



Biodiversity conservation and restoration and Poverty Reduction

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Question

How can landscape approaches to biodiversity conservation and restoration contribute to poverty reduction? Please provide some examples of specific interventions and their impact. What are the challenges related to transboundary approaches?

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1. Summary

Reconciling the twin goals of biodiversity conservation and restoration, and poverty reduction is difficult. A number of factors seem to influence effectiveness across intervention types including context, intervention design, governance and management quality, community engagement and participation, and intervention or programme length. This report largely focuses on outcomes from protected areas, payments for ecosystem services and community-based strategies. Protected areas can range from strictly protected to sustainable use PAs and from government-managed to community-managed areas (Woodhouse & Bedelian, 2018).

There is mixed evidence about the biodiversity and poverty reduction outcomes of PAs, but a general sense that PES can lead to positive outcomes in both spheres. There is evidence that PAs have reduced deforestation, but biodiversity outcomes appear to vary by species. One robust study demonstrates that habitat corridors can increase conservation and decrease rates of extinction (Damschen et al., 2019). There is some evidence that PAs have produced negative outcomes for poverty reduction and human well-being, and some evidence that PAs have contributed to poverty alleviation. Positive outcomes across the two spheres from PES programmes include reducing deforestation, improving water quality, increasing food security and improving poverty status (Clements & Milner-Gullard, 2014; Bottazzi et al., 2018).

Key findings

There is some evidence that outcomes are context dependent and related to the length or age of the intervention. Positive poverty reduction outcomes in Nepal's PAs are partly linked to the length of time the PA in question has been established. Wildlife repopulation, the benefits generated by ecosystem conservation, the development of new models of resource use and the adoption of a new legal framework all take time to establish, as do creating and strengthening human capacities for management and governance (AFD, 2016). Lee (2018) argues that the positive conservation outcomes in the Burunge WMA are linked to its age, its location close to two national parks, Tanzania's large ecotourism industry, and capacity building for village game scouts and management of the WMA.

Protected areas

Restricting access to natural resources can have negative poverty impacts for affected households, especially for communities living in PAs, who may be more dependent on non-timber forest products and other resources. Losing access to natural resources can lead to affected communities not supporting conservation (AFD, 2016). A small number of studies suggest that maintaining community access to resources or living within a PA can result in better human well-being outcomes.

Creation and management of PAs can undermine customary land rights (Pyhala et al., 2016). Evidence from India shows that forest tenure reform marginalised indigenous women from rights to forest land and resources in village forest reserves (Woodhouse & Bedelian, 2018). Customary rules were replaced by new legal institutions that benefited men (Woodhouse & Bedelian, 2018).

Compensation for loss of resources or livelihoods often includes payments or alternative livelihood schemes. However, there have been mixed, often negative, outcomes for poverty reduction and human well-being. Alternative livelihood schemes are not always accessible to all

groups in a community or address community needs, or they are short-lived (Woodhouse & Bedelian, 2018).

Tourism is often an alternative livelihood strategy in PAs or a compensation mechanism through arrangements for affected communities to receive a share of the PA's tourism income. However, it is important to remember that tourism takes a while to establish, needs a range of supporting infrastructure, and, communities may not be able to access tourism-related livelihood opportunities for a number of reasons including capacity and education (Woodhouse & Bedelian, 2018; AFD, 2016).

Two robust studies suggest that capacity is the key governance and management aspect related to positive biodiversity outcomes in PAs. Other factors are also likely to be important, but, very few studies examine the quality of PA governance and management.

Many landscapes such as the Great Limpopo Transfrontier Park, the Congo Basin and Mount Elgon include a number of different protected areas and national parks in different countries. These areas and parks often have different governance arrangements and there is evidence that outcomes vary by area. For example, Integra (2017) reported positive biodiversity outcomes from the Congo Basin, whilst Pyhala et al. (2016) found largely negative outcomes in 34 areas sampled. Petrusson et al. (2013) suggests that issues that are truly transboundary in nature should be identified and governance structures created that directly address those issues. Due to the time constraints of this report, it was not possible to undertake a thorough review of the literature related to transfrontier park governance, which is small but growing.

