

## CHAPTER FIVE

# Understanding local resource users' behaviour, perspectives and priorities to underpin conservation practice

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### 5.1 Introduction

Most of the chapters in this book focus on how best to bring science into policy, often at the national scale and mostly with a developed-world perspective. Ensuring that national policy frameworks are conducive to conservation is vital, but it is also important to improve the effectiveness of science in supporting conservation interventions on the ground. Small-scale interventions aiming to change the behaviour of local resource users in developing countries make up a large proportion of global conservation effort and funding (Brockington & Scholfield, 2010). These types of intervention are challenging to do well, and often do not produce the desired results (Larrosa et al., 2016). Typically, there is little scientific input into either the design or evaluation of these projects, and evidence of effectiveness is limited (Roe et al., 2015). Small organisations in developing countries may not have the capacity or confidence to implement scientifically informed design and monitoring, and supporting them to collate and learn from evidence may not be a major priority for researchers or donors. Increased sharing of insights and techniques to support more robust and effective interventions could transform grassroots conservation (e.g. Woodhouse et al., 2016). In this spirit, we use case studies from four locations around the world to illustrate some of the

challenging steps involved in understanding conservation issues and designing suitable interventions. These steps are often skipped or not made explicit, but are critical to success; they ensure that interventions have a strong foundation in evidence, making it more likely that their desired impacts are achieved.

First, we explore how to collect robust information on the prevalence of illegal resource use, as a first step towards understanding the extent of the problem, using a case study of bird hunting in a Cambodian grassland. Next, we consider how to bring together different sources of information to understand both resource use and local perspectives on conservation, using a case study from Tanzania. These two case studies about evidence gathering lead on to the next stage: intervention design. We start with an example, also from Tanzania, of developing a Theory of Change for a conservation intervention, in which the process by which actions lead to a desired result is identified, assumptions are made clear and the progress of the intervention towards its desired impact can be monitored. Finally, we explore the challenges of implementing one particularly prevalent intervention type – alternative livelihoods projects – using an example of a shark fishery in Indonesia. Together, these case studies provide a vivid illustration of the ways in which conservation researchers and practitioners are combining efforts to ensure that interventions are based on robust evidence and therefore more likely to succeed.

## 5.2 Asking questions about sensitive topics

Moderating human behaviour is critical to conservation success (Gore, 2011; Milner-Gulland, 2012). However, if we are effectively to change human behaviour, we must first ensure we understand the nature of the behaviour we want to change. Central to this is determining both the prevalence of behaviours that are detrimental to biodiversity, and the characteristics of the people engaging in these behaviours. This is essential to ensure managers efficiently allocate resources to tackle threats, and that behavioural change interventions target the right audiences with the right incentives (St John et al., 2010, 2015). However, obtaining such information can be extremely challenging, especially if the behaviour in question is illegal (Gavin et al., 2010).

A common approach to ascertaining the true extent of illegal behaviours is asking direct questions (e.g. Gandiwa, 2011; Kiffner et al., 2015). Other studies mask the sensitivity of questions about illegal behaviours by mixing them with less-sensitive questions about other livelihood activities (e.g. Martin et al., 2012; Mgawe et al., 2012; Kiffner et al., 2015). Although direct questioning may help to cast some light on the nature of natural resource exploitation, it runs the risk of bias from untruthful responses (Nuno & St John, 2015). Respondents may be scared to answer questions honestly for fear of incriminating

themselves, or the possible repercussions they might face from revealing their behaviour. They may avoid answering questions altogether, terminate interviews early or underreport activities. If respondents do answer sensitive questions, social desirability bias may lead them to moderate their responses so their actions appear more socially acceptable. This is especially true of data captured in group settings, where pressure from peers may prevent others speaking freely and truthfully about their activities. It is also important to consider the ethical implications of directly asking respondents about their illegal activity; research has an ethical responsibility to 'do no harm', yet asking such questions can cause respondents to directly implicate themselves in illegal activities, potentially leading to severe consequences.

Indirect questioning has started to become more widely used in conservation science in response to some of these challenges. The method comes from psychology, and has been used when asking questions about sensitive issues such as drug use and racial prejudice (Imai, 2011). The technique enables interviewees to respond in such a way that the interviewer cannot directly determine whether they have participated in the activity. Instead, data provide estimates of prevalence at the population level, affording both the respondent and the researcher greater levels of protection.

