

Can the Provision of Alternative Livelihoods Reduce the Impact of Wild Meat Hunting in West and Central Africa?

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Abstract

As threats to the world's ecosystems continue to escalate, the demand for evidence-based conservation approaches from conservation scientists, practitioners, policy-makers and donors is growing. Wild meat hunting represents one of the biggest threats to tropical forest ecosystems and various conservation strategies have been employed with the aim of reducing hunting impacts. Alternative livelihood projects have been implemented at the community level to reduce hunting through the provision of protein and income substitutes to wild meat. However, there is scant evidence of these projects' impact on hunting practices and wildlife populations. This study addresses this knowledge gap, focusing on alternative livelihood projects in West Africa and Central Africa. A comprehensive literature review and call for information identified 155 past and current projects, of which 19 were analysed in detail through key informant interviews. The study found that a range of different livelihood alternatives are being offered. Most projects are run by local and national non-governmental organisations, and project managers acknowledged the importance of involving communities in project decision-making; however, many projects are funded through small, short-term grants and struggle to meet their objectives with the available time, funding and capacity. Given these constraints, few projects monitor their outcomes and impacts. Projects also seldom implement conditionalities and sanctions, which may lead to the alternatives offered becoming additional rather than substitutional activities. Applying currently available best-practice guidelines for Integrated Conservation and Development Project design and implementation, including the use of simple monitoring methods for evaluating outcomes and impact, would greatly increase the chances of success for alternative livelihood projects, along with a restructuring of current funding models.

Keywords: best practice, bushmeat, effectiveness, integrated conservation and development projects, monitoring, ICDP, analysis, meaningful impact assessment

INTRODUCTION

Hunting has been recognised as one of the largest threats to tropical forest biodiversity worldwide (Leverington et al. 2010;

Abernethy et al. 2013; Maxwell et al. 2016), representing a major threat to even remote forest areas (Fa et al. 2002; Abernethy et al. 2013). Wild meat (otherwise referred to as 'bushmeat') has been used as a food source by African communities for centuries (Milner-Gulland et al. 2003; Fa and Brown 2009). Today, it is a key source of animal protein and an important source of income for rural forest dwellers (Wilkie and Carpenter 1999; Coad et al. 2010). Rural hunters supply the increasing demand for wild meat from growing urban populations who, having greater access to domestic meats, are less reliant on wild meat as the sole available protein source, and may even consume wild meat as a luxury good (Van Vliet and Mbazza 2011).

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The provision of alternative protein and income-generating sources is one of the most widely-used strategies at the community level to reduce wild meat consumption and trade while aiming to improve (or have no negative impact on) local livelihoods (Van Vliet 2011). The aim of these projects is to introduce or strengthen existing low-cost, easily implementable, low-environmental-impact livelihood activities, supplying communities with either an alternative source of meat protein or an alternative form of income generation, thus decreasing people's dependency on wild meat and reducing pressures on wildlife (Wright et al. 2016).

While many such alternative livelihood projects have been implemented across West and Central Africa at various scales, there has been little analysis of the characteristics, successes and failures of these projects, and little synthesis of the lessons learned. Nonetheless, alternative livelihood projects remain a major focus of governments (e.g., Central African Forest Commission (COMIFAC) *Plan de Convergence*), donors (e.g., Central Africa Regional Program for the Environment (CARPE), Darwin Initiative, French Global Environment Facility (FFEM) and Congo Basin Ecosystems Conservation Programme (PACEBCo)) and non-governmental organisations (NGOs) alike, in their efforts to combat unsustainable or illegal hunting practices.

This lack of evidence is not exclusive to research and interventions focusing on wild meat: it has been recognised as a serious obstacle to effective biodiversity conservation by a growing number of scholars and practitioners (Knight et al. 2006; Cook et al. 2010; Roe et al. 2015) and it has been suggested that "current conservation practice is based upon anecdote and myth rather than upon the systematic appraisal of the evidence" (Sutherland et al. 2004). Establishing an evidence base can inform current and future project design, improve cost-effectiveness, and ensure that funding is allocated to projects with the highest impact potential, where possible (Ferraro and Pattanayak 2006; Bare et al. 2015). Furthermore, since the conservation movement has evolved into being a major actor with increasing political influence and funds, there is a greater call for accountability from donors and civil society (Margoluis et al. 2009). Conservation researchers and practitioners have highlighted the importance of acknowledging and sharing project failures in addition to successes to obtain a realistic understanding of conservation impacts and to make consequent improvements (Redford and Taber 2000; Bottrill et al. 2011). However, despite a proliferation of rapid assessment monitoring and evaluation (M&E) tools for conservation, Integrated Conservation and Development Projects (ICDP) that have implemented M&E to assess their effectiveness and adaptively manage their projects are in the minority (O'Neill 2007; Bottrill et al. 2011).

In the meantime, the call for conservation action to tackle the wild meat crisis is increasing. The Convention on Biological Diversity (CBD) recognised the importance of livelihood alternatives at COP10 and requested the Executive Secretary to develop, through the CBD Liaison Group on wild meat,

options for small-scale food and income alternatives in tropical and subtropical countries, based on the sustainable use of biodiversity (CBD COP10 Decision X/32, section 4(a)).

This study, therefore, aims to increase our understanding of the potential for alternative livelihood projects to decrease hunting pressure by: 1) reviewing the number and distribution of current alternative livelihood projects in West and Central Africa; and 2) documenting the characteristics, successes and failures for a set of case-study alternative livelihood projects using semi-structured interviews with project managers. Referring to the results of the review and case studies, we suggest how the design and implementation of alternative livelihoods projects could be improved to increase their impact.

METHODS

Identifying past and current alternative livelihood projects

To locate past and existing alternative livelihood projects, we conducted an online search of the available grey and academic literature, including online libraries, conservation NGO, and donor websites. We also sent a call for information through conservation e-mail listservs to reach a high number of people with relevant conservation and/or development experience in planning or implementing alternative livelihood projects. We initially conducted the search between July and August 2012, and then updated the online search in February and March 2017. Detailed search methods are provided in Appendix 1 (<https://data.cifor.org/dataset.xhtml?persistentId=doi:10.17528/CIFOR/DATA.00083>). To be included in the study, projects needed to: 1) be located in countries within West and Central Africa (see Appendix 2 for full country list: <https://data.cifor.org/dataset.xhtml?persistentId=doi:10.17528/CIFOR/DATA.00083>); and 2) have an alternative livelihood component that was designed with the aim of either directly reducing wild meat hunting or more generally reducing human pressure on wild fauna.

Designing a comparative framework

We developed a comparative framework to describe, compare and evaluate the aims, design, implementation, outputs and outcomes of alternative livelihood projects. We reviewed and adapted elements from existing frameworks designed for evaluating conservation projects and management effectiveness (Pimbert and Pretty 1997; Salafsky et al. 2001; Stolton et al. 2007; Kapos et al. 2008; McDermott et al. 2011), in order to identify components important to alternative livelihood project design and practice. Table 1 outlines the main components of the comparative framework and describes why each component is important for project success. The full comparative framework is provided in Appendix 3 (<https://data.cifor.org/dataset.xhtml?persistentId=doi:10.17528/CIFOR/DATA.00083>).

