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Evidence for Enquiry on Animals Abroad Bill

Background

I am in the final-year of my PhD research through the London NERC Doctoral Training Partnership. I am based between University College London Anthropology and the Institute of Zoology, Zoological Society of London. My project aims to examine the social and ecological impacts of trophy hunting in Africa. For this work I have conducted a systematic map and narrative review of existing evidence on trophy hunting in Africa, focussing on its social and ecological impacts. I have also conducted a case study looking into the impacts of the 2014-2019 hunting moratorium in Botswana based on six months of ethnographic fieldwork in the country in 2019. I have a partnership with the International Institute for Environment and Development to improve the policy outputs of the work, and a collaboration with the University of Botswana for local insight and legitimacy.

This work is currently unpublished (the systematic map & review) and preliminary (case study on Botswana), but I consider both pieces of work to be highly relevant to this inquiry, providing evidence on questions 1-3 of the Call for Evidence.

Summary of work

The first piece of work, a combination of results from a systematic map and review, explores the evidence available on the impacts that trophy hunting is having in sub-Saharan Africa. At least one piece of evidence on trophy hunting impacts was found for 24 African countries, although much of the evidence was from southern Africa and Tanzania. A key finding is that outcomes of trophy hunting, and the contexts under which they arise, are very varied. In some cases trophy hunting has led to wildlife population increases, land being set aside for wildlife, community welfare and livelihoods being improved, and community attitudes towards wildlife improving. In other areas, trophy hunting, typically in conjunction with other mortality sources like illegal wild meat hunting or retaliatory killing, has contributed to local declines in some wildlife species, and is not the preferred land use option of local communities who benefit little from the activity. To me, this suggests a broad-brush approach, like a continent wide trophy-import/complete ban is unsuitable, predominantly, because it will detriment the places where trophy hunting is achieving positive outcomes for people and wildlife. Further, in the areas where trophy hunting's contributions to conservation are less clear, it is far from guaranteed that such restrictions would improve the prospects of the wildlife, given the other pressures they face. It is also likely that, unless more land and resource-use rights are given to communities, whatever replaces trophy hunting will bring similarly few benefits to local communities. Improved hunting governance (e.g. quota setting, wildlife regulations, community participation, etc), devolution of land and resource rights to communities, more equitable community participation in decision-making, and more extensive and equitable distribution of trophy hunting's revenue and other outputs, would likely improve social and ecological outcomes of the activity. The UK government would do more for both people and wildlife by supporting countries in taking such steps than restricting their options on how they achieve equitable conservation, e.g. by limiting the viability of trophy hunting.

The second piece of work, the case study on the impacts of the hunting moratorium in Botswana, shows some of the possible unintended consequences of banning trophy hunting. Over the course of six months ethnographic fieldwork, I interviewed over 100 local Batswana, and held focus group discussions with a further 150 people. Of those I interviewed, 95% thought the trophy hunting

moratorium had negatively affected their lives, was a bad decision, or that it should be reversed. The most widespread impacts were a loss of meat (with impacts on food security), a loss of jobs, and the loss of animal control (with impacts on food security, safety, and freedom of movement). Considerable discontent was also caused by the nature in which the moratorium was instigated: without community consultation (loss of empowerment and autonomy). Any decisions the UK, or another foreign country, takes which affect conservation decisions in another country ultimately limits that country's decision-making power. This would most likely result in further disenfranchising the voices of already marginalised local rural people in decision-making which deeply affects them. Such moves are not only unfair, but they also represent a means of indirect political control over conservation decisions in other countries, and are perpetuating unjust and exclusive conservation.

While the UK's trophy hunting footprint is quite small and a decision to ban trophy imports might not have large on the ground consequences, such a decision could potentially have knock on effects to countries with more significant numbers of hunting clients, e.g. the United States of America. Ultimately, making such a decision in the UK reinforces unequal power dynamics that are too often in play in conservation and takes the decision away from those on the ground who will be most impacted by it. We (in the UK) do not have to deal with the consequences of living alongside dangerous animals, therefore it should not be up to us to decide how they are managed in other countries.

1) Findings from the map and review into the social and ecological impacts of trophy hunting in Africa.

I would like to re-iterate that this work is currently unpublished, though is in preparation for peer-reviewed publication and will form part of my Doctoral Thesis.

Introduction & methods

Trophy hunting in Africa takes place under a wide range of conditions and so has diverse effects on the people and ecosystems involved. I conducted a systematic map and narrative review of the available evidence on the outcomes trophy hunting can generate, and the contexts under which they arise, to help understand where and how trophy hunting is having positive impacts.

One hundred and eighty-eight studies from twenty-four countries were included in the systematic map and eighty-five of these studies from twelve countries were included in the review. Studies were found by doing a comprehensive search of Thomas Reuter's Web of Science, SciVerse's Scopus, and Google Scholar (www.scholar.google.com) to get an unbiased sample of the literature. Studies were only included if they met key criteria including: being accessible online in English, containing information on an area in Africa where trophy hunting was being conducted, and containing information on land area, ecological and socioeconomic outcomes of trophy hunting. Studies included in the review passed further criteria: they had to be first hand (primary) research and conducted since 2000. Studies used in the review were further screened by study quality; low quality studies were not included. Information on trophy hunting was extracted from all studies using a standard template. Information was examined and compared to a theory detailing how trophy hunting aims to achieve socially-just and equitable conservation (Figure 1).

Theory of how trophy hunting achieves socially-just conservation

When communities are involved in trophy hunting, the meat, income and jobs from the activity are directed to local communities, to varying extents. Some or all of the income from trophy hunting goes to communities and is often used for community development, e.g. building schools/clinics. Meat from the hunted animals is often given or sold to local people, and jobs that the industry creates are typically given to locals. These outputs are meant to help diversify community livelihoods and improve well-being. The combination of the direct outputs, and improved wellbeing, is meant to improve community attitudes towards wildlife, help them tolerate the costs of living alongside

wildlife and motivate local people to conserve their local environments. People in turn will be motivated to perform actions like setting aside land for wildlife, stopping hunting for wild meat and monitoring for poaching. These actions then lead to the desired conservation outcomes of environments being protected or restored, and wildlife populations increasing or persisting.

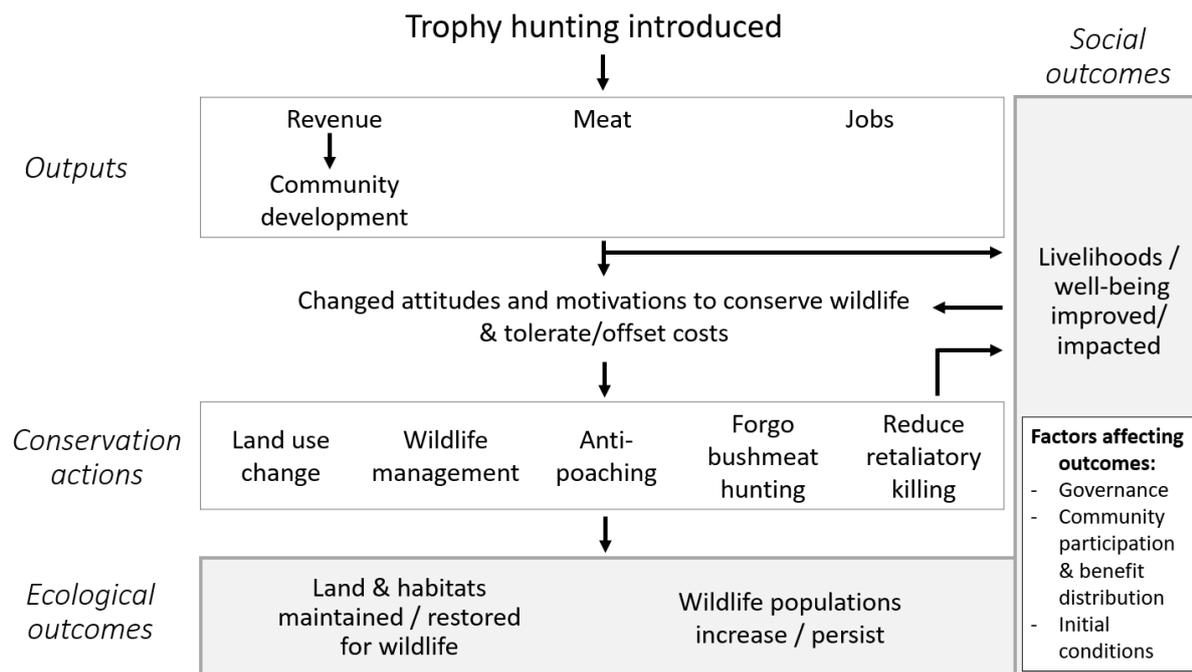


Figure 1: Theory of how trophy hunting contributes to socially-just conservation

This theory specifically relates to how trophy hunting works when communities are involved, e.g. in the many community-based conservation programmes across sub-Saharan Africa. It is important to note that not all trophy hunting directly involves communities; it is also conducted on private and government owned-land in many countries. In these instances it is mostly the income from trophy hunting that motivates and enables land owners to protect and manage their land for wildlife.

There are several assumptions that are made for this theory to work, for example whether the outputs from trophy hunting are sufficient to improve wellbeing, whether changed attitudes lead to conservation actions, and whether conservation actions lead to the desired ecological outcomes. I explored the evidence available for all assumptions. I also examined the many factors affecting trophy hunting outcomes, including external governance, like actions of national governments, NGOs and the private sector, equity issues in benefit distribution and community participation, and the initial conditions of the area like its human and wildlife populations.