One form of indirect questioning increasingly applied in conservation is the Unmatched Count Technique or Item List Technique (see Gavin et al., 2010; Nuno & St John, 2015). The technique works by devising a short 'control' list of three to five innocuous items that are non-sensitive but relevant to the research topic, and a treatment list which also contains the sensitive item of interest (Figure 5.1). The sampled population is randomly shown either the control or treatment list. Respondents are asked to report only the total number of items that apply to them. Because only a number is reported, the researcher has no way of knowing which specific items apply to a given respondent. The difference in the mean number of items reported by the two groups provides an estimate of the proportion of respondents engaging in the sensitive behaviour (Thomas et al., 2015).

### 5.2.1 Case study: Bengal florican

Ibbett et al. (2019) used the Unmatched Count Technique to investigate prevalence of illegal behaviours and to identify the characteristics of resource users in central Cambodia. In the dry season, the seasonally inundated grasslands surrounding the Tonle Sap lake are home to the world's largest remaining population of Bengal florican (*Houbaropsis bengalensis*), a critically endangered bustard species (Birdlife International, 2015). Recently, agricultural abandonment, scrub advancement and the emergence of dry-season rice – a form of intensive, irrigated rice cultivation – have dramatically reduced grassland cover. The Tonle Sap florican population is estimated to



**Figure 5.1** Using the Unmatched Count technique to ask about illegal bushmeat hunting in the Ugalla Wildlife Reserve, Tanzania. Picture by Paulo Wilfred. (A black and white version of this figure will appear in some formats. For the colour version, please refer to the plate section.)

have declined by 44–66% since dry-season rice was first cultivated on the floodplain in 2004 (Packman et al., 2014). However, conservation managers lack adequate understanding of the drivers of dry-season rice expansion. There is also evidence that hunting, a historic driver of decline, may persist in local communities (Packman, 2011).

Ibbett et al. (2019) used a mixed-methods approach to investigate these issues. Because hunting is potentially a sensitive activity (hunting wildlife is illegal in protected areas), the Unmatched Count Technique was selected to identify the prevalence of bird hunting and florican egg collection. The Unmatched Count Technique was combined with direct questioning and delivered through a household questionnaire, which captured information on household demographics, livelihood activities and awareness of bird species. Due to the florican's scarcity, Unmatched Count Technique questions concerned the hunting of larger grassland birds in general, with questions phrased as 'How many of the following animals/types of egg have people in your household caught in the last 12 months?' A warm-up question about different fruits consumed in the household was asked in order to introduce respondents to the technique.

A sample of 616 households across 21 villages was secured. The warm-up question identified a significant difference between control and treatment groups, suggesting the technique was working as expected. However, no significant difference was identified between control and treatment groups

for egg collecting or large bird hunting, suggesting the prevalence of these activities did not significantly differ from zero. When questioned directly, just 8.6% of households reported hunting birds in the previous 12 months, the majority of which were small, abundant game birds, such as buttonquail and ducks. Those that reported hunting birds were more likely to come from households which also collected other wildlife products, such as frogs and crickets.

### 5.2.2 Lessons learnt

While indirect questioning techniques avoid some of the pitfalls of traditional techniques, they are not without limitations. In this case, the Unmatched Count Technique failed to detect the presence of bird hunting, unlike direct questioning. This may be explained by the generally low prevalence of this activity and the probabilistic nature of the approach, which means that confidence intervals are large. Part of the issue is that the direct question was about bird hunting in general, and showed low levels of hunting of common species, while the Unmatched Count Technique question investigated targeted hunting of large bird species. Only one or two incidences of hunting large bird species were directly reported. Similar experiences of inability to estimate prevalence have been reported by others when using the Unmatched Count Technique to investigate illegal activities (e.g. Nuno et al., 2018). Therefore, the Unmatched Count Technique is unlikely to be useful when estimating the prevalence of an extremely rare activity. Indirect questioning is also not a panacea for sensitivity; if an activity is highly sensitive, particularly if it violates social norms, respondents may still not answer truthfully when the item is in a list; this can even result in negative estimates for prevalence (e.g. Fairbrass et al., 2016).