Table 1
Main components of the comparative framework and reasons for inclusion

Component	Questions	Best practice/reasons for inclusion of question
Project aims and objectives	What was the aim of the project? Did it remain the same throughout the project?	Project aims should be clearly defined: "Once you are clear about what the purpose of your project is, you can then determine how you are going to get there-what intermediate steps along the way you must take. Establishing a clear purpose enables you to develop a benchmark for measuring success" (Salafsky et al. 2001).
Project funding	What was the overall funding for the project? Was it part of a larger project? How many years was it funded for? Was the funding adequate?	Project budget size and budget security (the length of project funding), will influence both project scope and sustainability. Funding requirements will vary between projects, but ultimately, short-term, small-scale funding opportunities may only provide start-up funding and may not be adequate to ensure project continuation (Blom et al. 2010).
Project organisations and partners	Who were the project implementers? Who were the project funders? Did the project work with local/national government, and in which way?	Involvement of national or sub-national organisations in project management can bring a better appreciation of local context in project design and planning, and may also increase project sustainability due to a higher, and more sustained level of on-the-ground presence by NGO representatives (Blom et al. 2010). Where national policies support decentralisation of natural-resource management, ICDPs can exist within, and be supported by, a legal framework, including the legal recognition of community groups. Isolated conservation projects are unlikely to succeed in the long-term, and local government support can help create a greater cohesion of efforts on a landscape level.
Community involvement in project initiation, design and implementation	Who decided on project aims? Who chose project activities? How were potential participants contacted? Who made the day-to-day management decisions concerning the project?	Community participation in ICDPs is linked to more successful project implementation and outcomes (Travers et al. 2011; Dressler et al. 2010; Blom et al. 2010; Waylen et al. 2010). Furthermore, community involvement allows for the development of interventions that are sensitive to the local cultural context (Waylen et al. 2010; Ostrom 2009). The level of sustainability achieved by a project has been shown to be closely related to the level of community participation and empowerment within a project (Persha et al. 2011; Matose and Watts 2010; Murphree 2009)
Project Theory of Change (ToC)	How did the project aim to reduce hunting?	ToC can be described simply as: 'The description of a sequence of events that is expected to lead to a particular desired outcome' (Davies 2012). In this case, it describes the process by which project designers believe that the livelihood alternative (the project input) will result in populations of target species reaching/staying at a certain level (the desired outcome). At each stage along the cause-and-effect assumption chain, assumptions are made by both project managers and participants. Throughout the project, these assumptions must be tested to make sure that the ToC adopted by the project will work in practice (Woodhouse et al. 2016).
Project participant selection	Did the project work with a specific section of the community? Were there any criteria for participation?	The selection of project participants must be based on a good understanding of the resource users and their motivations, so that the project involves those community members who will have the largest impact on the resources that the project aims to conserve.
Project conditionality and sanctions	What did participants have to do to be involved in the project (were there any project rules)? Were there any sanctions if participants did not change behaviour? Has anyone been ejected from the project, if so what happened?	The use of conditionality and appropriate sanctions are recognised as important enabling conditions in ICDPs (Blom et al. 2010). The term 'conditionality' stands for certain conditions attached to project participation (e.g., hunters are asked to reduce or halt their hunting activity if involved in the project). Appropriate sanctions are then applied if the project participant fails to meet these conditions (e.g., hunters are fined if they hunt certain species, or, in cases of the repeated breaking of conditions, can be ejected from the project). The rationale for applying conditions and sanctions is that participants are entering into a <i>quid pro quo</i> agreement with project organisers: in exchange for entry into the alternative livelihoods project they must agree to modify their hunting behaviour. Adherence to this agreement is enforced with sanctions. However, not all alternative livelihood activities are set up as <i>quid pro quo</i> agreements, and the use of conditions and sanctions can therefore vary depending on the project aims.
Project monitoring	What were the indicators of project success? Was there a monitoring program? What data was collected? How often was it collected?	Social and ecological monitoring is crucial for project design, adaptive management and understanding project impact (Saterson 1999). Socio-economic and ecological baseline studies identify the main users of the resource that the project aims to conserve, and build an understanding of their motivations and cultural norms. Design of the project can then be based on this information. Measures of hunting behaviour throughout the project can be used to determine whether the assumptions of the project's ToC are being met. Measuring changes in socio-economic, ecological and hunting indicators, can be used to evaluate project outcomes and impact.
Project sustainability	Has there been handover of the project to local stakeholders? Is the project ongoing? How was sustainability factored into the project design?	Planning for project sustainability should include building in both financial sustainability (i.e., business planning/creating a project fund) and social sustainability (i.e., building local capacity and ownership).

Project practitioner interviews

We conducted 17 semi-structured interviews with project practitioners, covering a total of 19 projects (two interviewees

provided information on two projects) in nine different countries in West and Central Africa. The interviewees included six employees from international NGOs, seven from national NGOs/research institutions, and four from

local NGOs. Interviews were based on a set of questions generated from the comparative framework (Appendix 3 at <https://data.cifor.org/dataset.xhtml?persistentId=doi:10.17528/CIFOR/DATA.00083>). Following the comparative framework allowed us to systematically compare information collected during the interviews to help identify characteristics leading to success or failure in alternative livelihood projects.

We selected projects predominantly by availability for interview, whilst also seeking to create a representative regional sample of project types. Interviewees were all either project managers, project or regional coordinators, or the equivalent thereof in any given organisational structure. Most interviewees had not only developed and overseen the projects but had been highly involved in project design and implementation throughout the duration of the project. We conducted the interviews, which lasted between 50 and 90 minutes, via Skype or telephone. Interviews were then transcribed and analysed along the main themes described in the comparative framework (Table 1). We conducted all interviews between July 2012 and February 2013.

As this was a remotely conducted *post-hoc* project evaluation, information received in project practitioner interviews could not be verified through a process of informant triangulation to eliminate potential interviewee biases (Kumar 1986; Baxter and Eyles 1997). Ideally, project participants, community members and other project staff would be interviewed, as even if project managers gave an accurate account of their perceptions of project performance, and particularly the level of community involvement, these views might differ from the participants' experiences. However, our aim was to attain an overview of alternative livelihood project experiences from across West and Central Africa, and we therefore chose to maximise the number of projects that we could evaluate, rather than conduct an in-situ case-study, which would have allowed participant experiences to be captured. Overall, however, considering key informants did not uniformly report project success, and indeed elaborated on project difficulties and failures, we believe interviewee testimonies represent an honest account of their experiences.

RESULTS

Alternative livelihood projects in West and Central Africa

We identified a total of 155 past and present alternative livelihood projects in West and Central Africa (Figure 1; project details provided in Appendix 4: <https://data.cifor.org/dataset.xhtml?persistentId=doi:10.17528/CIFOR/DATA.00083>). Countries with the highest numbers of projects were Ghana ($n=32$), the Democratic Republic of Congo (DRC) ($n=27$), Cameroon ($n=25$), and the Republic of Congo (ROC) ($n=15$), respectively (Figure 1). NGOs were involved in the implementation of 139 of the 155 projects (local NGOs (LNGO)=58 projects, international NGOs (INGO)=57, national NGOs (NNGO)=44), national governments were

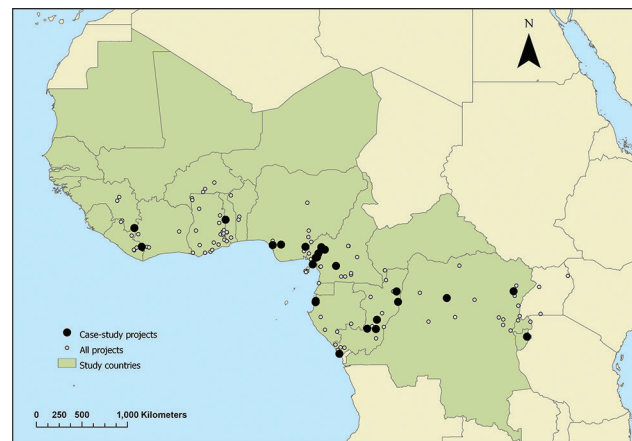


Figure 1

Alternative livelihood projects identified within Central and West Africa. Small circles represent all projects identified by literature review and expert contacts; larger black dots represent case-study projects. Countries highlighted in green are those included in the original literature review

involved in the implementation of 20 projects, and other implementers (e.g., private sector actors, research institutions and universities, zoos, intergovernmental organisations (IGO), or foreign national governments) were involved in the implementation of 20 projects. Thirty-seven projects had multiple implementers.

Almost half of these projects ($n=73$) aimed to reduce hunting pressures on wildlife by providing both alternative income and protein activities, while 56 projects offered alternative livelihood activities intended to generate income and 18 provided alternative protein activities only (for eight projects the specific aim was unknown). The four most frequently offered alternatives were beekeeping, cane rat farming, fish farming and pig farming (Figure 2).

Case-study projects

Table 2 provides a summary of the 19 case-study projects from nine countries, which we evaluated using the comparative framework and project practitioner interviews. All but two projects were situated in rural areas — the exceptions being peri-urban cane-rat rearing projects (Projects 8 and 9).