Results

Evidence of Trophy hunting's direct outputs

General revenue and land used for trophy hunting

Estimates of gross annual income from trophy hunting were obtained for twelve African countries, while estimates of land area used for trophy hunting for twenty-three countries (Table 1). Many of the estimates are dated and estimates of annual income from trophy hunting in many countries in West and Central Africa were not found. South Africa has by far the largest industry with annual income from trophy hunting in 2014 totalling US\$ 180 million. It also has the largest area of land set aside for the industry.

Potentially as much as 1.38million km² of land is used for trophy hunting in sub-Saharan Africa. With the protected area estate already drastically underfunded (a shortfall of US\$ 1 billion per year according to Lindsey et al., 2018), removing any income source, let alone one potentially worth US\$375million from those areas, without viable alternatives which can be scaled across the same area, seems short-sighted.

Table 1: Most recent estimates of gross income, income to communities and land area under trophy hunting and total CITES

	Country	Annual income (million US\$)		Land area	
		Gross	Year - Source	Km ²	Source
Southern	Botswana	40	2008 - ³	133,451	¹
	Eswatini			46	¹
	Mozambique	5	2008 - ³	82,250	¹
	Namibia	44.8	2007 - ¹	162,033	Roe et al. 2016
	South Africa	180.6	2014 - Taylor et al. 2015	220,000	van Hoven, 2015
	Zambia	16.2	2012 - Lindsey et al. 2014	170,000	Simasiku et al. 2008
	Zimbabwe	15.8	2007 - ³	64,945	¹
East	Ethiopia	1.3	? - ¹	9,600	¹
	Tanzania	56.3	2008 - ³	210,000	Roe et al. 2016
Central	Cameroon	9.6	2012 - Lescuyer et al. 2016	57,000	Lescuyer et al. 2016
	CAR	1.9	2006 - ²	66,000	²
	Chad			34,320	¹
	Congo, Rep.			1,510*	Wilkie & Carpenter, 1999
	Congo, Dem. Rep.			90,362*	¹
West	Benin	0.3	2007 - ²	4,000	¹
	Burkina Faso	2.8	2005 - ²	9,340	²
	Gambia			600	¹
	Ghana			1,137	¹
	Guinea-Bissau			8,000	¹
	Mali			15,280	²
	Niger			9,169	¹
	Senegal			24,344	¹
	Mauritania			6,000	¹
Total		375.4million		1,379,387	

Common sources: ¹ Lindsey et al. (2007), ² IUCN/PACO, 2009, ³ Booth, 2010

* State of industry questioned in IUCN/PACO (2009)

trophy hunting exports from 1990-2019.

Community income

Twenty-one studies reported that trophy hunting generated money for communities; thirteen reported amounts (Table 2). In some areas, income was quite substantial, e.g. Botswana and Namibia, but in others, revenue was quite limited. In Debub Omo revenue-sharing scheme in Ethiopia, income reaching the programme was so limited, communities received funds on rotation or it would be too little do anything with (Yitbarek et al., 2013). There was also substantial variation within countries. In Zambia for example, community resource boards earned US\$1.64 million in 2012, on average equalling about US\$ 456,000 per GMA. However, only half of them generated income from trophy hunting, while the rest earned nothing (Lindsey et al., 2014).

Table 2: Annual average income to villages or communities, community organisations, and national CBNRM programmes from trophy hunting and their sources (area). When reported in local currencies, amounts were converted using the World Bank Official Exchange Rate <https://data.worldbank.org/indicator/PA.NUS.FCRF>. k= thousand, m = million.

Country	Location	US\$/ Year	Year	Source
Botswana	Sankuyo	226.4k	2000-2007	Mbaiwa & Stronza (2010)
	Mababe	180.2k	2000-2007	"
	Khwai	171k	2000-2007	"
	OKMCT	160k	1999-2003	Mbaiwa (2004)
	Cgaecgae Tlhabololo	31.3k	1999-2003	"
	OCT	170k	1999-2004	"
Namibia	Nyae Nyae	100.6k	2000-2010	Koot (2019)
	Bwabwata	173.7k	2006-2007	"
	Wuparo	56.8k*	2010-2008	Kahler & Gore, 2015
Zambia	Average of 36 Game Management Areas	45.6k	2012	Lindsey et al. (2014)
CAR	Average of 6 north eastern community hunting areas	28.3k	2003	Bouché et al. 2010
Tanzania	Simanjiro District Council	20.7k	2005-2008	Snyder & Sulle (2011)
Zimbabwe	Chibwedziva	20.7k	2000-2010	Gandiwa et al. (2013)
	Chizvirizvi	4.8k	2004-2010	"
	Mahenye	28.3k	2002-2010	"
	Mtandahwe	4.4k	2000-2010	"
Cameroon	North province	29.2k	2008	Yasuda et al. (2011)
	Bénoué NP Community commission for 6 villages	1.9k	2007	"
Mozambique	Coutada 9	11.6k	2009	Lindsey et al. (2011)
Ethiopia	Murulle CHA villages	2k	2007-2011	Yitbarek et al. (2013)
	Wolishet Sala CHA villages	863	2007-2009	"
<i>Income to national CBNRM programmes</i>				
Botswana		3.4m	2011/12	Mbaiwa (2017)
Namibia		3.5m	2013	Naidoo et al. (2016)

A handful of studies reported that trophy hunting income went to cash dividends to all community members (e.g. Bandyopadhyay et al., 2004, Mbaiwa and Stronza, 2010), but few areas seem to do this. More studies reported low or no returns from trophy hunting at the household level (e.g. Snyder and Sulle, 2011, Yasuda, 2012), particularly in comparison to other livelihood activities, like agriculture (Poshiwa et al., 2013).

As income from trophy hunting is often too little to make meaningful contributions for households, it is invested in community development. Fifteen studies reported trophy hunting revenue being used to fund some form of community infrastructure or support: e.g. building schools, clinics and other useful infrastructure, providing water facilities, buying vehicles or helping with transport, funding community projects and enterprises, scholarships and other social support.

Meat

Meat from trophy hunting is broadly reported as a benefit of the sport, especially in Southern Africa. Studies suggested it is an important benefit and one that is clearly linked to trophy hunting in the local community (Mbaiwa, 2004, Angula et al., 2018). It can be particularly important in areas which do not otherwise have legal and convenient access to fresh meat (Mbaiwa, 2004). It is also mostly distributed in winter, the peak hunting season, when people are most likely to be food insecure (White and Belant, 2015). Amounts distributed to communities can be substantial (Naidoo et al., 2016, Mbaiwa, 2017), but they depend on an area's wildlife abundance and the local human population. For example, rural communities in Zambia's GMAs with more abundant wildlife received over 6 tonnes of meat each year, while those in depleted areas receive less than 1 ton (White and Belant, 2015). Meanwhile, in the five years prior to the 2014 hunting moratorium in Sankuyo, Botswana, approximately 154 tonnes of meat from elephants alone went to the community of roughly 370 people each year (Mbaiwa, 2017).

Employment

Seventeen studies reported the jobs created by trophy hunting in rural communities where typically few other income-generating opportunities exist. In some areas, jobs may reach substantial proportions of the local populations (e.g. Mbaiwa and Stronza, 2010), while in others there might only be a marginal gain in the numbers employed (Mutandwa and Gadzirayi, 2007). However, employment is often one most important sources of income of trophy hunting (e.g. Zafra-Calvo and Moreno-Peñaranda, 2018), so even small gains should not be discounted. In northern Cameroon around Benoué National Park for example, US\$60,000 was paid in wages in 2000 for local labour, while community payments were only US\$3000 (Mayaka, 2002). However, jobs vary in quality. Most trophy hunting is seasonal, so the majority of jobs it creates are only for part of the year. People doing jobs like tracking and skinning work for the whole hunting season and can earn substantial amounts, but others who are employed short-term and casually earn less (White and Belant, 2015). In a Cameroon village, 40% of men of working age were employed by the hunting operator in some form; 7% received wages that contributed substantially to household's annual income (Yasuda, 2012).

Evidence for further outcomes and assumptions

While trophy hunting clearly does generate varying amounts of income, meat and jobs for communities, it is less well evidenced whether these outputs in turn impact livelihoods and wellbeing, change people's attitudes towards wildlife, and motivate them to carry out conservation actions. It is also less well evidenced whether conservation actions lead to the desired ecological outcomes of land and habitats being maintained or restored for wildlife and how non-target wildlife species are impacted by trophy hunting. Overall there were few studies assessing either social or ecological outcomes which used study designs which were able to attribute the cause of change to trophy hunting, e.g. by using counterfactuals or accounting for confounding factors.

Livelihoods and wellbeing

Three studies explored the impacts of community based natural resource management (CBNRM) programmes which conducted trophy hunting, on household economic welfare in Namibia and Zambia using rigorous comparative study designs. They found that household income improved as a result of the projects, but that effects were not always evenly distributed (Bandyopadhyay et al., 2004, Bandyopadhyay and Tembo, 2010, Richardson et al., 2012). In Zambia, households in Game Management Areas with abundant wildlife saw significant welfare gains, while those in areas with less wildlife showed no significant improvement (Richardson et al., 2012). Further, improvements were not always evenly achieved within communities. In Zambia welfare gains mostly accrued to those relatively well-off in communities (Bandyopadhyay and Tembo, 2010, Richardson et al., 2012), but in a sample of Namibia's communal conservancies, gains were poverty neutral in one region and pro-poor in another (Bandyopadhyay et al., 2004). In other areas however, for example in Tanzania

and Mozambique, trophy hunting appears to have minimal impacts on economic wellbeing or welfare (Kangalawe and Noe, 2012, Suich, 2013).