Understanding people's motivation

Understanding motivation for participating in PES programmes and barriers to participation is important. The design of some PES programmes means that the poorest households are not able to participate.

Interventions to reduce wildlife crime are most effective when addressing the underlying motivations of people involved, delivered through community engagement strategies. There is some evidence from Uganda that wildlife crime, such as illegal wildlife trade, is linked to households that do not receive any benefits from PAs tourism revenue sharing, or experience human wildlife conflict.

Community engagement

The nature and quality of community engagement and participation in PA planning and management partly conditions outcomes. A lack of community participation in managing wildlife in the Limpopo National Park, Mozambique, and in the PA's governance and management partly contributed to limited socio-economic benefits for communities. In the case of Mount Elgon, establishment and governance of protected areas in both Uganda and Kenya has sparked conflict related to rights to land, access to park resources, relocations, and resettlements (Petrusson et al., 2013).

There is mixed evidence for the effectiveness of community based natural resources management for biodiversity and poverty reduction. This suggests that other factors such as how the intervention is implemented and the context may be important. Although, there is positive evidence that community engagement and participation leads to positive outcomes

including increased food security, increased animal density inside PAs, reduced deforestation, and reduced wildlife crime.

Complementary strategies

PA and PES can be complementary strategies. For example, Clements & Milner-Gullard (2014) found that implementation of PES programmes in northern Cambodia would not have been possible without the protective effect of the PAs.

There is a small body of evidence that suggests positive outcomes require a range of complementary strategies. For example, community engagement strategies to combat illegal wildlife trade and poaching often employ more than one strategy. In the Greater Kilimanjaro Landscape (Kenya and Tanzania) strategies include involvement in law enforcement, incentives for wildlife stewardship and human-wildlife conflict mitigation (Roe & Booker, 2019).

The evidence base

There is a limited evidence base for the efficacy of a number of interventions in terms of both biodiversity and poverty reduction outcomes. For example, Clements & Milner-Gullard (2014) argue that there are few rigorous evaluations of the environmental and social impacts of protected areas (PAs) and payments for ecosystem services (PES). Whilst Roe & Booker (2019) highlight the dearth of evidence on effectiveness of community-based strategies to tackle international wildlife crime (IWT).

This report reviews a mix of impact evaluations, randomised control trials, peer reviewed academic literature and grey literature. Within this, studies use different measures for poverty reduction and human well-being outcomes including income, food security, and access to resources. Consequently, this report understands poverty reduction outcomes quite broadly.

Due to the time constraints of this review, it was not possible to review the literature related to carbon mitigation and sequestration outcomes. However, biodiversity conservation interventions, particularly those that avert deforestation are likely to have positive outcomes for carbon mitigation as illustrated by Jayachandran et al., (2017). The consideration of alternative livelihood strategies, aside from tourism, which was a common strategy in the evidence base, is also limited due to time constraints.

2. Increasing biodiversity (habitats and species)

Protected areas

The evidence base suggests protected areas have mixed biodiversity outcomes. Protected areas can reduce deforestation in forest habitats (Geldman et al 2013, Coad et al 2015), and contain higher abundance and diversity of species (Coetzee 2014). Clements & Milner-Gullard's (2014) impact evaluation found that deforestation rates were reduced by approximately 60% in two PAs in northern Cambodia compared to control areas. A global meta-analysis on the effectiveness of protected areas has shown that the positive effects on biodiversity are primarily due to land use differences (Gray et al 2016). PAs have, compared to the counterfactual of no protection, protected biodiversity (Eklund & Cabeza, 2017).

Geldmann et al. (2017) argue that the **paucity of direct data on changes in biodiversity constrains our understanding of the performance of protected areas globally** and the

extent to which they safeguard biodiversity is debated. Burivalova et al. (2019) identified two studies that found biodiversity is better inside a PA than outside, however, they also identified one study that found 80% of reserves experienced a decline in biodiversity value over time, suggesting low effectiveness.