Compared to other indirect techniques, such as the Randomised Response Technique (see Nuno & St John, 2015), the Unmatched Count Technique is often preferred because it can provide higher estimates of prevalence, is simple to understand and adaptable, and thus useful in developing countries where levels of illiteracy may be high (Gavin et al., 2010; Nuno & St John, 2015). Despite this, the concept can still be difficult for respondents to grasp. Respondents may be wary, especially if they have previously had negative encounters with researchers. Taking time to thoroughly talk through the technique, using a warm-up question and explaining each list item is essential to avoid these issues. Often, conservation researchers rely on the help of translators or local research assistants. Selecting the very best help available and providing extensive training to assistants is essential in order to prevent information from getting 'lost in translation'. Local research assistants can also provide knowledge to ensure designs are appropriate. This is particularly helpful when working in illiterate communities, or when relying on pictorial prompts.

### 5.3 Triangulating different sources of evidence to build a rounded picture

Social research methods such as focus groups, interviews and household surveys are increasingly being employed to investigate illegal behaviours and profile resource users (Young et al., 2018). The current decade has seen an increase in the use of these mixed methods approaches to gain a more holistic understanding of resource use (e.g. Kahler & Gore, 2012; Harrison et al., 2015). A combination of perspectives, using both qualitative and quantitative methods, is commonly preferred.

#### 5.3.1 Case study: Ugalla Game Reserve

Ugalla Game Reserve (hereafter Ugalla; 5000 km<sup>2</sup>) in western Tanzania is predominantly miombo woodland. Its conservation value is high, serving as habitat for a wide range of species (UGR, 2006). It is part of the Malagarasi-Muyovosi Ramsar Site, and facilitates connectivity between protected areas in western Tanzania (Kalumanga, 2015; Riggio & Caro, 2017). The main legal activity in the reserve is trophy hunting, mostly by overseas tourists. A number of different approaches are used to conserve Ugalla, including irregular anti-poaching patrols and seasonal permission for fishing and bee-keeping activities (July–December). These also aim to attract local support for conservation and build a sense of ownership of the reserve among local people. However, recent studies suggest that this conservation approach is ineffective (Wilfred & MacColl, 2015; Wilfred et al., 2017). Unauthorised use of natural resources (including poaching, illegal logging and fishing) is common and local communities hold negative attitudes towards the reserve and its management. In an attempt to shed light on the prevalence of illegal behaviours and inform the management of Ugalla, multiple research methods were used to gather relevant information. Between 2013 and 2016, household surveys and focus groups were conducted in villages around Ugalla, along with a survey of signs of illegal activity undertaken across the Protected Area.

For the household surveys, 533 households were randomly sampled in 2016 in the vicinity of Ugalla. The Unmatched Count Technique was used to estimate the prevalence of illegal behaviours (logging, illegal hunting and honey-gathering). The survey also included questions on households' perceptions of the main threats to Ugalla and its wildlife, and what communities would do differently to improve Ugalla's management effectiveness. Six single-sex focus groups from six randomly selected villages within 20 km of the Ugalla boundary, each with 4–6 participants, were conducted to verify findings from the household survey. Free-listed threats to Ugalla were ranked in decreasing order of their importance, and each threat was then divided by the total number of threats to calculate the salience score (Papworth et al., 2013). The overall score for each threat was obtained by calculating the average salience

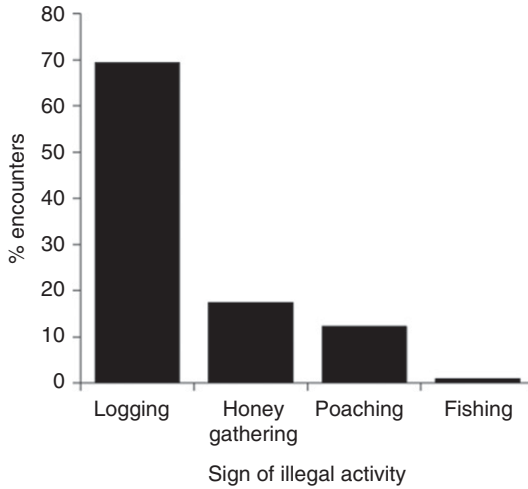
score across the focus groups. The greater the salience, the more important the threat.

For signs of illegal activity in the reserve, 10 patrol tracks were randomly selected in 2014. Six transect starting points were placed at 3000-m intervals along each road. At each point, two 1500-m transects were walked on opposite sides and perpendicular to the road. Signs of illegal activity (e.g. tree stumps, sawpits, meat smoking racks, snares, trees felled for honey extraction, fish smoking racks, poacher camps) were noted 50 m either side of the transect line (Figure 5.2).