Project funding

Projects were mainly funded by international donors, including the World Bank (Global Environment Facility), foreign aid programmes (primarily from the US, France, the Netherlands and Switzerland), foundations and trusts (e.g., Rufford, Arcus, Tusk Trust, Bees for Development), international NGOs (WCS, WWF, IUCN, International Primatological Society, International Primate Protection League), and the private sector (e.g., Shell, Disney). Three projects received a token amount of co-funding from community groups. The median annual project budget was USD 33,300/year (Interquartile range (IQR)=USD 87,500), with a median project duration of 3 years (IQR=3.5). Of the 19 case studies, 12 formed a sub-component of a larger project aiming to increase the

Table 2
Case study project summary information

ID	Project title (short)	Country	PA (WDPA code)	Funding period	Annual budget (1,000's USD) and % of wider project for livelihood component	Primary implementing organisation	Alternative livelihood provided	ToC	Conditions and sanctions
1a	Buffer zone delimitation for river and marsh conservation around the Ruvubu River	BDI	Ruvubu (9160)	2010-11 ^a	33 (35%)	LNGO	Goat rearing	1	2
1b	Ruvubu park biodiversity conservation project	BDI	Ruvubu (9160)	2010-11 ^a	33 (30%)	LNGO	Cattle rearing, beekeeping	1	2
2	Community-Based Management and Conservation of Great Apes in South West Cameroon	CMR	Lebialem Highlands Conservation Complex	2010-15 ^a	50 (30%)	NNGO	Beekeeping, agroforestry, community forestry, palm oil refining, improved farm production, village forest protection fund	1	2
3	Promoting Community Wildlife Management in the Southern Bakundu FR	CMR	Bakundu	2008-11 ^a	16 (60%)	NNGO	Pig farming, snail farming, beekeeping, poultry, market gardening	1	4
4	The Lebialem Hunters' Beekeeping Initiative	CMR	Lebialem Highlands	2008-11 ^b	4 (100%)	NNGO	Beekeeping	1	3
5	Maringa-Lopori-Wamba Landscape: Alternative Livelihoods in Conservation	COD	MLW Landscape including PAs	2004-11 ^a	516 (50%)	INGO	Agricultural support, pig farming, chicken farming, improved fish processing	2	3
6	Participatory action against poaching and over-exploitation in the Ituri-Aru landscape	COD	Ituri	2006; 2009-11 ^a	12 (50%)	NNGO (x2)	Duiker domestication, fish farms and chickens	2	2
7	Goat rearing as an alternative to bushmeat hunting in Djolu (MLW landscape)	COD	MLW Landscape including PAs	2009-10 ^a	18 (80%)	LNGO	Goat husbandry	1/2	2
8	Development of alternatives to hunting in Central Africa (DABAC)	GAB CMR COG	None	2002-04 ^c	726 (100%)	INGO	Cane rat farming	3	4
9	pre-DABAC cane rat pilot project (PEPG)	GAB	None	1997-2002	190 (100%)	INGO	Cane rat farming	3	4
10	Alternatives to hunting in the Ibolo-Koudoumou community PA and surrounding villages	COG	Ibolo-Koudoumou	2008-09 ^d	65 (100%)	NNGO	Aquaculture, crocodile farms, livestock and beekeeping	1	4
11a	Pig rearing in Impini Village, Lekana district	COG	None	2009-11a	16 (100%)	LNGO	Pig farming	1	4
11b	Pig rearing in Okiéné Village, Ngo district	COG	None	2010 -(funding delays) ^a	19 100%	LNGO	Pig farming	1	4
12	Contributing to wildlife conservation through cattle rearing, Bouanela	COG	Lac Tele (313494)	2011-12 ^a	21 (100%)	LNGO	Cattle rearing	1	1
13	Developing Livelihood Support Activities (Sustainable Bee Keeping and Grasscutter Rearing) in Kyabobo Park	GHA	Kyabobo (68788)	2010-11 ^a	70 (sub-component)	LNGO	Cane rat farming, beekeeping, marketing training	1	1

Contd...

Table 2
Contd...

ID	Project title (short)	ISO3	PA (WDPA code)	Funding period	Annual budget (1000's USD) and % of wider project for livelihood component	Primary implementing org.	Alternative livelihood provided	ToC	Conditions and sanctions
14	Livelihood Interventions In Support Of Biodiversity Conservation And Management At Nimba Mountain	GIN	Nimba Mountain (1295)	2004-07 ^e ; 2008-11 ^f	44 (35%)	INGO	Cane rat farming, pig rearing, fish farming	1	1/2
15	Conservation of the Tai National Park (TNP)	CIV	Tai National Park	2003-06	139	Research Institute/ University	Fish farming, chicken farming, pig rearing, manioc and maize planting	3	1
16	Biodiversity Action Plan Project for Gelegele and Urhonigbe Forest Reserves In Edo State	NGA	Gelegele and Urhonigbe (20302)	2007-10 ^e	250	NNGO	Agricultural support, improved food processing technology, fish ponds, poultry farming, snailry and rabbitry, micro-credit	1	2
17	Cross River Project	NGA	Cross River (20299)	2009-ongoing	10	INGO	Snail farming, beekeeping	1	1

Notes: A detailed summary for each project is provided in Appendix 5 at <https://data.cifor.org/dataset.xhtml?persistentId=doi:10.17528/CIFOR/DATA.00083>.

Country column full-forms: 1) BDI - Burundi; 2) CMR - Cameroon; 3) COD - The Democratic Republic of Congo; 4) GAB - Gabon; 5) COG - Congo; 6) GHA - Ghana; 7) GNI - Guinea; 8) CIV - Côte d'Ivoire; 9) NGA - Nigeria.

'Funding period' footnotes: a) Project ongoing after end of funding at time of the interview; b) has now been incorporated into the project activities of Project ID 2; c) only Cameroon projects still ongoing; d) project status unknown; e) phase 1 of project; f) phase 2 of project

Levels in the 'ToC' column are as follows: 1) Project assumption is that hunters will switch to the alternative livelihood activity and therefore stop hunting; 2) the project aims to reset past behaviours/help re-establish livelihoods that have been replaced by hunting for some reason; 3) the project aims to provide cheaper domestic meats to consumers so that the demand for wild meat falls.

Levels in the 'Conditions and Sanctions' column are as follows: 1) Conditions and sanctions created by the project; 2) external conditions and sanctions (law enforcement); 3) project conditions, no sanctions; 4) no conditions or sanctions.

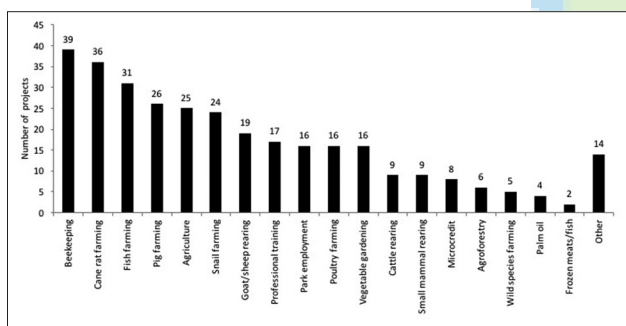


Figure 2

Alternative income and protein activities implemented. The number of times that each type of alternative livelihood was used in the 155 identified projects. The majority of projects used multiple alternatives, hence the total number of reported alternatives does not equal 155. Agriculture includes rice, fruit, nuts, coffee, protein producing crops, soy, beans; professional training includes sewing, tailoring, handicrafts, soap production, shea butter production, baking, and business development; 'Small mammal rearing' includes rabbits, guinea pigs and unspecified mini-livestock; 'Frozen meats/fish' involved providing frozen goods in return for reduced hunting; the category 'Other' includes agro-pastoralism, groundnut oil production, improving infrastructure, sump tree oil production, medical aid, caterpillar farming, unspecified livestock, bamboo processing, plant harvesting and tree replanting

conservation effectiveness of a nearby protected area (PA) ($n=10$), or landscape ($n=2$), with the provision of alternative livelihoods being one activity of several (such as environmental education or improving law enforcement).

Most interviewees (53%) felt that the available budget was inadequate for basic management needs and presented a serious constraint to achieving project aims. A further 16% said it was acceptable but could be improved to fully achieve effective management, and 31% said it met the full needs of the project. Interviewees remarked that most small grants supported core project activities (such as the provision of the alternative) without considering the costs of institutional support (i.e., staff training, veterinary support, business planning). Interviewees also drew attention to short project funding cycles as a constraint, highlighting that technical training, construction of facilities, breeding animals and developing markets for products can take years, and project funding could, therefore, end before projects were self-sustaining or results were perceptible. Some interviewees also felt that donors expected projects to run on rigid timetables and deliverables, which was impractical when working in remote areas under difficult external conditions, and could restrict the ability for project managers to adaptively manage their projects as they progressed.

Project organisations and partners

Projects were generally managed by local ($n=5$) or national ($n=5$) organisations. Only two projects were solely run by an international organisation, while seven were collaborations between different types of organisation (local/national/international).

Most projects employed less than 10 project staff ($n=6$ projects had <5 staff; $n=6$ had 5-10 staff; $n=2$ had 10-20;

$n=1$ had >20 ; staff numbers were unknown for $n=4$ projects). Independent consultants, such as veterinarians or business advisors, provided supporting services for shorter periods of time. Eight projects employed local staff exclusively. The remaining projects hired a mix of local and national staff, with at most one non-national staff member. Several interviewees highlighted that they wanted to contribute to the local economy by employing as many local staff as possible.