In Sankuyo village Botswana, a study found that 93.5% of households surveyed felt that their livelihoods had improved and diversified since 1996 when the trophy hunting based CBNRM programme began, i.e. improved subjective wellbeing (Mbaiwa, 2004, Mbaiwa and Stronza, 2010). Studies have also found the CBNRM programmes have led to improvements in other well-being domains such as social relations, governance, security, and cultural and spirituality (See McKinnon et al., 2016 for definitions). These included community empowerment, enhanced social capital and connectivity, establishments of new actor networks and local institutions, retaining youth in rural areas, development of skills, and improved relationships with government and the private sector (Mbaiwa and Stronza, 2010, Wright, 2016). There was also improved land access and improved social security through job creation (Mbaiwa, 2004). Störmer et al. (2019) meanwhile found that the majority of people in surveyed Namibian conservancies were happy and proud of having wildlife in their land again. They were pleased wildlife was being preserved for future generations and thought it played a cultural role as part of people's tradition and heritage (Bollig and Olwage, 2016). Some people also drew artistic and spiritual inspiration from wildlife while others thought they played important roles in the overall ecosystem (Störmer et al., 2019). These intangible benefits seem underemphasised in studies on trophy hunting's impacts, yet they may be important in people's views about conservation and warrant further exploration.

There were also costs associated with trophy hunting which can negatively affect livelihoods and well-being, though many of these apply to all wildlife-based land uses, including photographic tourism enterprises and other conservation efforts such as protected areas. Twenty-seven studies reported negative outcomes across nine countries. Fifteen studies reported wildlife costs such as livestock loss, crop damage, or disease risks to cattle. Where quantified, levels ranged from 50%-92% of respondents reporting some form of wildlife-related damage (Bandyopadhyay et al., 2004, Granados and Weladji, 2012, Suich, 2013). Sometimes these costs were outweighed, at least theoretically, by income from trophy hunting, e.g. in Tanzania (Zafra-Calvo and Moreno-Peñaranda, 2018), but in other areas, e.g. in Mozambique, income from trophy-hunting was insufficient to compensate for the economic costs of livestock losses at the household level (Jorge et al., 2013, Zafra-Calvo and Moreno-Peñaranda, 2018). Sogbohossou et al. (2011) meanwhile, found that trophy hunting might even be exacerbating levels of livestock depredation in the Pendjari Biosphere reserve complex in Benin.

Nine studies reported issues of restrictions on resource use and access (e.g. Hausser et al., 2009, Snijders, 2012), evictions (e.g. Igoe and Croucher, 2007, Yasuda, 2012), and the loss of autonomy, responsibility and rights over land (E.g. Kangalawe and Noe, 2012, Bamford et al., 2014). These are unfortunately common across all forms of wildlife conservation efforts (Brockington and Igoe, 2006), and not only an impact of trophy hunting. Indeed, in many of the areas with CBNRM projects with trophy hunting, restrictions on community lives are considerably less than other forms of protected areas.

Conflicts related to trophy hunting were also reported, particularly in Tanzania. Much of the conflict relates to access rights and land use, e.g. for cattle grazing, local hunting, ecotourism, and natural resource use, with conflict being between locals and the hunting operators or the Wildlife Division anti-poaching units (e.g. Hausser et al., 2009, Sachedina and Nelson, 2010). Conflict was also caused by corruption (Wright, 2016). A further six studies reported problems with power dynamics and unequal relations between hunting operators, NGOs and communities (Snyder and Sulle, 2011, Koot, 2019), game farm owners and their labourers in South Africa (Snijders, 2012, Brandt and Spierenburg, 2014), and relations within and between communities and local government (Dube, 2019, Kangalawe and Noe, 2012). It is important to reiterate, many of these issues are associated with all wildlife based land uses and not just trophy hunting, suggesting that changing international

restrictions on trophy hunting will do little to improve these issues. Indeed, the unequal power dynamics involved in the UK restricting the viability of trophy hunting in other countries and essentially dictating the terms under which they can operate, further suppresses the voices and views of local communities who would be most impacted by such decisions.

Attitudes towards wildlife and conservation

Six studies found improved or positive attitudes towards wildlife and conservation as a result of the various trophy hunting-based CBNRM programmes in Botswana, Namibia and Zimbabwe (e.g. Mbaiwa, 2005, Angula et al., 2018), though other studies from Zimbabwe reported contrasting findings (Gandiwa et al., 2013, Dube, 2019). Störmer et al. (2019) found that two thirds of people in Namibia's conservancies had positive attitudes towards wildlife, with trophy hunting being more likely to improve attitudes because of meat distribution and the killing of dangerous damage causing animals. Other reasons behind positive attitudes were that wildlife could generate income and development opportunities (Rust and Marker, 2013, Kahler and Gore, 2015), and for aesthetic and cultural reasons (Bollig and Olwage, 2016). By contrast, most of the studies reporting on mixed, unchanged or worsened attitudes were the result of limited trophy hunting income to communities, uneven benefit distribution, and continuing wildlife costs (e.g. Bamford et al., 2014, Ochieng et al., 2017).

Conservation actions due to trophy hunting

While a handful of studies showed that in some cases trophy hunting had improved people's attitudes towards wildlife, none went on to empirically explore whether this led to conservation actions. Overall, studies examining whether trophy hunting leads to conservation actions are relatively limited in both number and actions covered.

The most commonly reported conservation action from trophy hunting is increased funding, monitoring and enforcement for anti-poaching. Eight studies reported that trophy hunting increases or funds anti-poaching efforts and that this was helping wildlife populations (e.g. Croes et al., 2011, Lindsey et al., 2012, Atickem et al., 2011). Whether trophy hunting actually leads to reductions in poaching or wild meat hunting is less clear and poorly researched. Mutandwa and Gadzirayi (2007) reported that communities thought that the rate of poaching had declined and that the number of animals had increased due to Zimbabwe's CAMPFIRE. Mbaiwa (2005) also suggests that Botswana's CBNRM programme had led to reductions in poaching in the area. But other studies found that poaching and other illegal activities continued (Wilfred et al., 2019, Yasuda, 2011), largely due to negative views towards wildlife and minimal benefits from the trophy hunting and other wildlife-based enterprises (Dube, 2019). Despite these anecdotes, no studies actually empirically explored whether changed attitudes towards wildlife actually resulted in changes in levels of poaching and whether it was the communities hunting in the first place. Only one study, by Sachedina and Nelson (2010), assessed trophy hunting's impact on land use change in Tanzania and found no instances of communities setting aside land for wildlife conservation as a result of trophy hunting income. No studies explored whether benefits from trophy hunting affected levels of retaliatory killing.

Land and habitats maintained or restored

That trophy hunting helps protect natural land and habitats is one of the main arguments of how it contributes to conservation, yet there are few studies that empirically explore this; most just state the area of land used for trophy hunting. While ecosystems and habitats may well be conserved as a result of trophy hunting on private land, e.g. in South Africa (Cousins et al., 2008), there are suggestions this may not be the case when it comes to conservation on community land. In a study on livelihoods in the Kilombero Valley, Tanzania, Bamford et al. (2014) found that meat distribution to communities had stopped because the community had failed to meet their obligations to protect the community wildlife management area (WMA), suggesting the WMA was an insufficient mechanism to stop agricultural expansion into the area. Lindsey et al. (2014) found a similar situation with Zambia's Game Management Areas with the area of land used by humans continuing

to increase, while biomass of wildlife declined. Sachedina and Nelson (2010) meanwhile, found that no village land had been set aside for wildlife because of trophy hunting, while other initiatives, like community-led tourism and direct payment schemes for habitat conservation, had been effective in protecting areas of community land for wildlife.

One comparative study however, did find that trophy hunting was having a positive impact on habitats. Banda et al. (2006) assessed the role of different forms of protection on vegetation structure and composition in Tanzania. They found Game Controlled Areas, which allow trophy hunting but prevent human settlement, agriculture and grazing, had the highest mean stem density and density of larger trees, significantly higher tree basal area and species richness, and more unique species than the National Park which does not allow hunting. It also outperformed a forest reserve and an area which allowed human settlement in most of these measures. They concluded that a combination of protection strategies, including trophy hunting, was likely needed to conserve the greatest tree diversity.

Wildlife populations increasing or persisting

Twenty-two studies reported wildlife population or density trends (Figure 2). More studies (8) reported stable, slightly higher densities or increasing trends in trophy hunting areas, than studies which reported declines or lower densities (6). Four studies reported mixed results, highlighting that species and areas are unlikely to be impacted uniformly by trophy hunting (Packer et al., 2011). What is encouraging, are reports of increasing populations after moratoria and/or quota reductions, which shows populations can recover from over-hunting when it does occur and that hunting at sustainable levels does not reverse these trends (Loveridge et al., 2016). Trophy hunting can also incentivise reintroductions (Bollig and Olwage, 2016, Lindsey and Bento, 2012).