The Unmatched Count Technique results suggested that poaching and illegal logging were performed by 28% (SE  $\pm$  6) and 20% (SE  $\pm$  5), respectively, of surveyed households; 18% (SE  $\pm$  6) of respondents gathered honey. The top four threats to Ugalla, as identified by respondents, were poaching (40% of respondents), logging (39%), fishing (11%) and honey gathering (8%). Of the top four threats to Ugalla free-listed and ranked by focus groups, logging had the highest salience ( $S = 0.5$ ), followed by poaching (0.45). Within the reserve, 867 illegal activity signs were encountered. Signs related to logging had the highest frequency, followed by honey gathering, poaching and fishing (Figure 5.3). These results indicate that levels of illegal activity in Ugalla are high. The different methods consistently suggest that logging and poaching are the commonest illegal activities.



**Figure 5.2** Paulo Wilfred and his research assistant recording an illegal meat smoking rack in Ugalla Wildlife Reserve. (A black and white version of this figure will appear in some formats. For the colour version, please refer to the plate section.)



**Figure 5.3** Signs of illegal activity encountered inside Ugalla Game Reserve in 2014. Total signs = 867.

Of the activities that survey respondents and focus group participants said they would undertake if they were the Ugalla manager, the most common recommendations were to: improve the well-being of people around Ugalla (17% of respondents,  $S = 0.11$ ); ensure that local people have adequate land for their livelihood activities (16%,  $S = 0.35$ ); promote local participation in conservation (16%,  $S = 0.13$ ); improve law enforcement (15%,  $S = 0.14$ ); raise conservation awareness (15%,  $S = 0.14$ ); and improve local people's relations with reserve managers (12%,  $S = 0.54$ ).

### 5.3.2 Lessons learnt

Paulo Wilfred's research in Ugalla started nearly a decade ago with the overarching objective of informing conservation management. This long-term research suggests that local communities are knowledgeable about illegal activities and keen to participate in conservation efforts. For example, during household surveys, villagers from unsampled households sometimes expressed their desire to share their views and experiences about natural resources. Accordingly, researchers can facilitate liaison between reserve managers and local people.

Although Paulo's research exposes the situation on the ground, we are not yet able to connect these observations to a good understanding of the drivers of illegal behaviour or the governance context framing reserve management. To fulfil such an objective, more targeted research is required. Ideally, this should focus on individual activities, rather than trying to investigate all illegal activities at once. Different activities are conducted by different groups of people with different rationales and link to different governance issues.



The methods applied in Ugalla were resource-intensive. For example, Unmatched Count techniques typically require high sample sizes (see Nuno et al., 2013); more than 500 households were surveyed in this study, which was all that time and funding allowed. Surveying for illegal activity signs was also challenging, because it was difficult to estimate the time the signs had been present in the environment and different signs have different biases (e.g. rangers remove snares during their normal anti-poaching patrols, potentially leading to underestimates).

The main lessons learnt from Ugalla were as follows.

- Be interdisciplinary! Don't be afraid to use ecological survey methods, for example incorporating a field-based survey into the research design. This can provide a great opportunity to cross-validate findings from social research.
- Conservation researchers preferring mixed methods should not be over-ambitious. Instead, they should be realistic, choosing techniques carefully and planning activities based on the resources available, following a robust pilot study.
- While doing household surveys and focus groups, it is critical to use experienced research assistants who are neutral in the community but familiar with the study area. A survey of illegal activity signs also requires experienced field assistants, so information is collected accurately and consistently.
- Both focus group discussions and household surveys should be kept relatively short and simple to minimise participant fatigue.

## 5.4 Developing a Theory of Change for an intervention

It is vitally important to be clear about why we think that our intervention is the right thing to do, and what barriers there might be to success, before we start. This understanding needs to be set out in a logical way, so that it is understandable and appealing to project staff and donors, and so that it can later be tested. There are a number of approaches which can be used, falling under a general heading of causal chain models (Qiu et al., 2018). One such approach is Theory of Change (Center for Theory of Change, 2018), which shows how a project can reach its desired impact and goals through different pathways of change. It provides indicators that can be tested, thereby supporting evaluation of a project's success or failure. This is useful both for internal and external users, to understand what works, and to guide the allocation of project resources.