Community involvement in project initiation, design, and implementation

Most interviewees (representing 16 projects) reported that they involved the local community in project initiation, design, and implementation. Four projects were self-initiated by local communities, who then asked external organisations for financial and technical assistance. Only three projects reported not involving communities in designing the project or in choosing the alternative; of these, two projects worked in peri-urban areas and sought to train individuals in cane rat farming practices, rather than working with specific communities. All projects, apart from the two peri-urban rearing projects (Projects 8 and 9), operated through community groups; either existing hunter or artisanal groups or groups newly established for the purposes of the project. Several interviewees stressed how the involvement of the community in project design had positively impacted project success:

I think the approach we used was quite innovative, because we actually did not come with a ready cook recipe, and say, okay, stop all this. We actually designed everything with them, and in fact, they were implementing what they agreed, it's always much easier to do it that way, you know? So, doing it from their perspective, rather than our own perspective, has been for me key to what we have achieved today. (Project 14; July 27, 2012)

Project participants

Projects tended to involve few participants (median=110, IQR=429). Interviewees highlighted that the low number of project participants restricted the overall impact on hunting pressure. For example, the project manager of Project 3 in the Southern Bakundu Forest Reserve, Cameroon, which had 76 participants, noted that, "there are people that we are working with directly on these livelihood activities, and these are the people we think we are already reducing their time hunting, but there are a lot more people, many more people, a hundred thousand, that are hunting." (Project 3; July 30, 2012)

Most projects ($n=10$) allowed any community member to join the project. Five projects only allowed hunters (who were typically men) or wild meat traders (typically women) to join. One project allowed both hunters and farmers, and three were restricted to hunters only (of these, two encouraged the major hunters within the community to join the project). Participant selection was reported to influence project impact. For instance, the Lebalem Beekeeping Initiative (Project 4) found that, within their target group of hunters, the project tended to attract more

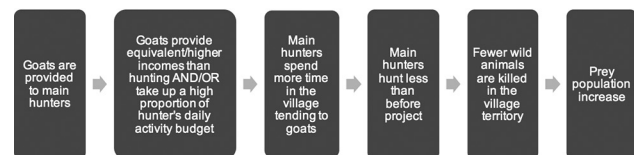


Figure 3

A hypothetical cause and effect assumption chain for a project offering goat rearing as an alternative livelihood option

elderly hunters who were looking for ways to diversify their income as they began to 'retire' from forest work, rather than the more commercial hunters with higher hunting offtakes. Thus, despite targeting hunters, the project may not have reached the participants most likely to reduce pressure on prey populations.

Project theory of change

Most projects ($n=13$; Table 2) were designed around the hypothesis that the chosen livelihood activities would: 1) provide the same level of (or more) income/protein as hunting, which would mean that hunters would no longer need to go hunting; and 2) would require hunters to spend more time on the alternative, leaving them less time to go hunting, thereby reducing their impact on prey species (Figure 3). These projects, therefore, aimed to act as direct substitutions for income/protein provision as well as for time. In addition, many projects formed part of a suite of interventions surrounding a PA, and livelihood projects were set up to compensate local people for reduced forest access following the creation of a PA (e.g., Projects 2 and 16), or increased law enforcement within an existing PA (e.g., Project 1).

Three projects in the DRC aimed to 'reset' past behaviours rather than introduce new ones. In DRC, animal husbandry had been a prominent livelihood activity before the civil war. During the war, however, militia from both sides stole community livestock, leaving herds depleted or non-existent, and communities increased their hunting activity to compensate for such losses. The hypothesis guiding two projects (Project 6 and 7) was, therefore, that if herds were restored, communities would leave the 'safety-net' behaviour of hunting and return to animal husbandry, resulting in a reduction in hunting pressure. For one project (Project 5), the main driver of hunting was the loss of agricultural revenue due to poor market access when roads were impassable. Entire families would then relocate to forest camps to recover lost revenues by selling dried meat, which is more easily transported to market. The theory of change (ToC) for this project was, therefore, that, by providing access to market for agricultural crops (using a river barge), and by increasing agricultural production, the need for families to relocate to hunting camps would be reduced.

Three projects (Projects 8, 9, and 15) aimed to change the behaviour of wild meat consumers, increasing the amount of affordable farmed domestic or 'wild' meat entering the market, and reducing the demand for hunted wild meat. In these cases, the underlying hypothesis was that farmed meat could be produced and sold at a competitive price (and make a profit for producers) and that consumers would change their preferences to farmed meat if the availability and price

of the goods were favourable. Appendix 5 provides details on the ToC for each project (<https://data.cifor.org/dataset.xhtml?persistentId=doi:10.17528/CIFOR/DATA.00083>).

Choice of alternative livelihood activity

Most projects ($n=11$) chose livelihood activities that had already been used to some extent in the project region, while five projects used both existing livelihood activities as well as new ones, and only three projects introduced livelihood activities completely new to the region. Projects that introduced animal husbandry (goat, cow, pig, or chicken rearing) often reported that villagers had frequently already kept livestock, but that it was left to range freely in the village, comprised only a few animals and was not often sold to provide income. Beekeeping projects reported that communities already collected honey, but used methods that resulted in ecological degradation (e.g., felling trees). Therefore, projects mainly aimed to augment existing practices, sometimes by using 'modern' methods, rather than by introducing new livelihoods to the community, and several project managers suggested that using pre-existing activities was more likely to be successful because they did not require new skills, and represented a known livelihood activity:

Gabon wasn't a very favourable environment for [cane rat farming], in the sense that the Gabonese are not naturally livestock rearers, and even less rearers of wildlife. So already it is not an obvious autonomous economic activity for the Gabonese...the reason that it worked very well in Cameroon, is because they are already livestock rearers. They know already about chickens and rabbits, and in this respect the cane rat is just a small modification on something that already exists. (Project 8; July 23, 2012; translated from French)

Interviewees also suggested that offering a range of different activities at the outset could insure against the failure of some of the activities, and that different products could fulfil different roles. For instance, in Burundi, providing beekeeping as well as livestock rearing ensured that participants gained income from the project in the short-term while they were developing their herds: "Beekeeping provided the fastest revenues but, in the long-term, raising goats and cows provided a more relevant impact, because it will help to fertilise the fields, to increase agricultural production, and provide [meat] instead of going poaching." (Project 1; February 5, 2013; translated from French)

Where projects aimed to provide alternative incomes, several interviewees stressed the importance of identifying local, accessible markets for products, and a few projects had indeed conducted market studies before choosing alternatives (Projects 4 and 11). An analysis by Fauna and Flora International (FFI) (2012) of the lessons learned in their alternative livelihood projects in Guinea and Liberia (including Project 14) found that significant economic alternatives to wild meat hunting were seriously limited by the lack of access to markets, prevented largely by the poor state of the roads and little communications infrastructure. Interviewees also mentioned difficulties and

costs involved in transporting materials needed for livestock rearing into remote villages, such as for Project 11 in Impini, ROC, where the cement needed to make pig pens had to be transported from Brazzaville, over 150 miles away.

Remoteness of projects could also limit access to veterinary services, posing difficulties to project sustainability, particularly through diseases. For example, in Bakundu, Cameroon (Project 3), some participants lost all their pigs to swine fever and dropped out of the project. In Taï, Côte d'Ivoire (Project 15), bird flu wiped out the project's entire chicken stocks, and goat herds were reduced by epidemics in Djolu, DRC (Project 7).

Project conditionality and sanctions

Five of the 19 projects had created conditions for participation that called for a reduction or cessation of hunting/sales of wild meat by the participants, with sanctions for breaking these conditions (see Appendix 5 for details of conditions and sanctions for each project: <https://data.cifor.org/dataset.xhtml?persistentId=doi:10.17528/CIFOR/DATA.00083>). For example, participants (hunters or traders) of Project 14 had to sign a Memorandum of Understanding (MOU) committing to no longer hunt or sell wild meat. If participants did not adhere to the conditions, they could be expelled by their group (this decision was made by the group).