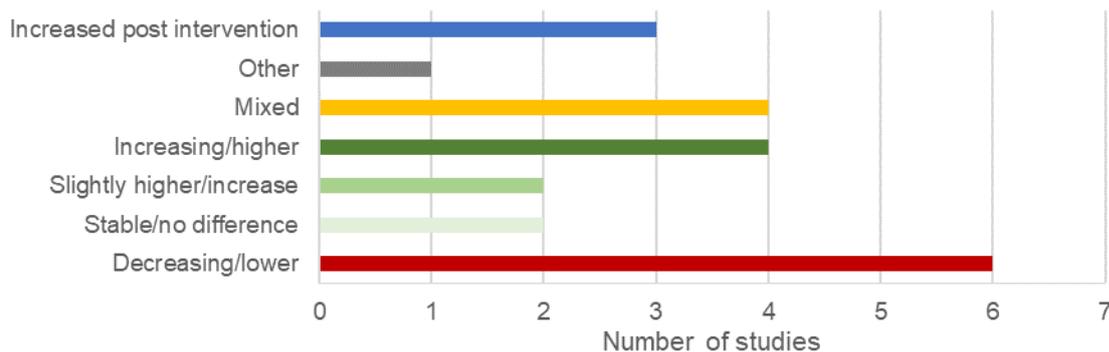


Figure 2: Direction of trends in wildlife density and abundance impacts of trophy hunting

An additional eight studies reported trophy quality and/or harvest trends (Figure 3). Both measures are considered reasonable substitute measures for trends in hunted populations, because hunting companies put large effort into finding quality trophies, so changes in the underlying populations are assumed to be reflected in the numbers of animals hunted and trophy quality (Muposhi et al., 2016a, Brink et al., 2016). Here too the sample size was small, and outcomes were varied across species and countries. Of note, Brink et al. (2016) found that harvest rates in Selous Game Reserve in Tanzania were stable and more likely to be sustainable in hunting blocks with long-term (10-15 year) leases, while offtakes in shorter-term leases were almost double the recommended level and declining.

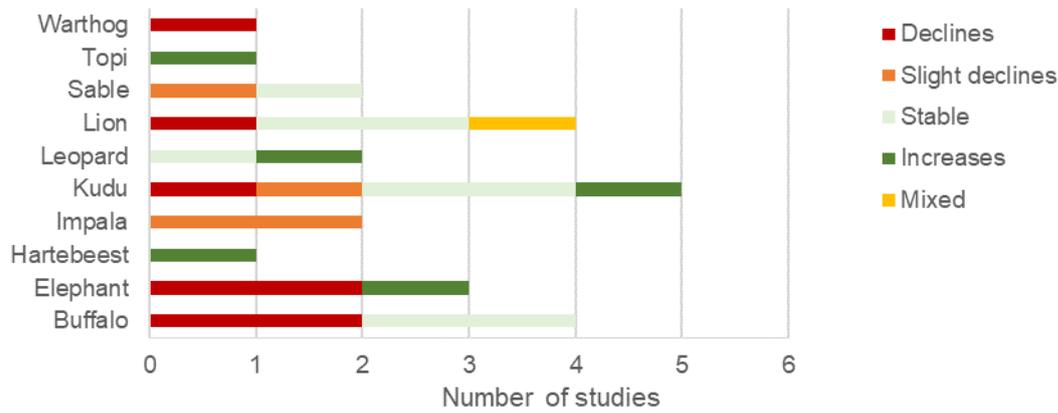


Figure 3: Number of studies by species reporting trends in trophy quality and/or harvest rates

An important consideration in interpreting these and other results on trophy hunting, is that none of the study designs accounted for confounding factors, which makes it impossible to definitively say trophy hunting was the cause. Indeed, several studies specifically mentioned that declining trends were more likely to be caused by factors other than trophy hunting – such as illegal wild meat hunting (Bouché et al., 2010, Caro, 2008), retaliatory killing (Williams et al., 2017) and habitat availability/preference in hunting and non-hunting areas (Waltert et al., 2009).

No studies examined population trends in non-hunted species, so the impact that trophy hunting can have on broader wildlife species is difficult to determine. Lindsey et al. (2014) did find that private hunting areas in Zambia had higher large mammal diversity than National Parks, suggesting it can enhance diversity in some cases. Community Game Management Areas in the country however, had substantially lower diversity, suggesting this positive outcome did not extend to trophy hunting on communal land.

There seemed to be no consistent findings across various population dynamics and behaviours studied (Figure 4), and whether these in turn affect population trends is unclear. An equal number of studies reported negative impacts of trophy hunting, e.g. skew sex ratios (e.g. Loveridge et al., 2007, Becker et al., 2013), increased mortality (Loveridge et al., 2017, Brandlová et al., 2018), changes in flight response (e.g. Ndiweni et al., 2015, Muposhi et al., 2016b), and changed habitat use, and mixed outcomes, where some aspects measured were negatively impacted, while others remained unchanged. Particularly for the studies assessing wildlife behaviour, like flight response, home range and group size, and habitat use, no studies went on to assess whether these impacted population trends or had long term detrimental effects on wildlife populations. Two studies also cautioned the interpretation that trophy hunting was the sole cause of these changes and suggested a combination of factors, particularly other sources of mortality, were likely to be affecting populations (Balme et al., 2009, Becker et al., 2013).

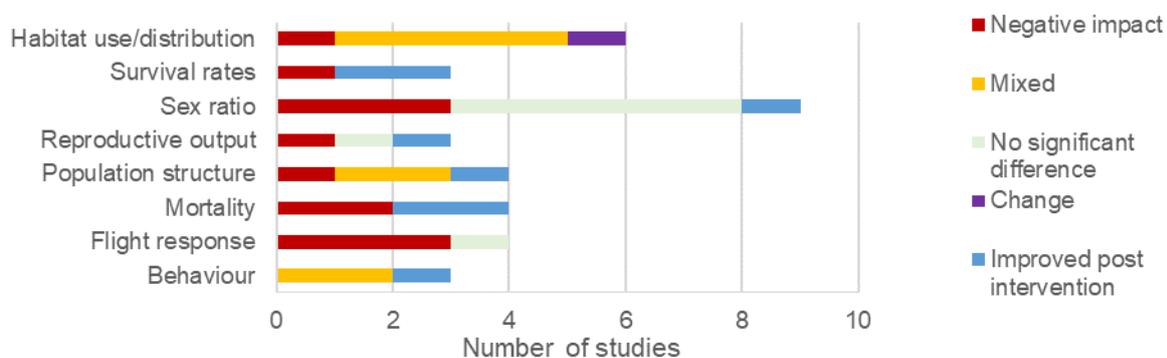


Figure 4: Number of studies reporting outcomes of trophy hunting on various wildlife behaviours and population dynamics

Factors affecting trophy hunting outcomes

Trophy hunting outcomes are clearly context specific. This is demonstrated not only by the mixed outcomes reported across and within countries, but also by the number of studies which reported on factors affecting both social and ecological outcomes. Eighty percent of studies in the review reported at least one factor that affected trophy hunting outcomes. Issues relating to national governments were most commonly reported (Figure 5), followed by issues of equity: benefit distribution and community participation (Figure 6).

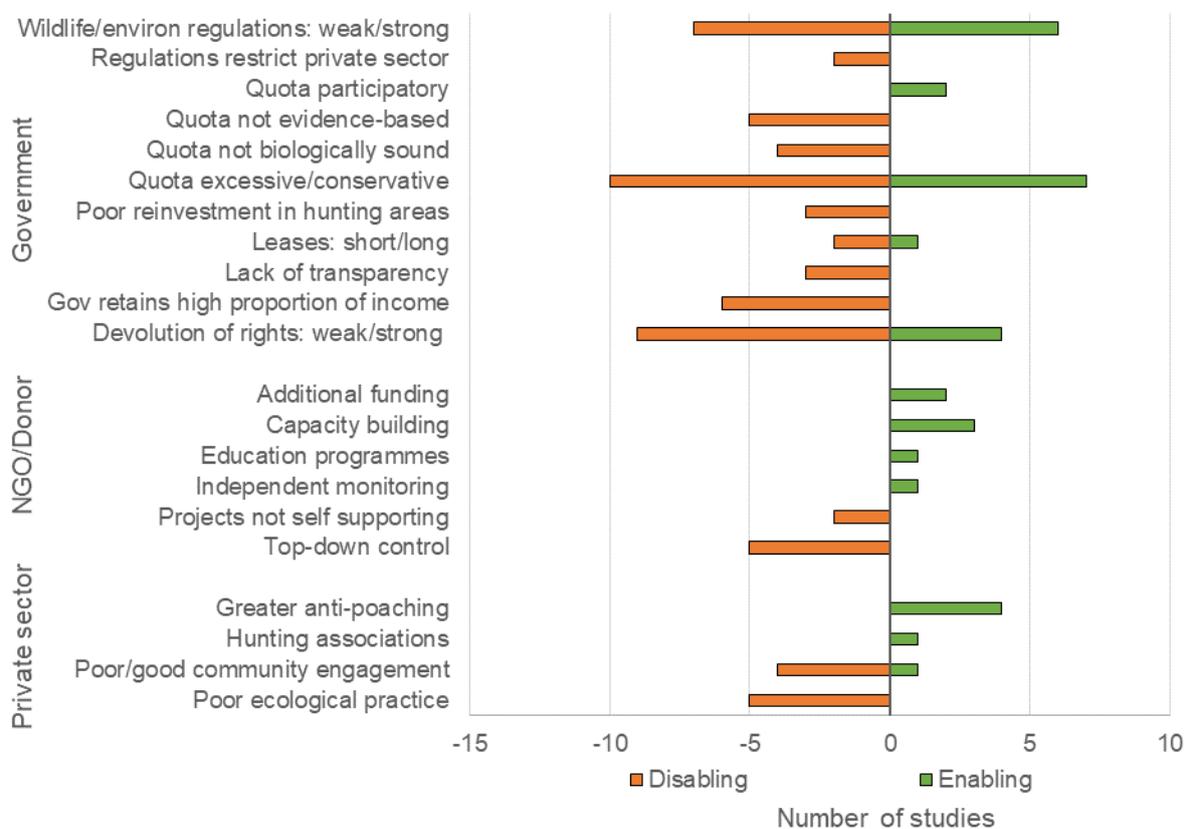


Figure 5: External governance and support influences on trophy hunting outcomes

Governments' impacts on trophy hunting

Forty-four studies reported that trophy hunting outcomes were affected by government policies and practices (Figure 5). Factors that supported positive outcomes from trophy hunting included governments setting conservative quotas, stakeholder engagement in quota setting (e.g. Naidoo et al., 2016), and putting in place and enforcing regulatory policies that manage hunting offtake, such as introducing age limits (e.g. Bouché et al., 2016, Begg et al., 2018), or instigating short-term moratoria (e.g. Loveridge et al., 2016, Mweetwa et al., 2018). Such actions help to ensure that trophy hunting is not harmful to wildlife populations and allows declining populations to recover should they need to. Policies which transfer wildlife use rights and management to communities, such as the CBNRM legislation in Namibia (e.g. Bollig and Olwage, 2016, Störmer et al., 2019) are also linked to positive hunting outcomes, along with long-term leases for hunting operators which encourage environmental stewardship (White and Belant, 2015). Encouraging the uptake of these enabling policies and practices would likely improve outcomes from trophy hunting.