### 5.4.1 Case study: Vijana na Mazingira

In 2016, Hans Cosmas Ngoteya designed a retrospective Theory of Change for Vijana na Mazingira (VIMA), the local conservation project which he runs in

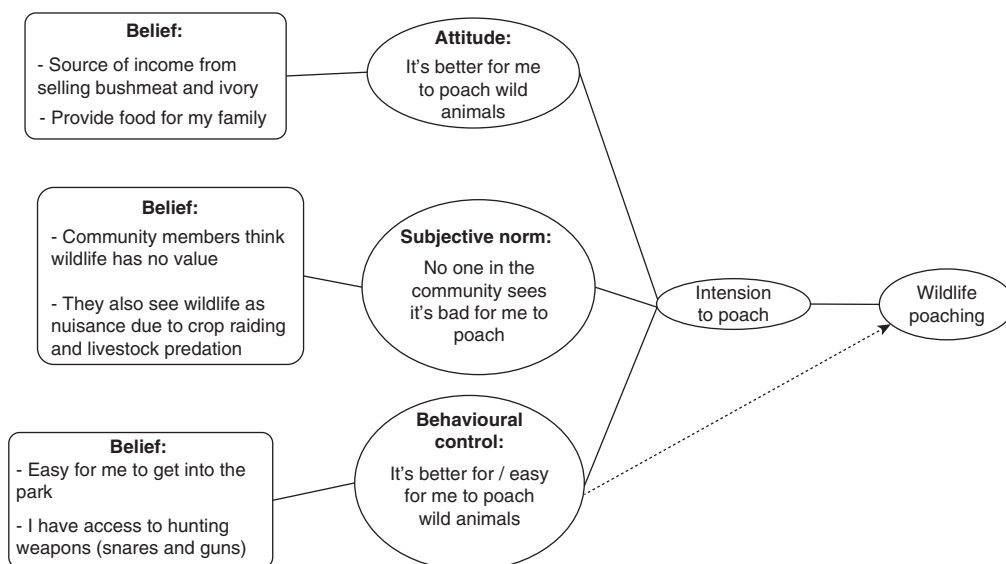
the Katavi–Rukwa ecosystem of western Tanzania. The project targets youths aged 12–35, with the goal of reducing pressure on natural resources from poaching, deforestation and encroachment. The Theory of Change was designed to support an evaluation of the effects of the project on attitudes, awareness and conservation behaviours by youths aged 18–35 participating in VIMA’s conservation education and alternative livelihood projects (Figure 5.4).

In order to achieve a project’s desired impact, it is necessary first to understand the motivations for engaging in the behaviour that the project is aiming to modify. There are a number of frameworks available from social psychology that represent the factors that interact to influence behaviours. One of the most widely used in conservation is the Theory of Planned Behaviour (St John et al., 2013). Hans used the Theory of Planned Behaviour to identify the different factors underlying the motivations of the VIMA project’s recipients (Figure 5.5). Based on Hans’ local knowledge and understanding of the project, a Theory of Planned Behaviour framework was developed for four desired project impacts, each of which represented a desired behavioural change. The Theory of Planned Behaviour was then used to identify how VIMA’s activities might tackle the different motivations underlying each behaviour.

A clear understanding of the motivations behind the behaviour, engendered by the Theory of Planned Behaviour exercise, can enable conservationists to map out the pathways of change the project should focus on, thereby generating a Theory of Change. The Theory of Planned Behaviour gives



**Figure 5.4** Hans Cosmas Ngoteya (second from right) setting up a beehive with local youths, as an alternative livelihood project. (A black and white version of this figure will appear in some formats. For the colour version, please refer to the plate section.)



**Figure 5.5** A Theory of Planned Behaviour diagram illustrating the factors underlying the poaching behaviours of individuals targeted by the VIMA project.

a representation of what underlies an individual's behaviour, and this can be used to develop a Theory of Change for the planned intervention. In this case, the Theory of Planned Behaviour exercise highlighted that, typically, youths in Katavi-Rukwa viewed poaching as a way to feed their families and generate an income through bushmeat or ivory sales. Therefore, an intervention that developed alternative livelihood programmes could be an effective approach. This could include training youths in new income-generating activities (input), thereby providing alternative income sources (output), which will reduce their dependence on natural resources (outcome) and ultimately reduce their poaching behaviour (impact; Figure 5.6). At each step of this pathway lie assumptions; for example, that any alternative income source will replace, rather than supplement, income from hunting (Table 5.1).