There is also mixed evidence from the same landscape, for example, the Congo Basin. A 2016 report by the Rainforest Foundation UK, based on a sample of 34 protected areas across Cameroon, Central African Republic, DRC, Gabon and Republic of Congo concluded that conservation efforts are failing to protect biodiversity (Pyhala et al., 2016). Pyhala et al. (2016) argue that biodiversity is declining, with large mammal populations in particular declining at alarming rates. There is some evidence that protected areas are doing better than extractive land use areas (e.g. logging concessions) in protecting fauna, but this is not necessarily a consistent outcome (Pyhala et al., 2016).

In contrast, a 2017 evaluation of USAID's Central Africa Regional Programme for the Environment (CARPE) found that activities to protect rainforests in the Congo Basin had contributed to biodiversity conservation with vulnerable species within protected areas in CARPE landscapes (including protected areas and community managed land units) being in a better condition compared to those in non-CARPE areas (Integra, 2017).

Habitat corridors

Habitat connectivity can increase rates of colonisation and decrease rates of extinction (Damschen et al., 2019). A habitat fragmentation experiment in South Carolina, USA manipulated connectivity through the creation of habitat corridors connecting otherwise isolated habitat fragments (Damschen et al., 2019). Both fragments and corridors are being restored to longleaf pine savannah and are surrounded by dense pine plantations that limit herbaceous plant growth (Damschen et al., 2019). Results include (Damschen et al., 2019):

- Annual colonisation rates for 239 plant species in connected fragments are 5% higher and annual extinction rates 2% lower than in unconnected fragments;
- This has resulted in a steady, non-asymptotic increase in diversity, with nearly 14% more species in connected fragments after 18 years.
- Connecting fragments with corridors results in a 1- to 6-year reduction in the time it takes an individual species to colonise new habitat fragments, relative to the time needed for colonisation of unconnected fragments

Damschen et al. (2019) argue that their results suggest the full biodiversity value of connectivity cannot be effectively evaluated over short time scales, and can be maximised by connecting habitat sooner rather than later. Landscape connectivity offers substantial, complementary and persistent gains in biodiversity (Damschen et al., 2019).

Tropical forests

The evidence base for different interventions is mixed (Burivalova et al., 2019). Burivalova et al. (2019) evaluated four mainstream strategies (forest certification and reduced impact logging; payments for ecosystem services; protected areas, and community forest management) for tropical forest conservation in terms of 35 environmental, social, and economic metrics. A total of 161 studies with 570 data points (with each point corresponding to one of the four conservation

strategies) were included in the database (Burivalova et al., 2019)¹. Key findings include (Burivalova et al., 2019):

- The scientific literature on the effectiveness of conservation strategies in tropical forests is still vastly inadequate, due to poor design, lack of scope, and too few examples; and a lack of rigorous studies assessing a wide range of real-world conservation example;
- The effects of conservation on biodiversity and the economic outcomes of conservation are particularly understudied. Many studies and conservation projects assume forest cover is a good proxy for biodiversity. This is not always a valid assumption as hunting, climate change and forest degradation are major threats to species survival. Biodiversity is also more difficult and expensive to measure than deforestation, which can be relatively reliably estimated from satellite imagery.

Land-use

Land sparing logging is a more promising strategy for maximising the biological value of logging operations than land sharing (Edwards et al., 2013). Edwards et al. (2013) evaluate the impacts of land sharing (combines timber extraction with biodiversity protection across the concession) and land sparing logging (higher intensity logging is combined with the protection of intact primary forest reserves). The two strategies were evaluated by comparing the abundances and species richness of birds, dung beetles and ants in Borneo (Edwards et al., 2019). Within each taxonomic group, more species had higher abundances with land sparing than land sharing, which translated into significantly higher species richness with land sparing concessions (Edwards et al., 2013). The results were similar when focusing only on species found in primary forest (Edwards et al., 2013). There is also some evidence that animal species may fare better under reduced impact logging, however, once logging intensity is taken into account, the improvement in terms of species richness and abundance becomes smaller (Burivalova et al., 2019).