A further two projects had created conditions but had no sanctions for breaking the conditions. For instance, hunters joining the Lebialem Hunters' Beekeeping Initiative (Project 4) signed pledges promising not to hunt five primate species but did not enforce sanctions in a bid to maintain good relations with the communities and build trust. The coordinator of this project described how the provision of alternatives may not lead to a reduction in hunting without applying conditions or monitoring compliance:

Even if you do as much as possible to get the level of income comparable with wild meat hunting, there's always that possibility that they're [the hunters are] going to do both...It's never going to happen [reduction in hunting] without compliance...It was based on goodwill since we didn't have a law enforcement component at the time. Until you have that [enforcement] there's always a tenuous link between goodwill and action. (Project 4; January 31, 2013)

Twelve projects had no project conditions or sanctions. Of these, seven projects reported that hunting was already sanctioned by existing hunting laws, often within neighbouring PAs (i.e., hunters caught breaking national hunting laws/hunting in the PA would be prosecuted – the projects were often set up as a way of compensating for a lack of access to wildlife). The other five projects had no internal or external conditions or sanctions, including the two peri-urban cane-rat rearing projects, which did not aim to directly influence hunter behaviour but rather to reduce urban demand for wild meat.

Project sustainability

Most interviewees reported that the project had taken measures towards building sustainability, transferring

management responsibilities to local stakeholders to strengthen local ownership. Fourteen projects reported to have given local stakeholders, including groups, associations, and organisations, full project management responsibilities, often from the start of the project but at the latest by project close. At the time of the interviews, three of the still ongoing projects had plans for future handovers, while only one project had closed with no handover, and one was unknown. Several projects tried to integrate additional sustainability enhancing mechanisms into the project design. Project 2, for example, was in the process of developing a Forest Protection Fund to support village conservation committees and provide micro-credit loans to villagers, in which the community would have 70% control of the fund, and the overseeing NGO 30%. Furthermore, Projects 3 and 7 used a 'pass the piglet/goat' scheme, in which farmers who had been given livestock by the project passed one of their new litter onto a new participant, thereby expanding the scheme. However, success of this scheme had been limited by livestock mortality and unwillingness by participants to share livestock. Project 1 provided participants with both a quickly reproducing species, such as pigs, as well as a slowly reproducing species, such as cows, for them to benefit from the former more immediately while waiting for the latter, which is more profitable, to become better established, thereby promoting both short- and long-term sustainability strategies.

Project monitoring

Over half ($n=10$) of projects had collected some form of baseline social or ecological information. However, only Projects 2 and 4 had documented their findings, either as reports or peer-reviewed articles (Nkemnyi et al. 2011; Wright and Priston 2010). Eight projects collected some socio-economic data, including on the reasons for hunting and hunting offtakes ($n=6$), household livelihoods and income levels ($n=6$), village governance systems ($n=2$), and bushmeat market surveys ($n=2$). In several cases, these baseline studies informed project design; for instance, in the case of Project 4, baseline data on hunting drivers highlighted that people hunted mainly for income rather than for food, and income alternatives were therefore chosen. Baseline ecological surveys were available for five projects, all of which were conducted as part of PA monitoring. A further four projects had access to ecological surveys that had been conducted when adjacent PAs were created, often around a decade before.

Of the 19 projects evaluated, all but one project had collected data on project implementation, process and outputs, such as the number of project participants, the number of training events/participants in training events, and the number of livestock/beehives, etc., distributed and currently owned. In comparison, very few projects measured their outcomes (Figure 4, Table 2), and only one project (Project 2) had evaluated outcomes for both the conservation (conserving target species/reducing hunting effort) and development (improving livelihoods) aims of the project. None of the projects had published their monitoring results.

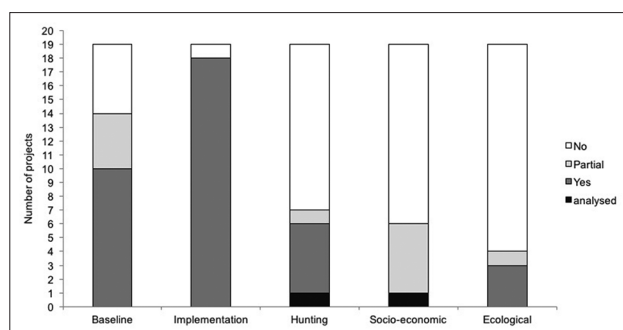


Figure 4

Number of projects conducting different types of monitoring activities. 'Baseline' refers to projects that collected socio-economic and/or ecological data prior to project design and implementation. 'Implementation' refers to the number of projects measuring indicators of their activities (e.g. number of livestock provided, number of participants, etc.). Partial monitoring means that few elements were measured, or that very simple indicators were used. Ecological monitoring includes two projects that monitored data pertaining to wild meat and one project that monitored agricultural encroachment

Most projects ($n=12$) did not monitor changes in hunting effort (Figure 4, Table 2). Of those that did, most used local law enforcement records (i.e., hunters caught within the PA) or encounter rates of 'hunting sign' by law enforcement patrols (e.g., number of snares, gun cartridges, hunting camps) as an indicator of change in hunting effort ($n=5$ projects). Other indicators included local market sales of wild meat or local observations of participants by project staff to estimate whether hunting effort was increasing or decreasing. Only one project had analysed monitoring results to provide a quantitative estimate of change in hunting effort; the Biodiversity Action Plan Project for Gelele and Urhonigbe Forest Reserves in Nigeria (Project 16) estimated that over the lifetime of the project (2007-2010) there had been a 3% reduction in hunting sign within the Reserves.

Project 16 was also the only project that had evaluated changes in incomes for project participants, finding a 7% increase in participant incomes over the three-year lifetime of the project. Two projects (Projects 2 and 4) had collected baseline data on incomes and other socio-economic measures, and intended to conduct repeat sampling but had not yet done so at the time of the interview. A further two projects (Projects 1 and 13) had recorded observational data, including the number of households making a profit from livelihood activities, the number of households repairing their roofs, or the number of children attending school.

Three projects measured changes in ecological indicators pertaining to hunting: Project 2 used camera trapping to monitor changes in target species (apes and monkeys); and Project 14 used ecological line transects. However, none had analysed their results at the time of interview. None of the projects had collected data that could theoretically be used to assess project impact (i.e., the extent to which the outcomes can be attributed to the project intervention, rather than to external drivers; Ferraro and Pattanayak 2006).

Many interviewees acknowledged the importance of monitoring, and that they would have liked to conduct more

in-depth project monitoring, but given the small-scale projects, the available time and budget was insufficient: “When you look at the Ituri forest area, you will see that, with the slice of money that we have, you cannot perform monitoring of an activity as complex as wild meat hunting...You just can’t do it.” (Project 6, July 25, 2012; translated from French)

The project impact is...an ongoing process. In a two, three-year project, you’re not really talking of impact, because of the time needed to establish things... It’s feasible, but you need time. You take one year to establish baseline, another year or two to establish a management system, so you can really be talking of impact from the fourth year. (Project 14; July 27, 2013)

I think one of the key problems that I should have highlighted is the fact that we have not been able to capture the real impact, in terms of wildlife populations, that the project is aiming to achieve...if we were able to give baseline information on wildlife issues, or on population issues, then after the project, we could to go back again and review it...and [the project funder] has not got the opportunity and capacity to do that. (Project 3; July 30, 2012)

Project outcomes and impacts

Although only one project had analysed both livelihood and hunting outcomes, most interviewees felt that project participants had experienced livelihood benefits and reduced their hunting effort, but that they could not gauge the ecological outcomes of their projects (Figure 5. Details of perceived and measured outcomes are provided in Table 3). In some cases, interviewees suggested that, although they perceived their

projects to have only created marginal increases in household incomes, at the right time of year and/or in communities where incomes are generally low, project incomes could still have important positive impacts on participants’ livelihoods:

The key thing that these livelihood activities are doing is to break the poverty cycle, because in our area, we have two main cash crops. We have cocoa and coffee, [and] during the cocoa season, the local communities have some little money, but outside these two seasons, they don’t have anything. So, it completes the cycle of income generation. It might be very small...we have places where people need money to help with school for their children, and we also have places where a group has sold a piglet and they bought maize seeds. (Project 3; July 30, 2012).