Baseline surveys, focused on the elements of the Theory of Planned Behaviour (attitudes, knowledge, social norms), provide a set of indicators against which change engendered by the intervention can be measured. Progress through the Theory of Change can also be monitored, using a set of more process-based indicators. For example, an input indicator might be the percentage of VIMA's target audience engaged in the alternative income activities, an output indicator might be the income generated from the alternative livelihood, the outcome might be measured as improvements in household livelihood security and the impact might be measured using an indirect questioning technique such as the Unmatched Count Technique to quantify change in poaching prevalence.

**Table 5.1** *Assumptions underlying the Theory of Change*


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1.	Participants understand the education they are given
2.	If someone is educated about environmental issues it will improve their attitude towards conservation
3.	Knowledge about conservation issues leads to a decrease in acceptance of environmentally harmful behaviours
4.	There is dissemination of information from VIMA participants to the remainder of the community
5.	If someone's attitude towards conservation improves, they will reduce their unsustainable resource-use behaviour
6.	If communities are against unsustainable resource use, illegal resource exploitation will decrease
7.	VIMA's alternative livelihood programmes can be put into practice and generate income
8.	There is opportunity for the rest of the community to become involved in the alternative livelihood projects
9.	Alternative livelihoods will be used to reduce unsustainable use of natural resources
10.	Decreasing dependency on natural resources will reduce poaching, encroachment and deforestation

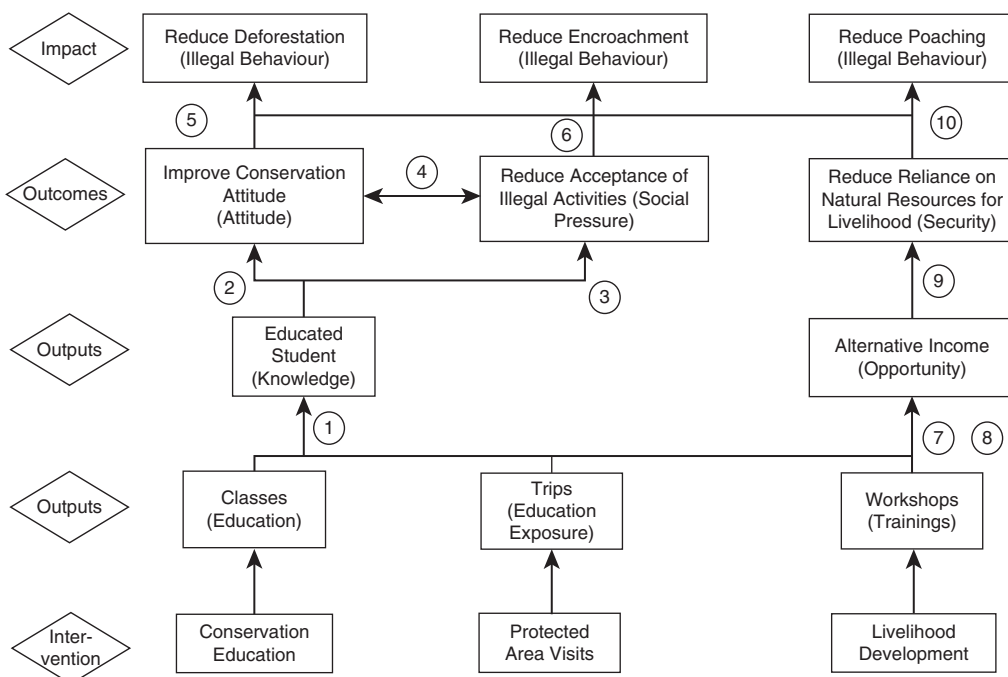
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#### 5.4.2 Lessons learnt

The requirement for robust evaluations of the effectiveness of conservation interventions is becoming more and more apparent (Sutherland et al., 2011). Practitioners are required to ensure that their activities are based upon the best available evidence and designed for accountability and learning. However, many small NGOs (such as Hans' organisation, Landscape and Conservation Mentors' Organisation) may not feel that they have the capacity to design and implement evaluations that are both user-friendly and robust enough to be useful for adaptive management. Lacking a rigorous framework for articulating goals and assumptions, it is easy to drift through interventions without having either a strategic plan or a means of measuring success. This can lead to ineffective interventions and failure to capture the changes engendered in order to learn and adapt and demonstrate impact to funders. The development of a Theory of Change for the VIMA project enabled Hans to identify his assumptions, and develop methods to collect information which can be used to monitor future impact and test assumptions against a relevant baseline.