3. Protected areas: biodiversity and poverty reduction outcomes

A 2018 policy and practice brief by Ecosystems Services for Poverty Alleviation argues that **protected areas have often failed to achieve both improving the wellbeing of local people and ecological goals** (Woodhouse & Bedelian). Peturrsson et al. (2013) argue that the man versus nature perspective, still implicit in most PA strategies, has contributed to severe social impacts and to a situation in which management failures and park-people conflicts are more the rule than the exception. Simultaneously, environmental degradation has not been avoided, with key issues in the Mount Elgon PAs being forest degradation and wildlife depletion (Peturrsson et al., 2018).

Evidence from Nepal suggests that PAs have had poverty reduction impacts. den Braber et al.'s (2018) study assesses how PAs in Nepal have influenced poverty, extreme poverty and inequality with a particular focus on tourism. Key findings include: PAs have reduced overall

¹ Burivalova et al. (2019) created an interactive, nontechnical visualisation of the available evidence on the effectiveness of the four strategies. This platform can be accessed here: <https://www.conservationeffectiveness.org/>.

poverty and extreme poverty, and have not exacerbated inequality; benefits occurred in both lowland and highland regions and were often greater when a larger proportion of the area was protected; the spread of benefits to areas outside the PAs was negligible; and, older PAs performed better than more recently established ones (den Braber et al., 2018). In terms of tourism, whilst this was a key driver of poverty reduction, PAs also reduced extreme poverty in areas that received fewer tourists (den Braber et al., 2018).

The socio-economic outcomes of PAs are in need of further, rigorous study (Burivalova et al., 2019). Burivalova et al. (2019) found very few rigorous studies on social outcomes of PAs, including community wellbeing and livelihoods, but these did show mostly positive outcomes. However, PAs had mostly negative outcomes in terms of community access to forest land and they tended to exacerbate human-wildlife conflict (Burivalova et al., 2019). Within this small evidence base there were almost no studies that quantified the economic losses or gains from PAs (Burivalova et al., 2019).

Access to resources and compensation

It is difficult to reconcile the twin goals of biodiversity conservation and poverty reduction (AFD, 2016; Woodhouse & Bedelian, 2018; Peturrsson et al., 2013). Key areas include community access to natural resources, compensation for loss of land or access to resources, and alternative livelihoods strategies, which in the context of PAs often include tourism.

Protected areas are only likely to help poor people in the local area if they can still access natural resources within the park (Woodhouse & Bedelian, 2018). Restricting access to ecosystem services (e.g. food, fibre, medicinal plants) may push poor people deeper into poverty (Woodhouse & Bedelian, 2018). For example, approximately 2 million people live in administrative districts bordering protected areas in Mount Elgon in Uganda and Kenya, with high dependence on mountain natural resources (Petrusson et al., 2013). The establishment and governance of the protected area has sparked conflict in both countries related to rights to land, access to park resources, relocations, and resettlements (Petrusson et al., 2013).

Common strategies in PA conservation to compensate for household losses, such as access to resources, include cash payments, alternative livelihoods, payments for ecosystem services (PES), and compensation for wildlife damage/human-wildlife conflict (Woodhouse & Bedelian, 2018). The establishment of the Derma forest corridor in Tanzania from the 1990s onwards involved the appropriation of 960 hectares of land, with monetary compensation to over 1,100 claimants (Hall et al., 2014). Whilst data suggests the forest corridor enhanced forest connectivity and conditions, the compensation payment failed to mitigate livelihood losses, especially amongst the poorest (Hall et al., 2014). Affected people often view compensation as insufficient, for example, material compensation is not commensurate for loss of life or a cultural loss (Woodhouse & Bedelian, 2018). PES are considered in section 4 of this report.

Compensation schemes can be viewed as positive if they are reinforced with greater engagement and commitment beyond the provision of one-off compensatory payments (Woodhouse & Bedelian, 2018). For example, swift compensation for the predation of livestock in India, facilitated by mobile phone technology, has improved tolerance of wildlife (Woodhouse & Bedelian, 2018). The compensation programme was combined with other methods to mitigate conflict, including protecting livestock corrals and locating conflict hotspots, which showed authorities' commitment and recognition of the problem (Woodhouse & Bedelian, 2018).