Project managers also suggested that the existence of the project, even in the absence of tangible ecological outcomes from the provision of alternative livelihoods, could have a positive conservation impact by increasing communication and trust between local communities and conservation practitioners:

...because conservation is not always popular in villages, not in all communities. They’re saying, well, you know, we’ve given up our forests, we’ve given up this access to bushmeat, what’s going to be the return? It’s [the alternative livelihood project] useful in that respect just as a kind of a PR exercise. (Project 17; July 30, 2012)

However, other interviewees stressed that, as many projects are small-scale (and low-budget) with a low number of participants, project outcomes can often be dwarfed by external factors, such as the continuation of hunting by other hunters in the community and wider area, or larger external threats such as organised poaching gangs, which require state-level intervention:

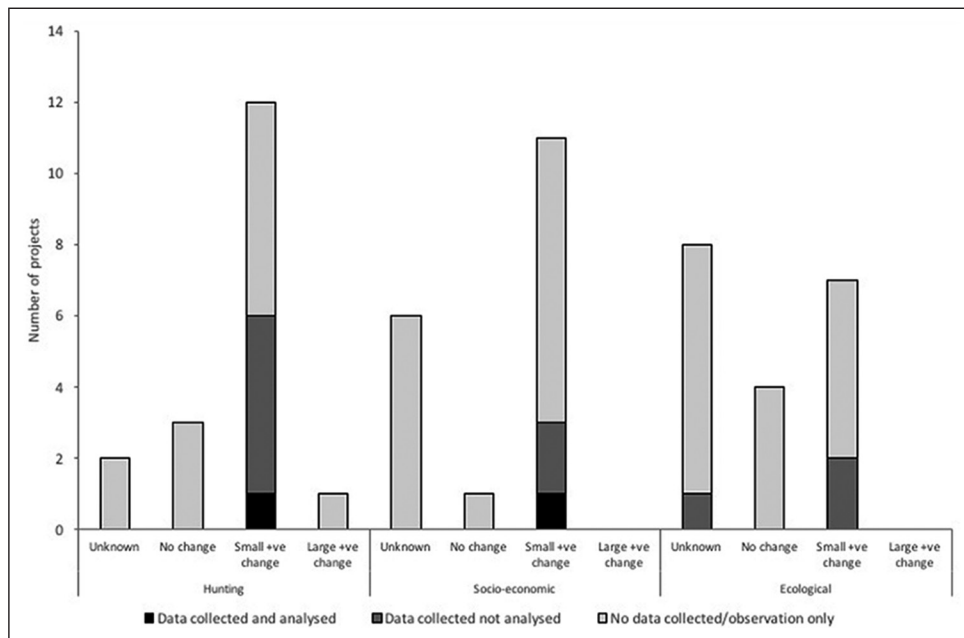


Figure 5
Reported project outcomes. Further information on monitoring and outcomes for each project is provided in Table 3 and Appendix 5

It is not the [little community members] who wake up in the morning with their spears to go out and hunt the elephant. No. It is the large resources that are made available, especially in the context of our region, by the military authorities, the generals and the army colonels, who send out people to do this work... Therefore, the problem of hunting and overexploitation in our area is a problem that needs to be addressed not only at the community level, but above all, at the state level. (Project 6; July 25, 2012; translated from French)

Although the project manager interviews provided useful insights into the factors they felt influenced project success, overall, a lack of project monitoring, data analysis, and reporting prevented any meaningful analysis of project outcomes or impacts by this study.

DISCUSSION

The provision of alternative livelihoods is a commonly applied strategy for reducing hunting pressure at a local level (Van Vliet 2011), and since the 1990s, such interventions have multiplied across West and Central Africa. This study identified 155 projects within the region, with the largest number in Ghana, the DRC, Cameroon, and the ROC, possibly because these countries have the legal structures in place that allow for decentralised land management and the creation of legal community groups (Roe et al. 2009). A great variety of alternative livelihood activities have been tried (Figure 2), most frequently using beekeeping, cane rat farming, livestock rearing, and fish farming.

Despite this proliferation, we found little evidence as to whether alternative livelihood approaches have been effective. While all but one of the 19 case-study projects measured their inputs (e.g., budgets, staff, and equipment) and outputs (e.g., the number of individuals trained, the number of participants, the number of livestock bought and distributed), outcome monitoring was lacking or data had not been analysed. Few projects had collected data that could be used to robustly assess changes in livelihoods, hunting activity or wildlife populations, and only one project had analysed their data. There was no evidence that any of the projects had compared measures of project outcomes to suitable controls, thereby evaluating project impact (e.g., Clements et al. 2015).

Interviewees were aware of the importance of monitoring outcomes and impact, and attributed the lack of monitoring to time and budget constraints. In addition, the perception of a need for complexity in the design of a monitoring programme, combined with a lack of training, may also be barriers to effective monitoring. However, evaluating the socio-economic impacts of alternative livelihood projects need not be costly or complicated, and existing rapid-assessment toolkits could be easily adapted without the need for a large amount of additional funding. For example, the PROFOR-IUCN forest-poverty toolkit (PROFOR-IUCN 2012) describes lost-cost, simple, and rapid (one- to two-day) participatory methodologies,

using local indicators, which could be customised to measure changes in livelihood activities and well-being over time, and following this study, has begun to field test an adapted version aimed at understanding the impacts of alternative livelihood projects, using participant and non-participant interviews (Gill Shephard pers. Comm. 2016). Similarly, Woodhouse et al. (2016) provide guiding principles for evaluating impacts of conservation interventions on well-being in which they emphasise the need for the participatory development of a ToC for the intervention, and the selection of multiple indicators of project outcomes that are based on local priorities and the intervention ToC. A measure of project socio-economic impact, as well as outcomes, could be achieved by measuring indicators for non-participants (a matched control group) in addition to participants, thereby allowing for comparison of changes over time between the two groups.

Both methodologies highlight the importance of developing indicators in participation with local stakeholders, who hold highly contextual knowledge, and may well consider potential consequences and unintended changes that would not otherwise be addressed. The use of locally relevant indicators was likewise advocated by our project interviewees, who mentioned multiple ways in which projects might provide a benefit to participants that would not be captured by simply quantifying the change in overall household income, such as bridging the gap between agricultural harvest incomes, providing a safety net for when crops fail, increasing school attendance, and creating lines of communication between conservationists and communities. Several case-study projects had collected observational data on these types of outcome indicators, but not as part of a devised methodology that could be used to robustly evaluate project outcomes and impact.

Methods for measuring ecological outcomes and impact are more complex, generally requiring high levels of expertise, time, and financing (e.g., line transect surveys, camera-trapping). It is unrealistic to ask all small projects to set up their own ecological transect surveys, and linkages with nearby conservation programmes with monitoring already underway may provide a solution, albeit one which does not allow for the impact of the alternative livelihoods project to be disentangled from that of surrounding conservation interventions. An alternative to measuring ecological outcomes is to measure changes in hunting effort as a proxy, assuming that a reduction in hunting effort will lead to positive ecological outcomes. However, repeat transect surveys of hunting sign (such as snare counts and shotgun pellets) may again be cost-prohibitive and overly complex for small projects. Hunter self-reporting can provide a cheaper alternative, and although hunters may be unwilling to report on hunting activity where such activity is penalised by the project or local authorities, using anonymous questionnaires and/or random response techniques to keep responses confidential may help (Nuno et al. 2014; Thomas et al. 2015).

Notwithstanding these constraints, it is critical that the conservation performance of alternative livelihood projects be field-tested. While individual projects can suffer from low

levels of funding, the 19 case-study projects represented a total conservation investment of USD 2.2 million/year, of which the ecological impact is unknown. Although most projects aim to provide a livelihood benefit to participants, their principal aim is biodiversity conservation. What we measure affects what we do (Stiglitz et al. 2009), and if projects only monitor what can easily be measured, they may focus on achieving their secondary development aims, under the untested assumption that these livelihood benefits will translate into biodiversity benefits. While ecological monitoring will not be possible for all projects, comprehensive monitoring of socio-economic and ecological impacts in selected projects, representing a range of alternative livelihood strategies, would provide essential information on the biodiversity gains that we might expect from such projects.

CONCLUSION

International donors can play a key role in ensuring that the alternative livelihood model is systematically tested, and that individual project managers have adequate capacity to adaptively manage their projects. Project funding should be made contingent on a realistic plan for simple but well-designed project monitoring, and a specific section of the project budget should be set aside for outcome and, where feasible, impact monitoring. Donors need to allow for longer project timeframes to allow for such monitoring to take place. Donors could also provide in-country training for project managers on existing participatory monitoring techniques and assist in tailoring these to fit the local context where needed. A standardised monitoring approach would provide donors with an evidence base on the impact of their funding, which could then be used to identify successful interventions and target future funding.

