihood approaches with integrated campaigns, particularly as alternatives to hunting; work together with local government and influential stakeholders to influence policy and ease social change.
- Address the value-action gap, cognitive biases, and dissonance by removing barriers and enhancing accountability; encourage co-creation of approaches and generate collective demand for change; enable direct involvement in protected area management.
- Simplify messages, make them locally understandable in local language, and speak to the cultural frames within the communities.
- Alter choice architecture, by providing alternatives to unsustainable practices; strengthen empowerment and perceived behavioural control through religious acceptance and pluralism and working with religious leaders and institutions.
- Harness lessons of CBSM to remind people of desired behaviours and norms, including prompts and reminders at bushmeat markets to dissuade selling and purchasing of protected species.

While nonexhaustive, nonspecific to one stakeholder and adaptable, this strategy has been implemented and monitored by Selamatkan Yaki and used to inform an ongoing, programme-wide framework for action which guides holistic conservation activities to reduce threats to *M. nigra* and its habitat.

Primate conservationists and social scientists are exploring how they can engage in mutually transformative dialogue, building on guidance for the selection and application of social science research methods and threat reduction strategies based upon behavioural science (Bennett & Roth, 2019; Chua *et al.*, 2020). Using innovative methods to decrease demand for bushmeat could be critical in conserving the regional biodiversity of protected and overharvested species (Veríssimo, 2019). Behaviour change strategies and social marketing campaigns have been successful in improving global conservation outcomes and reducing key threatening activities, such as illegal hunting (Green *et al.*, 2019). While many primatologists accept the benefits of more socially inclusive dimensions of research and conservation practice, in reality there remain many challenges (Cardinal *et al.*, 2022). Substantial engagement with the discourse reveals that there is a distinction between positivist and sociological paradigms; however, we have found them complementary from an applied perspective (Hilser, 2021). From our experience, practitioners may benefit from going beyond individual agency and adopting practice theory as a broad management lens to aid in understanding how key behaviours are positioned within society and the mechanisms of change in these behaviours (Spaargaren *et al.*, 2016). Social practices may act as useful metrics to recognise the importance of embedded social values and normative influences, while recognising how the dynamics of individuals' psychological characteristics contribute to the propagation of these systems.

Research in North Sulawesi indicates how social practices of hunting, trade, and consumption of bushmeat, along with certain forms of agriculture, appear to be diminishing (Bailey *et al.*, 2022; Hilser, 2021). Despite the decline in recruitment of agents into these practices, illegal trade in wildlife still represents a major problem, which requires a systematic, multipronged approach. By working with hunters, traders, and consumers of bushmeat to collectively create and disseminate new social norms while fostering intrinsic motivation to protect nature, we anticipate that illegal wildlife trade in North Sulawesi can be reduced. Stakeholders involved in curbing these issues must work together to ensure actions are strengthened and progress towards goals is monitored, evaluated, and communicated.

Findings from adopting approaches from the social sciences and locally situated strategy development for Selamatkan Yaki are distilled below into several key recommendations. These findings are applicable to practitioners and policymakers, extending beyond the scope of the specific conservation area or issue discussed in this review:

1. **Conduct ethnographic fieldwork** to develop a nuanced understanding of the sociopsychological and cultural conditions influencing people's relationship with the natural world. Ethnography will provide opportunities to gain trust, access, and networks to facilitate the suggested changes required for threat reduction.
2. **Adopt principles of social practice theory** to support a holistic understanding of conservation needs and dynamics, and the ability for the pragmatic compart-

mentalisation of interventions and their targets. Consider which common sets of activities affect the environment and how, and in what ways the individual attitudes, values, and beliefs of the agents that they recruit (the carriers of change) govern how these practices are reproduced, recrafted and interconnected.

3. **Co-create a holistic and integrated theory of change** with input from all levels of stakeholders including local community members, seeking a balance between the needs of local people and the environment. This strategy should address faith-based governance structures and barriers to change, particularly cognitive biases and the value-action gap, utilising bespoke message framing and local empowerment.
4. **Strengthen law enforcement, knowledge of regulations, and promote its effectiveness.** Building on normative motivations primarily, where possible adopt principles of environmental citizenship through local faith-based regulatory systems. Conduct research on the potential for transforming livelihoods to become more sustainable and shift away from hunting and other environmentally damaging activities.
5. **Develop strategically framed campaign messages that promote pro-sociality and pro-social education (Neaman *et al.*, 2018).** Work within the governing structures of societal control particularly active belief systems; introduce value-priming into strategic environmental management by speaking to preexisting, socially embedded communal values and social norms surrounding the acceptance of exploitative practices related to the natural world.

Conclusions

The reflections on the Selamatkan Yaki conservation programme have helped reveal the need for increased efficiency in the adoption of social science approaches and for greater emphasis on responsiveness to insights from field data to ensure research findings are effectively applied (Junker *et al.*, 2020). We will continue to explore innovative approaches to community engagement and threat reduction and also to improve our evaluation of the approaches outlined here. While further evidence remains key to full validation of our approaches, we propose that by incorporating sociopsychological principles and proven methods from the social sciences into conservation programmes, conservation practitioners may broaden their interpretation, communication, and application of research findings to effectively protect threatened primate species.

Acknowledgements This research was funded largely by Wild Planet Trust, UK, and Mandai Nature, Singapore, with additional support from other donors. We thank all the partners, collaborators, supporters, and Selamatkan Yaki team members who contributed over the years to supporting the development of the conservation programme and all of its diverse strategies. Special thanks to the local communities who have been so supportive, eager for inclusion, welcomed change with open arms, and shared their knowledge and wisdom to help protect their natural environment.

Data Availability While data are not currently within an electronic repository, the authors may be contacted by researchers to request data where available.

Declarations

Conflict of Interest No conflict of interests from any authors.

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