Alternative livelihood schemes are also not always accessible to all groups in a community due to biases associated with knowledge, age, gender or wealth (Woodhouse & Bedelian, 2018). They also do not necessarily address communities' needs, interests or culture, making them short-lived and likely to fail (Woodhouse & Bedelian, 2018). Benefits can be small, giving communities no incentive to support conservation (Woodhouse & Bedelian, 2018). Dependence on ecosystem services can limit poor people's livelihood options and capacity to engage in alternative livelihood schemes (Woodhouse & Bedelian, 2018). For example, community members who are reliant on fishing as their dominant livelihood strategy will have limited flexibility to engage in tourism schemes (Woodhouse & Bedelian, 2018).

A number of measures can support more equitable conservation including (Woodhouse & Bedelian, 2018):

- Protected area managers should recognise that conservation activities can affect many aspects of local people's wellbeing, including non-material aspects
- PA management should ensure that the **poor have long-term access to ecosystem** services that support human wellbeing, either within the PA or, as a last resort, by creating opportunities outside of the PA.
- In developing long-lasting and cost-effective alternative livelihoods programmes, there should be **early dialogue with communities** so particular activities or schemes introduced match the needs, values, and culture of a particular community.
- It is important that PA programmes and interventions do not just focus on the poor, but also recognise the role of the wealthy in resource extraction/creating pressure on PA resources.
- **Compensation is rarely sufficient to offset the negative impacts** that local people may suffer when their access to and use of natural resources is restricted. There should be a shift from one-off compensation to ongoing and adaptive engagement with affected communities
- **Governance of protected areas must be more equitable**, allowing for full and effective participation by and partnership between protected area managers and local communities during the designation, planning and implementation stages. Barriers preventing participation can include costs for communities in terms of time and resources, so partnerships that share costs and benefits may be the best approach. Participation also needs to be inclusive, with care taken to engage all groups.
- **Tenure rights** can play a vital role in securing local people's rights and incentives to conserve the environment but must be approached sensitively, to ensure that formal tenure processes do not marginalise poor people further. There is evidence from India that forest tenure reform marginalised indigenous women from rights to forest land and resources in village forest reserves as their customary rules were replaced by new legal institutions that benefited men.

Protected areas case studies

The Congo Basin

Evidence from the Congo Basin includes mixed outcomes. Endamana et al.'s (2010) study found that there was little change in either livelihood or conservation indicators over the period 2006 to 2008 in the Tri-National de la Sangha, shared by Cameroon, the Central African Republic and the Republic of Congo. The activities of conservation organisations had only modest impacts on either (Endamana et al., 2010). Weak institutions and corruption were the

major obstacles to achieving either conservation or development objectives (Endamana et al., 2010). In contrast, as mentioned above, a 2017 USAID impact evaluation found positive biodiversity outcomes (Integra, 2017). However, the same evaluation states that livelihood alternative initiatives are too limited in scope, under-conceptualised, and too poorly executed to be effective in reducing deforestation and forest degradation, as well as de-faunation driven by high levels of bush-meat consumption and trade (Integra, 2017)².

A 2016 Rainforest Foundation UK report concludes that “Conservation efforts in the Congo Basin are mostly failing to protect forests and biodiversity, having serious negative impacts on local populations, and for these reasons are probably unsustainable” (Pyhala et al., 2016). Key findings from a sample of 34 protected areas in the basin include (Pyhala et al., 2016):

- Creation and management of protected areas undermine customary land rights. In at least 26/34 areas sampled there was partial or complete relocation or displacement of local indigenous and farming communities, without compensation. No examples were found of customary land tenure mapping or other documenting processes taking place prior to PA creation.
- PAs diminish already strained local livelihoods through restrictions on livelihood activities and access to resources including food and food products (which often provide an income). There was evidence of revenues for local people from park activities (mainly local people acting as rangers or tourists guides) in only 8/34 areas.
- Indigenous people suffer disproportionately: areas targeted for conservation often coincide with traditional lands, and indigenous peoples’ nomadic or semi-nomadic lifestyles depend on use of extensive areas of forests, which often overlap with PAs.
- The relationship between forest peoples and conservationists is largely conflictual
- While local communities face severe restrictions on their livelihoods, extractive industries and large scale habitat destruction are encouraged by national governments: 62% of areas sampled for the study have mining concessions inside (a further 12% have mining concessions just on the border of the park); 39% have oil concessions inside; , and 68% have logging concessions directly bordering the park. The impacts that these extractive industries are having on both biodiversity and on local communities’ health and wellbeing in the region remains unaddressed and understudied.