Although the lack of monitoring by these case-study projects limits any analysis of factors influencing project success, the design and implementation of the case-study projects can be compared with agreed best practice, as described by the ICDP literature (Table 1). We provide the following recommendations for improved project design and implementation, derived from the findings of this study:

Projects should be designed and implemented in collaboration with local communities and national/local organisations. Projects are more likely to succeed if local communities participate meaningfully in project design and planning, and if projects are developed within a local/national context. Interviewee responses suggest that many project managers understood, and were taking into consideration, the need for community consultation and meaningful participation in project design and management to increase ownership and community empowerment. Encouragingly, nearly all the 19 case-study projects were implemented by local groups and organisations or by national NGOs. However, participant interviews are needed to obtain a true gauge of levels of participation as well as to get a more detailed picture of the structure and use of community groups and committees.

Project funding cycles should be longer to increase project sustainability. Most case-study projects had low budgets and short funding cycles, which were factors highlighted by interviewees and previous studies (e.g., Balmford and Whitten 2003; and Blom et al. 2010) as major constraints on project implementation and potential impacts. Longer-term funding (e.g., over 5 years, rather than 1-2 years) would provide a more realistic timeframe for manager and participant training, community uptake, livelihood activity development and project handover. The small-scale nature of alternative livelihood projects was highlighted by interviewees as a crucial factor in restricting project impact, with the impacts of non-participant hunters in a community or landscape outweighing any reduction in hunting by participants.

Interventions should be based on an understanding of the main drivers and agents of illegal hunting, and the wider social and economic context of the area. While some projects used baseline studies to inform study design, half of the case-study projects did not collect baseline data on the cultural, economic and ecological context of the area in which they were working. Interviewees highlighted that the potential for a project to reduce hunting pressure in a landscape could be seriously jeopardised by circumstances outside the project's control. For instance, in many countries in West and Central Africa, large mammal hunting is often carried out by 'external' commercial hunters with no ties to local villages (Abernathy et al. 2013; Duffy and St John 2013). In these cases, decreasing hunting pressure within one local community will have minimal impact on overall hunting pressure, and strengthened government enforcement capacity is required. Similarly, offered alternatives need to not only provide a suitable substitute for hunting revenues, but also compete with other available income streams in the surrounding area. An example is provided by the Bili Coffee project (see project database, Appendix 4: <https://data.cifor.org/dataset.xhtml?persistentId=doi:10.17528/CIFOR/DATA.00083>). In this case, project managers offered communities in CAR a premium price for sustainably-farmed coffee beans, if they agreed to stop hunting. The agreement collapsed when a gold mine was opened nearby, and coffee farming was no longer lucrative enough to provide an incentive to stop hunting.

Projects should be based on ToC, developed in collaboration with local communities, and ToC assumptions tested. Most of the case-study projects had chosen activities that they felt had the potential to provide the same amount of protein/income as hunting and hypothesised that participants would switch from hunting to the alternative (a substitutional activity). In the case of alternatives such as livestock rearing or beekeeping, which require minimal daily time commitments, this may be a false assumption. For low-income households, substituting one income for another, rather than investing time in both and increasing available income sources, might seem a poor strategy. In this situation, offered alternatives risk becoming an additional activity, rather than a substitutional one (Wright et al. 2016). In our case-study projects, ToC assumptions were

not being monitored and, therefore, project managers could not know whether the offered alternative livelihoods were acting as substitutional or additional activities to hunting.

Projects should include clear conditions and enforceable sanctions. Where there is the potential for an alternative livelihood to be used as an additional activity rather than a substitutional one, the application of locally-agreed and appropriate project conditions and sanctions can be critical in ensuring the conservation aims of the project are achieved (Blom et al. 2010). However, nearly 70% of case-study projects had no conditions or sanctions. The most widely used sanction was the application of existing hunting regulations, assuming state enforcement of national PA and hunting laws. In practice, however, many countries in the West and Central African region have extremely low capacity for enforcement of forestry and wildlife laws (Roe et al. 2009) and local knowledge of the (often overly-complex) hunting laws can be low (e.g., King 2014). Under these conditions, with low risk of being penalised, project participants may well continue to hunt. As one project manager explained, applying national laws as conditions can also have unintended negative consequences where projects are too small to provide livelihood benefits to all villagers as national laws are applied over the entire population: “We can’t be too hard on people, because we haven’t been able to equip everybody [with alternatives] [...] If we penalise [villagers who have not been given an alternative], it’s as if we are sending them to die.” (Project 7; July 29, 2012; translated from French)

Project participants should be selected with the project ToC in mind. Most case-study projects used a non-targeted approach to participant selection, allowing all community members to engage in project activities. However, the members of the community choosing to engage in alternative livelihood activities may not necessarily be those engaging in the behaviour that the project aims to change (e.g., hunting). Cultural norms and individual motivations will influence which community members participate in an activity, and throughout much of Central Africa mini-livestock rearing (e.g., chickens, cane-rats) is often a women’s activity (Hardouin et al. 2003; Thorton et al. 2003). The introduction of such activities to a household, while potentially providing livelihood benefits may, therefore, have little impact on the hunting behaviour of household men. A few individuals within a community can often be responsible for most of a village’s hunting offtake (Coad et al. 2013), and projects to reduce village hunting effort should target these individuals, ensuring that the benefits of the project are commensurate with their gains from hunting.

Alternatives should be locally relevant, and market analyses should be conducted for alternative income generating activities. Encouragingly, most case-study projects had chosen alternative livelihoods that were pre-existing in communities, increasing the likelihood of uptake and success. A clear example of the importance of choosing locally-relevant activities was provided by the relative success of the DABAC project in Cameroon, and other cane-rat rearing projects in West Africa (Adedapo et al. 2013), where participants are used to raising mini-livestock and wildlife has already been

depleted, hence profits from hunting are low and livelihoods are diversified (Schulte-Herbrüggen et al. 2013). In comparison, cane rat rearing was unsuccessful in other Central African countries where participants did not have a history of livestock rearing, and wildlife was much easier to come by. Of the 155 projects identified, 83% aimed to provide an alternative income source, and access to markets was highlighted as an important component of project success by several the case-study interviewees. In remote, rural, forested areas in West and Central Africa, transport systems have a major impact on the price of commodities, and costs may vary seasonally, such as during the rainy season when roads become virtually impassable. More in-depth and structured business planning is generally needed in the feasibility-assessment stage of alternative livelihood projects (factoring in market demand, access and transportation costs when estimating potential incomes), and supporting business and entrepreneurial services should be provided throughout the project to strengthen long-term sustainability.

Our analysis of case-study projects highlighted that, while international, national, and local project managers were working diligently with local communities to provide alternatives to hunting, important project design features likely to influence project success were often missing and monitoring was rare. Donor organisations (themselves under pressure to demonstrate funding impact) are well-placed to start addressing such shortcomings by providing appropriate funding models and the technical training and support needed for adequate project design, monitoring and subsequent adaptive management. Only with such changes in place can we begin to understand the ecological and social impacts of alternative livelihoods projects, and create the evidence base needed to develop more targeted, effective and equitable conservation efforts in the future.