Many studies however, reported factors relating to national governments that restricted positive trophy hunting outcomes. Many of these related to excessive quotas, poor wildlife regulations, weak devolution of rights to communities, and governments keeping large amounts of trophy hunting income rather than directing it to local communities. Issues with quotas included quotas being set too high, not being evidence-based, and allowing females and sub-adults to be hunted (e.g. Loveridge et al., 2007, Croes et al., 2011, Sogbohossou et al., 2014). Problems arose when there was

no systematic monitoring of wildlife populations or proxies (Mweetwa et al., 2018), when quotas did not account for other sources of mortality, e.g. illegal killing (Williams et al., 2017) and when transboundary populations quotas were set independently for individual countries without consideration for the whole system-scale population (Selier et al., 2014).

Perverse and weak regulations also restrict outcomes. Regulations which penalise companies for using less than a minimum amount of their quota (e.g. at least 40% in Tanzania) can promote harvesting of immature individuals, particularly if quotas are set too high (Brink et al., 2016, White and Belant, 2015). Imposing fixed-quotas where operators are forced to pay animal licence fees before hunting also forces operators to harvest wildlife regardless of sustainability (Lindsey et al., 2014, Muposhi et al., 2016a). Meanwhile, regulations designed to enhance sustainability, such as age limits, are often poorly enforced (e.g. Sogbohossou et al., 2014, Becker et al., 2013), while systems which encourage good performance by hunting operators are lacking (Lindsey et al., 2014). Private sector development is also hampered in various ways, for example lengthy administrative permit processes, ownership restrictions on big game, and short-term leases which discourage investment in depleted hunting blocks as wildlife populations could not recover sufficiently over such time periods for those areas to be considered profitable (Lindsey et al., 2013, Lindsey et al., 2014). Short-term leases can drive over-hunting (Brink et al., 2016).

Outcomes tend to be worse when governments' are over-reliant on hunting income as this increases risks of setting unsustainable quotas to bring in more revenue (Brink et al., 2016, Lindsey et al., 2014, White and Belant, 2015) and reduces the likelihood of meaningful devolution to communities. Insufficient funds being returned to communities (e.g. Kangalawe and Noe, 2012, Yasuda, 2011), weak legislation entrusting wildlife use and management rights to communities (e.g. Mbaiwa, 2005, Wright, 2016), and overly complicated devolution processes where many decisions remained in government control (e.g. Igoe and Croucher, 2007) have all been criticised for hampering social outcomes of trophy hunting. There are also issues of a lack of transparency and corruption in processes (Bandyopadhyay and Tembo, 2010, Wright, 2016), and poor reinvestment into hunting areas (Lindsey et al., 2014, Yitbarek et al., 2013) or community capacity building (Mbaiwa, 2004).

NGO/donor

NGOs and donors more often had positive effects on trophy hunting outcomes, but this was not always the case (Figure 5). NGO provisions of additional funding (Bouché et al., 2010, Henschel et al., 2016), community capacity building (e.g. Mbaiwa, 2005, Suich, 2013), and education programmes (Granados and Weladji, 2012) were all found to improve trophy hunting outcomes. NGOs can also facilitate improved stakeholder collaboration and hunting practice, and act as an independent auditors (Begg et al., 2018). However, their involvement was also criticised for being top-down: driving decisions and policies which governments are not fully committed to, communities are not meaningfully involved in, and where the institutions created are complex, weak and reliant on donor funding and input (e.g. Igoe and Croucher, 2007, Hausser et al., 2009, Dube, 2019). An over-reliance on donor funding can also lead to projects collapsing or weakening once that funding is removed (e.g. Mbaiwa, 2004, Suich, 2013).

Private sector

The private sector can also have different impacts on hunting outcomes (Figure 5). The private sector's involvement and investment into anti-poaching monitoring and enforcement is commonly reported to improve ecological outcomes with private companies often being better equipped than national parks (e.g. Croes et al., 2011, Scholte et al., 2017). Some companies also help develop infrastructure in the area more generally (Brink et al., 2016). Importantly, hunting associations can play a positive role by regulating practice in the sector, including by increasing the minimum safari length and package price to increase income generated (Bouché et al., 2016). However, several studies also highlight harmful ecological practices of the private sector, such as hunting in prohibited areas around national parks (Jeke et al., 2019), luring animals outside parks (Loveridge et al., 2007),

and targeting under-sized trophies to fill quotas (Wilfred, 2012). There are also issues on private game farms of game fences preventing migration and increasing risks of overstocking, and intolerance towards predators (Lindsey et al., 2013). Bamford et al. (2014) and Sachedina and Nelson (2010) also raised issues around community engagement, including private operators not negotiating land use with communities and not recognising community rights. However, it is important to note that hunting operators/companies vary, and so do their impacts on hunting outcomes. In Namibia in the Nyae Nyae conservancy for example, the community complained about one of the hunting operators because of poor working conditions and community engagement, the second operator meanwhile was well liked by the community, sought advice on how to improve their relationship, and treated local workers well (Koot, 2019).

Community participation

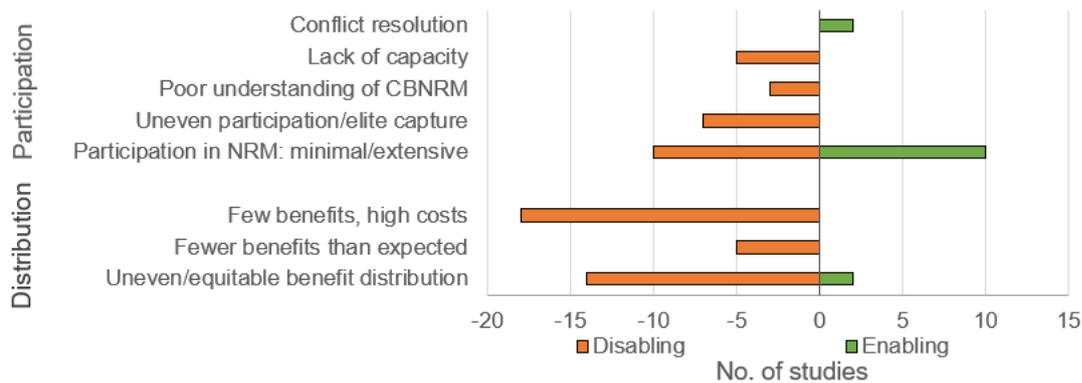


Figure 6 Community participation and benefit distribution factors affecting trophy hunting outcomes

Twenty studies discussed the extent of community participation in natural resource management and decision making in relation to trophy hunting outcomes (Figure 6). When communities were involved in monitoring, managing, making-decisions about, and benefiting-from their natural resources and land, social and ecological trophy hunting outcomes were more positive (e.g. Naidoo et al., 2016, Bouché et al., 2016, Richardson et al., 2012). Extensive devolution of use rights and management responsibility in Namibia for example, has enabled communities to manage their wildlife and other natural resources, zone their land for different uses, and benefit from hunting and other tourism developments, leading to many examples of positive outcomes for communities and wildlife (e.g. Bandyopadhyay et al., 2004, Bollig and Olwage, 2016). Participation in decision-making and wildlife management can lead also lead to improvements in human-wildlife conflict, and can help resolve conflicts over land and resource use (Hausser et al., 2009, Wright, 2016). Negligible community participation in decision-making and wildlife management by contrast was linked to limited benefits to communities from trophy hunting (e.g. Mutandwa and Gadzirayi, 2007, Kangalawe and Noe, 2012, Yitbarek et al., 2013), and, in some cases, conflicts (Sachedina and Nelson, 2010).