The Great Limpopo Transfrontier Park (GLTP)

Evidence from the GLTP suggests that whilst there have been some biodiversity benefits, there have not been poverty reduction benefits in Mozambique and Zimbabwe (AFD, 2016; Zanamwe et al., 2018). A 2016 impact evaluation of Agence Française de Développement (AFD) support for the Limpopo National Park (LNP) in Mozambique found limited impact on socio-economic development and improving living conditions, but some contribution to preserving the ecological integrity of the park (AFD, 2016). The LNP had generated few benefits for residents since its establishment in 2001 and residents’ did not necessarily support the park’s conservation objectives (AFD, 2016). Reasons for this include: minimal development of tourism in the park;

² USAID funded activities focus on sustainably managing targeted forest landscapes, mitigating threats to biodiversity in those landscapes, establishing policy and regulatory environments supporting sustainable forest and biodiversity conservation, and strengthening capacity to monitor forest cover change, greenhouse gas emissions, and biodiversity (Integra, 2017).

poor understanding by the LNP authorities of how residents use natural resources; residents experienced negative impacts of biodiversity conservation including loss of access to productive resources, and more human-wildlife conflict (AFD, 2016). The impact evaluation argues that this is partly because residents are not involved in managing wildlife in the park (AFD, 2016).

Poverty reduction outcomes in both Mozambique and Zimbabwe are assumed to be delivered through tourism development. However, in both countries, local communities have limited capacity to benefit from tourism (AFD, 2016; Zanamwe et al., 2018). Zanamwe et al.'s (2018) case study on ecotourism and wildlife conservation-related enterprise development by local communities in south-eastern Lowveld, Zimbabwe, argues that transfrontier conservation has not led to poverty reduction, improved cross-border ecotourism, or wildlife conservation-related enterprise development (Zanamwe et al., 2018).

4. Payments for ecosystem services: biodiversity and poverty reduction outcomes

PES can deliver both biodiversity conservation and human well-being outcomes. However, there is a relatively small evidence base studying both sets of outcomes (for examples PES are not well-studied from a biodiversity perspective in South and Central America) and there is some evidence suggesting negative biodiversity impacts (Burivalova et al., 2019). For example, a small body (approximately 2 studies) of evidence from China, which has the world's largest PES programme, is negative as results show a decline in animal and tree diversity (Burivalova et al., 2019).

However, overall there is a sense in the literature reviewed for this report that PES can have positive outcomes for both biodiversity and human well-being. Burivalova et al.'s (2019) review found 17 data points across 161 studies evaluating the impact of PES on deforestation and forest degradation, all of which showed either a decline or no significant change in deforestation, with more cases of positive change than no change. Positive outcomes for human well-being include several studies that found that land tenure security improved with the implementation of PES projects (Burivalova et al., 2019). Sometimes secure land tenure was an important reason for participants to re-enrol their land in the programme, even if they did not perceive financial benefits from the programme (Burivalova et al., 2019).

Evidence from northern Cambodia illustrates that PES can deliver positive biodiversity and human well-being outcomes. Clements & Milner-Gullard's (2014) impact evaluation measured the impacts on forest conservation (in terms of deforestation) and human well-being (in terms of poverty (using the Basic Necessities Survey), rice harvests, food security, and education level of each household member) from three different PES programmes instituted within two PAs in northern Cambodia. The three PES programmes were: direct payments for protection of nests of globally threatened birds in six villages; community-managed ecotourism conditional upon wildlife and habitat protection in two villages; and, payment of premium prices for agricultural goods to households that kept to the land-use plans in four villages (Ibis Rice), which included those with ecotourism and the birds nest protection programme (Clements & Milner-Gullard, 2014).