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Table 3
Project outcomes

ID	Hunting outcomes	Socio-economic outcomes	Ecological outcomes
1 (a&b)	<p>Data: Local authority data on poaching levels; information on local sales of wild meat. Project managers were in the process of compiling the information.</p> <p>Findings: No available reports/analyses to date. Interviewee reported that initial data seemed to indicate a reduction in hunting.</p>	<p>Data: Incomes attained by participants from goats, cows and beekeeping; observations from 2-3 monthly project monitoring visits (e.g., noted increase in number of children going to school).</p> <p>Findings: No available reports/analyses to date. Interviewee reported minor increases in revenue from goat rearing, but said it would take longer to become profitable. Beekeeping has increased participants' income, and school attendance has increased for participants' families. As the number of cows has increased, participants have started giving calves to new members, which may allude to their improved financial situation. Project impact could not be properly evaluated in 3 years, but may show more long-term benefits.</p>	<p>Data: No monitoring. The projects were not able to perform ecological monitoring due to insufficient resources (financial and technical).</p>
2	<p>Data: Observational data (not using organised questionnaire) recorded during monthly project monitoring on whether hunting has increased or decreased. Original baseline surveys collected transect data on hunting and human sign.</p> <p>Findings: No available reports/analyses to date. The interviewee reported that hunting of protected species (project focus) was decreasing/reduced to zero within the protected landscape.</p>	<p>Data: Baseline data collected at the beginning of the project. Follow-up was planned for 2012 (not started at time of interview) to evaluate changes in incomes.</p> <p>Findings: No available reports/analyses to date. The interviewee suggested that the project resulted in increased family incomes, through increased agricultural yields and increased livestock holdings.</p>	<p>Data: Camera trapping within the protected landscape for chimps and gorillas (target species).</p> <p>Findings: Data has not yet been analysed, but the interviewee reported that they were obtaining photos of chimpanzees with offspring, and that the camera-trapping photos were suggestive of ecological recovery.</p>
3	<p>Data: No monitoring.</p> <p>Findings: Interviewee believed project participants reduced hunting levels, but many others (100s) in the area continued to hunt.</p>	<p>Data: No monitoring.</p> <p>Findings: Interviewee reported that farmers seemed invested in the project. Incomes were being re-invested in the project and were used to pay school fees.</p>	<p>Data: No monitoring.</p> <p>Findings: No observations.</p>
4	<p>Data: No monitoring.</p> <p>Findings: The interviewee thought it probable that participants were both hunting and beekeeping. Interviews and informal discussions suggested that the hunting of gorillas and chimpanzees had reduced due to the combined effort of all ERuDeF's community engagement activities (Project 2).</p>	<p>Data: Collected socio-economic data from participants on a yearly basis during implementation (4 years) but no follow up after this.</p> <p>Findings: No available reports/analyses to date. By the end of the project, 50% of the hunters originally involved in training had stopped beekeeping; however, many hunters who continued with beekeeping had constructed additional hives. Few hunters were producing enough honey to satisfy the consumption demands of their extended families, and hunters were expressing concern over the levels of market demand for the product.</p>	<p>Data: No monitoring.</p> <p>Findings: Camera-trapping in the same region carried out by Project 2 suggested recovery of key species, but interviewee believed that this was a result of a suite of activities across the region, rather than the alternative livelihood activity alone.</p>
5	<p>Data: No monitoring.</p> <p>Findings: Interviewee reported that only a few communities were involved so overall hunting levels would be the same as pre-project.</p>	<p>Data: No monitoring.</p> <p>Findings: Interviewee reported that other communities want to join the project.</p>	<p>Data: Within the reserve, the populations of target species are being monitored. The University of Maryland is monitoring agricultural encroachment using remote sensing techniques.</p> <p>Findings: No available reports/analyses to date. Interviewee reported that he was seeing many more animals in the PA.</p>

Table 3
Contd...

ID	Hunting outcomes	Socio-economic outcomes	Ecological outcomes
6	Data: No monitoring. Findings: Local informants were unable to say whether hunting had decreased, but stated that awareness of the hunting laws had increased. There might be project impact on small-bodied animals but hunting of large-bodied animals is carried out by contractors/the military, not villagers.	Data: No monitoring. Findings: Interviewee believed incomes had increased in the area, but was unable to say that it was due to the project as there are other interventions in place addressing similar issues.	Data: No monitoring. Findings: None.
7	Data: No monitoring. Findings: Interviewee suggested that there had been a decrease in wild meat market sales and an increase in domestic meat sales, but that the project only worked with a small number of hunters (in 3 of 30 <i>groupements</i>), so most hunters in the area were still hunting. Hunters also still hunting during the caterpillar season.	Data: No monitoring. Findings: Interviewee suggested that the community is so poor after the civil war in COD that small increases in income make a significant difference.	Data: No monitoring. Findings: Interviewee suggested local increase in wildlife around the village, but said that the project was too small to make a difference in the surrounding forests.
8	Data: No monitoring. Findings: No impacts on hunting. This was not the focus of the project.	Data: No monitoring. Findings: Interviewee believed there had been little benefit to participants in Gabon and Congo; rearing of cane rats had some potential in Cameroon.	Data: No monitoring. Findings: No impact due to insignificant amount of cane rats reared compared to the amount of wild meat hunted and sold.
9	Data: No monitoring. Findings: Technical pilot project.	Data: No monitoring. Findings: Technical pilot project.	Data: No monitoring. Findings: Technical pilot project.
10	Data: No monitoring. Findings: Interviewee did not know.	Data: No monitoring. Findings: Interviewee did not know.	Data: No monitoring. Findings: Interviewee did not know.
11 (a&b)	Data: No monitoring. Findings: Interviewee suggested that a separate WCS project monitoring hunting in the area found reductions in hunting. No reports/analyses are available.	Data: No monitoring. Findings: Interviewee suggested it was too early to evaluate whether there has been impact.	Data: No monitoring. Findings: Interviewee suggested impact was unlikely.
12	Data: No monitoring. Findings: Interviewee's personal observations were that there were less shotgun cartridges found in the forest, and there was greater awareness of hunting laws.	Data: No monitoring. Findings: Interviewee suggests 1 year is too short a time to see impacts.	Data: No monitoring. WCS have carried out ecological surveys in the Lac Tele region since 2004. Findings: Interviewee believed that there had been an increase in buffalo in the area.
13	Data: Local authority poaching arrest records. Findings: Interviewee believed that the low numbers of poachers caught since 2010 (2005-09: 26 arrests; 2010: 1 arrest) reflected a reduction in hunting pressure in the PA. Interviewee believed that hunters preferred the project livelihood activities to gun hunting at night, because this was dangerous.	Data: Observational data. Findings: Interviewee reported that city residents were coming to the villages to buy honey. Young farmers and other residents had begun beekeeping on their own accord because of the perceived benefits of the project. Increased number of families sending their children to school. Families were upgrading the roofs of their houses (indicators of increased wealth).	Data: Observational data. Findings: No bushfires (fire drives are traditionally used to hunt) since the beginning of the project. However, it was unclear how often bushfires had been observed in the past.
14	Data: Weekly data collected on the amount of wild meat entering the local market and the main species traded. Findings: No available reports/analyses to date. Interviewee reported a drop in volumes of local trade, but noted that it was still too early to evaluate impacts.	Data: No monitoring. At the end of the project, socio-economic indicators were added to project monitoring. Findings: Interviewee reported increased local participation in the project and continued involvement by original members. Other donor organizations were interested in replicating the project.	Data: Baseline data collected. Regularly monitored permanent line transects to determine relative abundance of a range of species. Findings: Some species had been observed to increase, and other (e.g., chimpanzee) to decline. Declines thought to be mainly due to habitat encroachment rather than hunting. Too early to evaluate impacts.

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Table 3
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ID	Hunting outcomes	Socio-economic outcomes	Ecological outcomes
15	Data: No monitoring. Findings: Interviewee felt that there had been a reduction of hunting in the park, but mainly because of park rangers and staff returning to the park after the civil conflict; it is hard to separate out the effects of park management and the alternative livelihoods component. He observed that during the project local restaurants started serving more chicken and fish and less wild meat, and young hunters involved in the project changed their mentality in relation to poaching. Two years after the project, probably no impact.	Data: No monitoring. Findings: Interviewee suggested that up until 2 years after funding ended, the activities did have an impact on increasing participants' revenues. After this period, the groups/ associations stopped functioning and manioc planting continued on an individual basis only, and continued to make real profits (they were given a pest resistant crop which has proven effective). However, its planting was no longer linked to conservation.	Data: No monitoring. Findings: No observations.
16	Data: Patrol data on hunter sign and seizures. Findings: No available reports/analyses to date. Hunting sign in in both reserves reduced by 3% during the project lifetime. The project manager added that hunter participants continued hunting as they liked the bush and preferred the meat derived therefrom.	Data: Household incomes of project participants. Findings: No available reports/analyses to date. Income levels of beneficiaries increased by about 7% since the commencement of the livelihood programme of the project. The project manager believed it takes time for people to learn and adopt new activities. Fish farming was the only successful activity. Livestock was not successful as participants simply ate the stock provided rather than breeding it.	Data: No monitoring. Findings: The interviewee did not think there had been an impact.
17	Data: Patrol data on hunting sign (wire snares, cartridges, gunshots, arrests). Findings: No available reports/analyses to date. No change in the high levels of hunting in the PA. The interviewer believed that hunters participating in the project may have reduced their hunting effort slightly.	Data: No monitoring. Findings: The interviewee believed that rural incomes were low, therefore, small increases in income could have an impact on livelihoods. The amount of money gained by the participants was small, but the interviewee thought that at the rural level, this increase could be considered significant.	Data: No monitoring. Findings: Unsure if target species (gorilla) had increased or decreased - gorilla numbers very hard to monitor.
Summary of outcomes	Monitored: 7/19 projects Law enforcement records: 5 Market data: 3 Observation: 1	Monitored: 6/19 projects Household incomes: 5 Observation of poverty indicators: 3	Monitored: 4/19 projects Camera trapping/line transects: 3 Fire incidence: 1

Notes: Further information on monitoring and outcomes for each project is provided in Appendix 5 at <https://data.cifor.org/dataset.xhtml?persistentId=doi:10.17528/CIFOR/DATA.00083>

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