Equitable participation was also mentioned as an issue affecting trophy hunting outcomes and community conservation programmes in general, not just those that engage in trophy hunting. Uneven participation is unfortunately common and in some cases can lead to conflicts. Decision-making and community organisations can be hard to access by marginalised groups, e.g. women or ethnic minorities (Mutandwa and Gadzirayi, 2007), or open to corruption and power abuse by traditional authorities or more prosperous community members (e.g. Bandyopadhyay and Tembo, 2010, Lindsey et al., 2014, Dube, 2019). A lack of community capacity, in terms of entrepreneurial, legal, financial, and management skills, can also limit positive outcomes (e.g. Lindsey et al., 2014, Bollig and Olwage, 2016). It can constrain community involvement in the tourism sector, and can lead to misappropriation and mis-management of funds (Mbaiwa, 2004, Bandyopadhyay and Tembo, 2010). A lack of training, equipment, and funding for community game guards meanwhile can hamper how effective communities are in monitoring their land (Lindsey et al., 2014). Limited

and unequal knowledge of communities rights and entitlements within national legislation also hampers equal participation (Bandyopadhyay and Tembo, 2010, Snyder and Sulle, 2011), while a lack of transparency and formality of some revenue-sharing agreements can restrict community benefits from trophy hunting and other arrangements (e.g. Kangalawe and Noe, 2012).

Benefit distribution

Issues around benefit distribution also affected trophy hunting outcomes and were reported in twenty-eight studies (Figure 6). The most widespread issue was that benefits from trophy hunting were few, rarely reached communities, and did not out-weigh the costs associated with living alongside wildlife and restrictions on livelihoods (e.g. Kangalawe and Noe, 2012, Suich, 2013, Lindsey et al., 2014). There seems to be a mis-match between the household level costs, and benefits from trophy hunting only reaching community, regional or national levels (e.g. Yasuda, 2012, Gandiwa et al., 2013). Uneven benefit distribution is also pervasive and was raised in most countries, with far fewer reports of equitable benefit sharing. Elite or political capture of benefits and limited access by marginalised and poorer groups within communities were reported in many countries (e.g. Bandyopadhyay and Tembo, 2010, Zafra-Calvo and Moreno-Peñaranda, 2018, Ochieng et al., 2017). Only in Namibia were benefits found to be shared reasonably evenly across households (Suich, 2013, Bandyopadhyay et al., 2004), and equitable distribution was not always the case (Kahler and Gore, 2015, Koot, 2019).

Conclusion

Trophy hunting is clearly a complex endeavour, with many varied outcomes and factors affecting them. While there are places where trophy hunting does not seem to be improving people's lives or leading to better outcomes for biodiversity, trophy hunting is contributing to positive outcomes for people and wildlife in other areas. This alone warrants caution on broad-brush approaches and decisions related to the activity being implemented at larger scales. While reforms in some places are clearly needed to ensure more community involvement, greater benefits and improved hunting practice, blanket approaches, responding to a narrow set of negative outcomes, risk undermining efforts where trophy hunting is improving lives and contributing to biodiversity conservation. Caution therefore, seems prudent when making decisions that might restrict the viability of the activity, particularly given the current lack of viable alternatives to trophy hunting, and the many factors which would likely restrict benefits from other forms of wildlife based land use as much as they are restricting benefits from trophy hunting. Decisions like national or international hunting bans, or bans on trophy hunting imports from all countries, like the UK is considering, as opposed to measures which target specific species or instances where change is needed, might well do more harm than good (Dickman et al., 2019).

2) Preliminary results of case study: How are communities impacted by trophy hunting bans? Lessons from Botswana.

Introduction & methods

After decades of including trophy hunting in their conservation strategy, the Government of Botswana set a nation-wide hunting moratorium from 2014-2019. The five-year ban created a natural experiment for adding to the evidence base on the efficacy of trophy hunting as a conservation and rural development too. It also created an opportunity to understand what some of the consequences of hunting bans or other restrictions might be on the communities involved with the industry. The work below reports preliminary results of how communities in Botswana have been impacted by the trophy hunting moratorium. Results are from six months of ethnographic fieldwork conducted in two former-hunting villages in Botswana: one successfully converted to photographic tourism activities, the popular alternative to hunting, and one did not. Key impacts in

both villages are the loss of wildlife control, access to game meat and jobs. A loss of income to community organisations was less commonly mentioned.

I spent six months in Botswana in 2019, predominantly living in two rural villages that are part of the country's Community Based Natural Resource Management (CBNRM) programme. Through the CBNRM programme, the people in these villages formed Community Trusts and were assigned areas of land to manage and benefit from. Prior to the moratorium, both Trusts were allocated a hunting quota by the Government and conducted trophy hunting on the land through auctioning the quota and/or forming longer-term partnerships with hunting companies. After the moratorium, one of the Trusts (Village 2) successfully converted to photographic tourism activities and set up three partnerships with photographic tourism enterprises. The other Trust (Village 1) did not manage to arrange a partnership with a photographic tourism enterprise and has all but collapsed without trophy hunting.

I interviewed 108 people across the two villages, sampling about 20% of the population evenly across age and gender. I also held 24 group discussions with over 150 people.

Preliminary results

Across both villages, 95% of people thought the hunting moratorium was bad, had negative impacts, and/or should be lifted. 2% thought the moratorium was a good decision, despite there being some negative impacts. The remaining 3% didn't know, but spoke of wildlife-related problems. The key impacts raised were a loss of meat (80% of interviewees on average across both villages), loss of jobs (62%), and a loss of animal control (49-92%, 49% of people explicitly stated that hunting had been controlling animals, while 92% reported that animal numbers had increased since the moratorium and were affecting village life). There were nuances within and between the two villages which are explored below.

Village 1: Trust which could not convert to photographic tourism

In the village with the Trust which failed to convert to photographic tourism, 87% of people reported a loss of meat as a key impact. They used to get a substantial amount of meat from hunting, which was predominantly of elephants. The community had an annual quota of 20 elephants which produced a substantial amount of meat. The poorest in the village were most affected by the moratorium which heavily impacted their food security. Prior to the moratorium they ate meat nearly every day, drying meat from the hunting season to use for the rest of the year. After the moratorium, they could only afford to eat meat once a month. The loss of meat wasn't only important for food security, it was also considered a cultural loss as people felt eating meat was part of their culture. Many also preferred game meat to beef or other livestock meat, which they felt was processed and less healthy.

A loss of jobs was raised by 74% of respondents. Village unemployment was very high with only 8% of people formally employed. The 30 additional jobs created locally by the combination of trophy hunting and an active Trust were substantial in a community of around 300 adults. There was a sense of hopelessness that their lives, and the lives of their children, might not improve. This was not the case when the Trust was active and conducting trophy hunting when people were hopeful that the Trust would create jobs and deliver other benefits to the community.

A loss of animal control was raised by 45-66% of the respondents. 66% of people reported being unable to farm successfully as a result of increased crop raiding since the hunting ban caused by increased animal numbers. People reported that the elephant population in particular was increasing and causing problems for them being able to farm and live their lives freely. The reduction in subsistence crop production increased the need for people to buy basic staples, decreasing disposable income and increasing food insecurity. 45% of people also reported a reduced sense of safety and freedom of movement. People were afraid of the coming across elephants and as a result

many, particularly women, were afraid of leaving the village to do daily tasks like harvest wild food and collect firewood. Some also reported being afraid of moving around the village at night as elephants had been known to come into the village.

Village 2: Trust which was able to convert to photographic tourism

In the village where the Trust did convert to photographic tourism, people still reported negative outcomes of the hunting moratorium and wanted the decision reversed. The biggest impact in this village was the loss of wildlife control. 92% of respondents reported a reduction in safety and fear of moving freely. 30% of interviewees specifically stated they were afraid of being killed by an elephant: a very real fear as a man from the village was killed by an elephant, during my fieldwork, just outside the village on a route many in the community used daily. Elephants regularly entered the outskirts of the village at night and damaged trees in the village. 65% of people reported being unable to farm successfully and the majority had given up even trying after years of trying, reducing food security. Farming is a large part of their culture and being unable to provide basic staples was a substantial change and loss of autonomy. 67% of people also reported the loss of meat. Only 38% of interviewees reported a loss of jobs caused by the hunting ban. This is likely because overall, more people are now employed in the shift to photographic tourism. Because of this, the Trust has decided against reintroducing trophy hunting in the area even after the moratorium is lifted. However, they do want trophy hunting to take place in the surrounding area to help control the elephant population.

Other findings

Interestingly, a loss of income to the Community Trusts was rarely mentioned in either village. This is despite a loss of income to these institutions being a commonly reported potential impact of hunting bans. What this work seems to show is at the individual and household level, other impacts, like increases in wildlife costs, meat and jobs, are more important than losses in community level income.

A final issue raised was the lack of input communities had in the decision to instigate the moratorium in the first place. Botswana has prided itself on being a democratic country with decision-making based on consultation from the village (kgotla) level upwards. The decision of the moratorium was taken by the top levels of Government without consultation. In a number of interviews, I raised the issue of international trophy hunting bans and potential restrictions imposed by foreign countries. When interviewees were asked their opinions on this, there was typically confusion at why foreign countries should have any say in the matter. People interviewed were upset by not being consulted on a decision taken by their own government, the idea that foreign governments might be able to instigate similar restrictions was unbelievable.

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References

- ANGULA, H. N., STUART-HILL, G., WARD, D., MATONGO, G., DIGGLE, R. W. & NAIDOO, R. 2018. Local perceptions of trophy hunting on communal lands in Namibia. *Biological Conservation*, 218, 26-31.
- ATICKEM, A., LOE, L. E., LANGANGEN, Ø., RUENESS, E. K., BEKELE, A. & STENSETH, N. C. 2011. Estimating population size and habitat suitability for mountain nyala in areas with different protection status. *Animal Conservation*, 14, 409-418.
- BALME, G. A., SLOTOW, R. & HUNTER, L. T. B. 2009. Impact of conservation interventions on the dynamics and persistence of a persecuted leopard (*Panthera pardus*) population. *Biological Conservation*, 142, 2681-2690.
- BAMFORD, A. J., FERROL-SCHULTE, D. & WATHAN, J. 2014. Human and wildlife usage of a protected area buffer zone in an area of high immigration. *Oryx*, 48, 504-513.