Key findings include (Clements & Milner-Gullard, 2014):

- Both PES and PAs delivered additional environment outcomes relative to the counterfactual: reducing deforestation rates significantly relative to controls (approximately 60%) and protection of globally threatened wildlife species.
- The impacts of PES on household well-being were related to the magnitude of the payments provided. The two higher paying market-linked PES programmes (ecotourism and Ibis Rice) had significant positive impacts, whereas a lower paying programme (bird nest protection) that targeted biodiversity protection had no detectable effect on livelihoods, despite its positive environmental outcomes.
- The PES programmes had significant positive impacts on livelihoods for those that could afford to participate. Households that signed up to the Ibis Rice and ecotourism programmes improved their poverty status at a greater rate than non-PES households from the same villages. Ibis Rice households also increased their rice harvests and improved their food security at a faster rate than other comparable households. Households that received high payments from the ecotourism and Ibis Rice programs were able to afford to keep their children in school for longer and to pay for them to attend secondary and high schools away from their home villages. The Bird Nests programme had no additional impact on household wellbeing, perhaps because the payments were significantly lower than the other schemes

PES can lead to additional conservation, but there is some evidence that some people were given payments who would not have deforested their land anyway (Bottazzi et al, 2018; Burivalova et al., 2019; Clements & Milner-Gullard, 2014). Evidence from the Rio Grande catchment in the Bolivian Andes suggests that PES can lead to additional conservation (i.e. conservation that would not have happened without the programme) (Bottazzi et al., 2018). The Watershed programme aims to conserve biodiversity and improve water quality by incentivising farmers to prevent forest conversion and exclude cattle from riparian forest (Bottazzi et al., 2018). Results from Bottazzi et al.'s (2018) study include that up to 39% of contracts to exclude cattle and 14% to prevent deforestation appear to be additional conservation (Bottazzi et al., 2018).

Carbon mitigation

PES transfers to reduce deforestation can have both biodiversity and climate change mitigation benefits (Jayachandran et al., 2017). A PES programme in Uganda included annual payments of 70,000 Ugandan shillings per hectare to forest-owning households if they preserved their forest (Jayachandran et al., 2017). A randomised control trial of the programme found that tree cover declined by 4.2% in villages receiving the transfer as opposed to 9.1% in control villages (Jayachandran et al., 2017). There was no evidence that participants shifted their deforestation to nearby land (Jayachandran et al., 2017). The programme averted/delayed 183.5 metric tonnes of CO₂ emissions per eligible private forest owner (Jayachandran et al., 2017). A cost-benefit analysis of the delayed CO₂ emissions found that the programme benefit was 2.4 times as large as the programme cost (Jayachandran et al., 2017).

Programme design

Understanding motivation for participating in PES programmes and barriers to participation is important (Bottazzi et al., 2018; Clements & Milner-Gullard, 2014). Bottazzi et al. (2018) argue that there is some evidence that additional conservation occurs if people are motivated by something in addition to or as well as financial incentives (Bottazzi et al., 2018).

Targeting programmes can also be difficult as it may be hard or not socially desirable to enrol only those participants who would deforest their patch of land with high certainty in the absence of payments (Burivalova et al., 2019).

The impacts of PES programmes on human well-being depend on programme design and entry barriers can stop the poorest households from participating (Clements & Milner-Gullard, 2014). Two of the three PES programmes evaluated by Clements & Milner-Gullard (2014) had entry constraints. For example, to participate in the Ibis Rice programme, participants needed to have sufficient land to produce agricultural surplus to sell to the programme. In contrast, the Bird Nests programme provided a proportion of the direct payment up front and required no capital assets to join, meaning any household could participate (Clements & Milner-Gullard, 2014). The ecotourism programme targeted poor female-headed household through participation in a women's group that sold supplies to tourists, whereas all Ibis Rice households were headed by men (Clements & Milner-Gullard, 2014).

Protected areas and payments for ecosystem services can be complementary strategies. For example, Clements & Milner-Gullard (2014) found that implementation of PES programmes in northern Cambodia would not have been possible without the protective effect of the PAs. The PAs mitigated external drivers of ecosystem loss including in-migration to existing villages, formation of new settlements, and the gazettement of large-scale concessions for agro-industrial development within PAs (Clements & Milner-Gullard, 2014). PAs also increased security of access to land and forest resources for local households, benefiting forest resource users but restricting households' ability to expand and diversify their agriculture (Clements & Milner-Gullard, 2014). However, the impacts of PAs on household well-being were limited overall and varied between livelihood strategies (Clements & Milner-Gullard, 2014).