#### 5.5 Exploring alternatives to illegal behaviour

One of the key lessons learnt in the VIMA project was the importance of having a clear understanding of the motivations behind behaviour. Unfortunately, not all conservation projects that involve communities take this approach when designing an intervention. For example, alternative



**Figure 5.6** Theory of Change for VIMA project showing interventions at the bottom and different pathways to reach the desired impacts. Numbers 1–10 are assumptions along the pathways of change (listed in Table 5.1).

livelihood projects have long been used as strategy for reducing local threats to species, habitats or resources of conservation concern. Alternative livelihood projects are designed to reduce the prevalence of behaviours that are considered environmentally damaging and unsustainable (Wright et al., 2016). However, a systematic review of alternative livelihood projects conducted by Roe et al. (2015) found insufficient evidence to understand when, where or why alternative livelihood projects work. Even though there is uncertainty regarding the effectiveness of alternative livelihood projects, they continue to be a key strategy in both terrestrial and marine conservation. However, the assumptions on which they are based are often unrealistic; for example, that the alternative livelihood projects will substitute for the undesirable behaviour, that the resource users are a homogeneous group, and that targeting interventions at individuals will scale up to population-level change in pressure on resources (Wright et al., 2016).

In marine conservation, a common response to perceived over-fishing is to provide alternative employment for existing fishers. This requires that the assumption of substitutability holds, so that fishers will willingly and happily

settle into a new way of making a living (Pollnac et al., 2001; Pollnac & Poggie, 2008). Pollnac et al. (2001) added that this is based on the assumption that fishing is a hard and undesirable occupation and hence an employment of last resort, that fishers are among the poorest of the poor and that the poor care little about the type of job they have as long as they make enough to live.

### 5.5.1 Case study: shark fishers in Tanjung Luar

Fishing pressure is generally considered to be the main cause of the decline of shark populations globally (Stevens et al., 2000; Robbins et al., 2006; Dharmadi et al., 2015). Indonesia is the world's largest shark producer, with annual average production of 106,000 tons in 2000–2011, contributing 13% of global shark production (Dent & Clarke, 2015). Although the exact number is unknown, it is assumed that many Indonesian fishers are heavily dependent on shark fisheries as a source of income and food. However, shark production in Indonesia has been declining in recent years (Sub Directorate of Capture Fisheries Data and Statistics, 2016), which could be leading to a decline in income and livelihood security for fishers.

From 2014 to the present, the Wildlife Conservation Society (WCS) Indonesia Programme has carried out a study of shark fishers in Tanjung Luar, a shark-fishing community in East Lombok, in order to understand whether providing alternative livelihoods could help to reduce fishing pressure on sharks. Tanjung Luar is one of the main shark landing sites in Indonesia. It is home to a targeted shark fishery comprising approximately 50 boats employing surface and bottom longlines and one of the biggest fish markets on Lombok Island, with more than 5000 fishers using it to sell their catch. Fishing is the main livelihood of Tanjung Luar's population and there are at least 150 households heavily dependent on the shark industry, either as fishers, meat processors or traders. Shark fishers in Tanjung Luar use 4–25 gross tonnage boats, with three or four crew members, and the average fishing trip is 14 days.

Due to growing international concern regarding their conservation status, several shark and ray species have been listed on CITES Appendix II. As a CITES member, Indonesia is required to implement management measures, such as quotas, size limits and export bans to ensure that international trade in these species is not detrimental to wild populations. These measures could have negative impacts on the income and livelihood security of Tanjung Luar's fishers, who are already vulnerable to market fluctuations, particularly in export markets (Jaiteh et al., 2017). WCS Indonesia Programme's study aimed to: (1) collect data on biological and operational characteristics of the fishery (Figure 5.7), (2) understand shark fishers' current socioeconomic status and aspirations, (3) explore alternative livelihood options and (4) create dialogue between fishers and the management authorities.



**Figure 5.7** WCS Indonesia team members measuring guitarfish at Tanjung Luar port. Photo provided by WCS-Indonesia. (A black and white version of this figure will appear in some formats. For the colour version, please refer to the plate section.)