- BANDA, T., SCHWARTZ, M. W. & CARO, T. 2006. Woody vegetation structure and composition along a protection gradient in a miombo ecosystem of western Tanzania. *Forest Ecology and Management*, 230, 179-185.
- BANDYOPADHYAY, S., SHYAMSUNDAR, P., WANG, L. & HUMAVINDU, M. 2004. Do households gain from community-based natural resource management? An evaluation of community conservancies in Namibia. *DEA Research Discussion Paper*. Windhoek, Namibia.
- BANDYOPADHYAY, S. & TEMBO, G. 2010. Household Consumption and Natural Resource Management around National Parks in Zambia. *Journal of Natural Resources Policy Research*, 2, 39-55.
- BECKER, M. S., WATSON, F. G., DROGE, E., LEIGH, K., CARLSON, R. S. & CARLSON, A. A. 2013. Estimating past and future male loss in three Zambian lion populations. *Journal of Wildlife Management*, 77, 128-142.
- BEGG, C. M., MILLER, J. R. B., BEGG, K. S. & HAYWARD, M. 2018. Effective implementation of age restrictions increases selectivity of sport hunting of the African lion. *Journal of Applied Ecology*, 55, 139-146.
- BOLLIG, M. & OLWAGE, E. 2016. The political ecology of hunting in Namibia's Kaokoveld: from Dorsland Trekkers' elephant hunts to trophy-hunting in contemporary conservancies. *Journal of Contemporary African Studies*, 344, 61-79.
- BOUCHÉ, P., CROSMARY, W., KAFANDO, P., DOAMBA, B., KIDJO, F. C., VERMEULEN, C. & CHARDONNET, P. 2016. Embargo on Lion Hunting Trophies from West Africa: An Effective Measure or a Threat to Lion Conservation? *PLoS One*, 11, e0155763.
- BOUCHÉ, P., RENAUD, P.-C., LEJEUNE, P., VERMEULEN, C., FROMENT, J.-M., BANGARA, A., FIONGAI, O., ABDOULAYE, A., ABAKAR, R. & FAY, M. 2010. Has the final countdown to wildlife extinction in Northern Central African Republic begun? *African Journal of Ecology*, 48, 994-1003.
- BRANDLOVÁ, K., GLONEKOVÁ, M., HEJCMANOVÁ, P., JŮNKOVÁ VYMYSLICKÁ, P., AEBISCHER, T., HICKISCH, R. & MALLON, D. 2018. Chinko/Mbari drainage basin represents a conservation hotspot for Eastern Derby eland in Central Africa. *African Journal of Ecology*, 56, 194-201.
- BRANDT, F. & SPIERENBURG, M. 2014. Game fences in the Karoo: reconfiguring spatial and social relations. *Journal of Contemporary African Studies*, 32, 220-237.
- BRINK, H., SMITH, R. J., SKINNER, K. & LEADER-WILLIAMS, N. 2016. Sustainability and Long Term-Tenure: Lion Trophy Hunting in Tanzania. *PLoS One*, 11, e0162610.
- BROCKINGTON, D. & IGOE, J. 2006. Evictions for Conservation: A global Overview. *Conservation and Society*, 4, 424-470.
- CARO, T. 2008. Decline of large mammals in the Katavi-Rukwa ecosystem of western Tanzania. *African Zoology*, 43, 99-116.
- COUSINS, J., SADLER, J. & EVANS, J. 2008. Exploring the role of private wildlife ranching as a conservation tool in South Africa: stakeholder perspectives. *Ecology and Society*, 13, Art43.
- CROES, B. M., FUNSTON, P. J., RASMUSSEN, G., BUIJ, R., SALEH, A., TUMENTA, P. N. & DE IONGH, H. H. 2011. The impact of trophy hunting on lions (*Panthera leo*) and other large carnivores in the Bénoué Complex, northern Cameroon. *Biological Conservation*, 144, 3064-3072.
- DICKMAN, A., COONEY, R., JOHNSON, P. J., LOUIS, M. P. & ROE, D. 2019. Trophy hunting bans imperil biodiversity. *Science*, 365, 874-874.
- DUBE, N. 2019. Voices from the village on trophy hunting in Hwange district, Zimbabwe. *Ecological Economics*, 159, 335-343.
- GANDIWA, E., HEITKÖNIG, I. M. A., LOKHORST, A. M., PRINS, H. H. T. & LEEUWIS, C. 2013. CAMPFIRE and Human-Wildlife Conflicts in Local Communities Bordering Northern Gonarezhou National Park, Zimbabwe. *Ecology and Society*, 18.
- GRANADOS, A. & WELADJI, R. B. 2012. Human–Elephant Conflict Around Bénoué National Park, Cameroon: Influence on Local Attitudes and Implications for Conservation. *Human Dimensions of Wildlife*, 17, 77-90.
- HAUSSER, Y., WEBER, H. & MEYER, B. 2009. Bees, farmers, tourists and hunters: conflict dynamics around Western Tanzania protected areas. *Biodiversity and Conservation*, 18, 2679-2703.

- HENSCHER, P., PETRACCA, L. S., HUNTER, L. T. B., KIKI, M., SEWADÉ, C., TEHOU, A. & ROBINSON, H. S. 2016. Determinants of Distribution Patterns and Management Needs in a Critically Endangered Lion *Panthera leo* Population. *Frontiers in Ecology and Evolution*, 4.
- IGOE, J. & CROUCHER, B. 2007. Conservation, Commerce, and Communities: The Story of Community-Based Wildlife Management Areas in Tanzania's Northern Tourist Circuit. *Conservation and Society*, 5, 534-561.
- JEKE, A., CHANYANDURA, A., MUPOSHI, V. K., MADHLAMOTO, D. & GANDIWA, E. 2019. Trophy Hunting and Possible Source-Sink Dynamics in Protected Areas: Insights from Trophy Size and Offtake Patterns in Southeast Zimbabwe. *Hindawi - International Journal of Zoology*, 2019, Article ID 1313927.
- JORGE, A. A., VANAK, A. T., THAKER, M., BEGG, C. & SLOTOW, R. O. B. 2013. Costs and benefits of the presence of leopards to the sport-hunting industry and local communities in Niassa National Reserve, Mozambique. *Conservation Biology*, 27, 832-843.
- KAHLER, J. S. & GORE, M. L. 2015. Local perceptions of risk associated with poaching of wildlife implicated in human-wildlife conflicts in Namibia. *Biological Conservation*, 189, 49-58.
- KANGALAWA, R. Y. M. & NOE, C. 2012. Biodiversity conservation and poverty alleviation in Namtumbo District, Tanzania. *Agriculture, Ecosystems & Environment*, 162, 90-100.
- KOOT, S. 2019. The limits of economic benefits: Adding social affordances to the analysis of trophy hunting of the Khwe and Ju/'hoansi in Namibian community-based natural resource management. *Society & Natural Resources*, 32, 417-433.
- LINDSEY, P., BALME, G., BECKER, M., BEGG, C., BENTO, C., BOCCHINO, C., DICKMAN, A., DIGGLE, R., EVES, H., HENSCHER, P., LEWIS, D., MARNEWICK, K., MATTHEUS, J., MCNUTT, J. W., MCROBB, R., MIDLANE, N., MILANZI, J., MORLEY, R., MURPHREE, M., NYONI, P., OPYENE, V., PHADIMA, J., PURCHASE, N., RENTSCH, D., ROCHE, C., SHAW, J., VAN DER WESTHUIZEN, H., VAN VLIET, N. & ZISADZA, P. 2012. Illegal hunting and the bush-meat trade in savanna Africa: drivers, impacts and solutions to address the problem. *Panthera/Zoological Society of London/Wildlife Conservation Society report*. New York: Panthera/Zoological Society of London/Wildlife Conservation Society.
- LINDSEY, P. & BENTO, C. 2012. Illegal Hunting and the Bushmeat Trade in Central Mozambique: a case-study from Coutada 9, Manica Province. Harare, Zimbabwe: TRAFFIC East/Southern Africa.
- LINDSEY, P. A., HAVEMANN, C. P., LINES, R., PALAZY, L., PRICE, A. E., RETIEF, T. A., RHEBERGEN, T. & VAN DER WAAL, C. 2013. Determinants of persistence and tolerance of carnivores on Namibian ranches: implications for conservation on Southern African private lands. *PLoS One*, 8, e52458.
- LINDSEY, P. A., MILLER, J. R. B., PETRACCA, L. S., COAD, L., DICKMAN, A. J., FITZGERALD, K. H., FLYMAN, M. V., FUNSTON, P. J., HENSCHER, P., KASIKI, S., KNIGHTS, K., LOVERIDGE, A. J., MACDONALD, D. W., MANDISODZA-CHIKEREMA, R. L., NAZERALI, S., PLUMPTRE, A. J., STEVENS, R., VAN ZYL, H. W. & HUNTER, L. T. B. 2018. More than \$1 billion needed annually to secure Africa's protected areas with lions. *Proceedings of the National Academy of Sciences*, 115, E10788-E10796.
- LINDSEY, P. A., NYIRENDA, V. R., BARNES, J. I., BECKER, M. S., MCROBB, R., TAMBLING, C. J., TAYLOR, W. A., WATSON, F. G. & T'SAS-ROLFES, M. 2014. Underperformance of African protected area networks and the case for new conservation models: insights from Zambia. *PLoS One*, 9, e94109.
- LOVERIDGE, A., VALEIX, M., ELLIOT, N. B. & MACDONALD, D. W. 2017. The landscape of anthropogenic mortality: how African lions respond to spatial variation in risk. *Journal of Applied Ecology*, 54, 815-825.
- LOVERIDGE, A. J., SEARLE, A. W., MURINDAGOMO, F. & MACDONALD, D. W. 2007. The impact of sport-hunting on the population dynamics of an African lion population in a protected area. *Biological Conservation*, 134, 548-558.
- LOVERIDGE, A. J., VALEIX, M., CHAPRON, G., DAVIDSON, Z., MTARE, G. & MACDONALD, D. W. 2016. Conservation of large predator populations: Demographic and spatial responses of African lions to the intensity of trophy hunting. *Biological Conservation*, 204, 247-254.