Livelihoods options explored with the fishers included diversifying the target catch to more resilient species (e.g. squid, tuna and reef fish) and tourism, yet WCS Indonesia Programme's surveys showed that shark fishing offered higher revenues than other fisheries. An independent fisheries assessment by Masyarakat dan Perikanan Indonesia also showed similar results (MDPI, 2017). Tanjung Luar was known for its squid fishery in the 1980s, but the number of squid fishermen has increased rapidly, increasing competition and making the addition of new fishers unsustainable (MDPI, 2017). Some fishers in Tanjung Luar who catch tuna or skipjack mentioned that their catch is also declining, and The Indian Ocean Tuna Commission classifies yellowfin tuna as overfished (IOTC, 2017). Some shark fishers have already started to fish for groupers and snappers on the side, but the value of this catch is far less than their earnings from sharks. Tourism is promising, but the industry is still under-developed. To date, identifying feasible alternatives that provide economic incentives to shift away from shark fishing has proven challenging, as there are no legal or sustainable marine alternatives that offer similar profits.

Our research showed that shark fishers wish to remain shark fishers. Fishing is the only skill they know, and most of them said that they would continue to fish as usual even if their catch declined by 50%. Our landings survey showed that some commonly caught sharks are over-exploited. When findings were shared with fishers, although not all agreed with the results, shark fishers acknowledged that it is now harder to catch sharks and the sharks that are caught are smaller, a view also shared by shark fishers in eastern Indonesia (Jaiteh et al., 2017). The Tanjung Luar fishers' response is not surprising, as

similar reactions were also reported by Pollnac and Poggie (2006), with fishermen refusing to leave their existing fishery even though their incomes were declining; it is potentially their best option in the short run if they are still making a profit.

### 5.5.2 Lessons learnt

Based on the results of this research, instead of deploying alternative livelihood projects for shark fishers in Tanjung Luar, WCS's Indonesia Programme chose to:

- (1) strengthen the existing fisher institutions, which focus on tourism development, in order to help that industry to develop, become more attractive and profitable;
- (2) maintain close interaction with shark fishers by regular home visits and conducting informal meetings; and
- (3) facilitate formal meetings between shark fishers and the management authorities, to foster dialogue on developing management measures that ensure the sustainability of both shark and ray populations and fishers' livelihoods.

It is challenging to establish a direct connection between livelihood interventions and conservation. Rather than trying to find new livelihoods, sometimes it is more appropriate to focus on enhancing existing livelihood strategies which do not involve exploiting the natural resource of concern, targeting those most vulnerable to conservation-imposed resource access restrictions (Wright et al., 2016). It may also be possible to establish a clearer link between livelihood sustainability and conservation as a means of building good community relations, as we opted to do. It is important to have a clear pathway demonstrating how an intervention is expected to lead to the desired outcome, e.g. by using theory of change to design the intervention after gaining a thorough understanding of community dynamics.

## 5.6 Discussion: interlacing research and practice

The four case studies presented here take us from research to practice; in so doing, they illustrate how integrated the two are. By starting with a strong theoretical framework (such as the Theory of Planned Behaviour) underpinning an intervention's Theory of Change, unwarranted assumptions can be avoided, such as those which plague alternative livelihoods projects. Engaging with resource users before embarking on interventions can reveal dead ends, as illustrated in Tanjung Luar, where plans for an alternative livelihood project needed to be replaced by a more indirect process of advocacy and engagement with different parties, while building capacity for a livelihoods shift. A clear understanding of what the actual problem is, based on evidence rather than



supposition, is vital; the example from Cambodia suggested that hunting was actually not a major threat to floricans, enabling conservation practitioners to focus on other threats.

Although a range of techniques is available for collecting information to underpin management, these should not be applied lightly. As the Ugalla example showed, the ideal of using mixed methods to gain a nuanced understanding takes time and resources, as well as expertise. Approaches such as the Unmatched Count Technique can look superficially appealing and easy to administer, but there are technical challenges in developing appropriate item lists, administering the questions in a way that makes respondents comfortable, and in data analysis. Even then, as the Cambodian example shows, the results may not be as informative as might be hoped. Time invested in foundational studies is well spent, but not all small NGOs can afford extensive research. Even then, however, it is possible to develop a robust Theory of Change, as a tool for exposing assumptions and supporting ongoing monitoring and evaluation, as the VIMA example showed.

Our case studies have specific lessons, but they also tell universal stories. The role of research in facilitating positive interactions between managers and local people is an interesting observation that was seen in both Ugalla and Tanjung Luar, while both the Cambodian and Ugalla case studies highlighted the importance of good local research assistants. All four case studies emphasised how research and practice need to intertwine more often and more routinely. This will enable conservationists (whether from governments or NGOs) to think through their interventions in advance, use appropriate methods to understand existing behaviour and local perspectives on ways forward, and thereby design locally appropriate, participatory interventions that support adaptive management.

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