- MAYAKA, T. 2002. Wildlife co-management in the Bénoué National Park-Complex, Cameroon: A bumpy road to institutional development. *World Development*, 30, 2001-2016.
- MBAIWA, J. E. 2004. The socio-economic benefits and challenges of a community-based safari hunting tourism in the Okavango Delta, Botswana. *Journal of Tourism Studies*, 15, 37-50.
- MBAIWA, J. E. 2005. Wildlife resource utilisation at Moremi Game Reserve and Khwai community area in the Okavango Delta, Botswana. *J Environ Manage*, 77, 144-56.
- MBAIWA, J. E. 2017. Effects of the safari hunting tourism ban on rural livelihoods and wildlife conservation in Northern Botswana. *South African Geographical Journal*, 100, 41-61.
- MBAIWA, J. E. & STRONZA, A. L. 2010. The effects of tourism development on rural livelihoods in the Okavango Delta, Botswana. *Journal of sustainable tourism*, 18, 635-656.
- MCKINNON, M. C., CHENG, S. H., DUPRE, S., EDMOND, J., GARSIDE, R., GLEW, L., HOLLAND, M. B., LEVINE, E., MASUDA, Y. J., MILLER, D. C., OLIVEIRA, I., REVENAZ, J., ROE, D., SHAMER, S., WILKIE, D., WONGBUSARAKUM, S. & WOODHOUSE, E. 2016. What are the effects of nature conservation on human well-being? A systematic map of empirical evidence from developing countries. *Environmental Evidence*, 5.
- MUPOSHI, V. K., GANDIWA, E., BARTELS, P., MAKUZA, S. M. & MADIRI, T. H. 2016a. Trophy hunting and sustainability: temporal dynamics in trophy quality and harvesting patterns of wild herbivores in a tropical semi-arid savanna ecosystem. *PLoS One*, 11, e0164429.
- MUPOSHI, V. K., GANDIWA, E., MAKUZA, S. M. & BARTELS, P. 2016b. Trophy hunting and perceived risk in closed ecosystems: Flight behaviour of three gregarious African ungulates in a semi-arid tropical savanna. *Austral Ecology*, 41, 809-818.
- MUTANDWA, E. & GADZIRAYI, C. T. 2007. Impact of community-based approaches to wildlife management: case study of the CAMPFIRE programme in Zimbabwe. *The International Journal of Sustainable Development & World Ecology*, 14, 336-344.
- MWEETWA, T., CHRISTIANSON, D., BECKER, M., CREEL, S., ROSENBLATT, E., MERKLE, J., DRÖGE, E., MWAPE, H., MASONDE, J. & SIMPAMBA, T. 2018. Quantifying lion (*Panthera leo*) demographic response following a three-year moratorium on trophy hunting. *PloS one*, 13, e0197030.
- NAIDOO, R., WEAVER, L. C., DIGGLE, R. W., MATONGO, G., STUART-HILL, G. & THOULESS, C. 2016. Complementary benefits of tourism and hunting to communal conservancies in Namibia. *Conserv Biol*, 30, 628-38.
- NDIWENI, T., ZISADZA-GANDIWA, P., NCUBE, H., MASHAPA, C. & GANDIWA, E. 2015. Vigilance behavior and population density of common large herbivores in a southern African savanna. *Journal of Animal and Plant Sciences*, 25, 876-883.
- OCHIENG, A., VISSEREN-HAMAKERS, I. J. & VAN DER DUIM, R. 2017. The battle over the benefits: analysing two sport hunting policy arrangements in Uganda. *Oryx*, 52, 359-368.
- PACKER, C., BRINK, H., KISSUI, B. M., MALITI, H., KUSHNIR, H. & CARO, T. 2011. Effects of trophy hunting on lion and leopard populations in Tanzania. *Conserv Biol*, 25, 142-53.
- POSHIWA, X., GROENEVELD, R., HEITKÖNIG, I., PRINS, H. & IERLAND, E. 2013. Reducing rural households' annual income fluctuations due to rainfall variation through diversification of wildlife use: portfolio theory in a case study of south eastern Zimbabwe. *Tropical Conservation Science*, 6, 201-220.
- RICHARDSON, R. B., FERNANDEZ, A., TSCHIRLEY, D. & TEMBO, G. 2012. Wildlife Conservation in Zambia: Impacts on Rural Household Welfare. *World Development*, 40, 1068-1081.
- RUST, N. A. & MARKER, L. L. 2013. Attitudes Toward Predators and Conservancies Among Namibian Farmers. *Human Dimensions of Wildlife*, 18, 463-468.
- SACHEDINA, H. & NELSON, F. 2010. Protected areas and community incentives in savannah ecosystems: a case study of Tanzania's Maasai Steppe. *Oryx*, 44, 390-398.
- SCHOLTE, P., NGUIMKENG, F. & IYAH, E. 2017. Good news from north-central Africa: largest population of Vulnerable common hippopotamus *Hippopotamus amphibius* is stable. *Oryx*, 51, 218-221.
- SELIER, S. A. J., PAGE, B. R., VANAK, A. T. & SLOTOW, R. 2014. Sustainability of elephant hunting across international borders in southern Africa: A case study of the greater Mapungubwe Transfrontier Conservation Area. *The Journal of Wildlife Management*, 78, 122-132.

- SNIJDERS, D. 2012. Wild property and its boundaries – on wildlife policy and rural consequences in South Africa. *Journal of Peasant Studies*, 39, 503-520.
- SNYDER, K. A. & SULLE, E. B. 2011. Tourism in Maasai communities: a chance to improve livelihoods? *Sustainable Tourism*, 19, 935-951.
- SOGBOHOSSOU, E. A., BAUER, H., LOVERIDGE, A., FUNSTON, P. J., DE SNOO, G. R., SINSIN, B. & DE IONGH, H. H. 2014. Social structure of lions (*Panthera leo*) is affected by management in Pendjari Biosphere Reserve, Benin. *PLoS One*, 9, e84674.
- SOGBOHOSSOU, E. A., DE IONGH, H. H., SINSIN, B., DESNOO, G. R. & FUNSTON, P. 2011. Human–carnivore conflict around Pendjari Biosphere Reserve, northern Benin. *Oryx*, 45, 569-578.
- STÖRMER, N., WEAVER, L. C., STUART-HILL, G., DIGGLE, R. W. & NAIDOO, R. 2019. Investigating the effects of community-based conservation on attitudes towards wildlife in Namibia. *Biological Conservation*, 233, 193-200.
- SUICH, H. 2013. The effectiveness of economic incentives for sustaining community based natural resource management. *Land Use Policy*, 31, 441-449.
- WALTER, M., MEYER, B. & KIFFNER, C. 2009. Habitat availability, hunting or poaching: what affects distribution and density of large mammals in western Tanzanian woodlands? *African Journal of Ecology*, 47, 737-746.
- WHITE, P. A. & BELANT, J. L. 2015. Provisioning of Game Meat to Rural Communities as a Benefit of Sport Hunting in Zambia. *PLoS One*, 10, e0117237.
- WILFRED, P. 2012. Trophy Hunting and Trophy Size in Ugalla Game Reserve, Western Tanzania. *Tanzanian Journal of Science*, 38.
- WILFRED, P., MILNER-GULLAND, E. J. & TRAVERS, H. 2019. Attitudes to illegal behaviour and conservation in western Tanzania. *Oryx*, 53, 513-522.
- WILLIAMS, S. T., WILLIAMS, K. S., LEWIS, B. P. & HILL, R. A. 2017. Population dynamics and threats to an apex predator outside protected areas: implications for carnivore management. *R Soc Open Sci*, 4, 161090.
- WRIGHT, C. V. 2016. Turbulent times: fighting history today in Tanzania's trophy hunting spaces. *Journal of Contemporary African Studies*, 34, 40-60.
- YASUDA, A. 2011. The impacts of sport hunting on the livelihoods of local people: a case study of Bénoué National Park, Cameroon. *Society & Natural Resources*, 24, 860-869.
- YASUDA, A. 2012. Is sport hunting a breakthrough wildlife conservation strategy for Africa? A case study of northern Cameroon. *Field Action Science Reports: FACTS Reports*, 6.
- YITBAREK, T. W., TADIE, D., TIMER, G. & FISCHER, A. 2013. Evaluating governance processes in the sharing of revenues from wildlife tourism and hunting in Ethiopia. *Environmental Conservation*, 40, 253-265.
- ZAFRA-CALVO, N. & MORENO-PEÑARANDA, R. 2018. Exploring local people's views on the livelihood impacts of privately versus community managed conservation strategies in the Ruvuma landscape of North Mozambique-South Tanzania. *Journal of environmental management*, 206, 853-862.