Unconditional transfers

Unconditional transfers are less well understood from a theoretical perspective than PES transfers. However, their use is particularly attractive in the sector for areas outside of PAs where the scope for using conditionality on land use is more limited (Wilebore et al., 2019).

Wilebore et al. (2019) used a randomised control trial to evaluate the impact of unconditional livelihood payments (through vouchers) to local communities on land use outside the Gola Rainforest National Park, Sierra Leone. The one-off, unconditional payment, resulted in increased land clearance for agriculture (Wilebore et al., 2019). This is potentially because the payment relieved constraints on land clearing, which is usually undertaken by male agricultural labour early in the season, as opposed to post-land clearance activities, which are undertaken by women (Wilebore et al., 2019). Although, results do show that increased land clearing was predominately carried out on land with young vegetation regrowth: the rate of clearing mature forests, including within the Gola Rainforest National Park, remained low and unchanged (Wilebore et al., 2019).

Unconditional transfers may be less effective at achieving positive biodiversity outcomes. Unconditional transfers rely on indirect mechanisms to alter local community or household behaviour including income effects, goodwill or reciprocity, the purchase of land-saving technology, or general equilibrium effects discouraging local deforestation (Wilebore et al., 2019). In contrast, conditional PES transfers, are linked to the altered behaviour (Wilebore et al., 2019).

5. Governance and management

Biodiversity outcomes

There is some evidence that governance and management processes can affect biodiversity outcomes. However, understanding of the relationship between management inputs and biodiversity outcomes in protected areas remains weak (Geldmann et al., 2017). This is partly because assessing the effectiveness of PAs is difficult and requires a multifaceted approach and an understanding of their contextual setting (Eklund & Cabeza, 2017). A deeper understanding of the causal role of quality of governance is needed (Eklund & Cabeza, 2017).

This reviewed identified two robust studies, both of which suggest capacity is a key factor. Brenes et al. (2018) impact evaluation of 12 protected areas in three Central American countries assesses how governance processes and management structures (restrictions, capacity, and decentralisation) affect changes in the Normalised Difference Vegetation Index (NDVI). Findings include that on average (Brenes et al. (2018):

- strict and multiple-use PAs have a significant and positive effect on NDVI compared to non-protected land uses;
- both high and low decentralised PAs also positively affect NDVI;
- high capacity PAs have a positive and significant effect on NDVI, while low capacity PAs have a negative effect on NDVI;
- Findings suggest that capacity may be more important than governance type or management restrictions in maintaining and enhancing NDVI.

Geldmann et al. (2017) examine whether protected areas management quality impacts biodiversity outcomes using data on changes in native species populations (vertebrates) across 73 terrestrial protected areas in 29 countries outside of North America, Western Europe and Australia (Geldmann et al., 2017). Management quality includes factors such as staffing, management plans, and stakeholder engagement (Geldmann et al., 2017). Data is derived from the Management Effectiveness Tracking Tool (METT) and the Living Planet Database (LPD): the largest global quantitative data sets on management inputs and time-series of animal populations, respectively (Geldmann et al., 2017). Findings include that capacity and resources (including adequacy of staff, budgets and available equipment) was the only dimension of management associated with positive changes in populations (Geldmann et al., 2017).

Geldmann et al. (2017) do not take their results to imply that local stakeholder engagement, monitoring and enforcement, or planning are not important in ensuring effective PAs, but rather that their relative importance may be related to other performance measures (e.g., equity and economic benefits, or species and ecological representation).

A number of other factors have been suggested that could influence PA effectiveness in achieving biodiversity outcomes. These include adequate resourcing. However, funding for managing protected areas has not kept pace with increases in protected areas coverage (Geldmann et al., 2017). A 2016 assessment of the current state of the knowledge of the drivers of biodiversity outcomes in PAs finds that elements of PA design, management, and local and national governance challenges, species and system ecology, and socio-political context can all influence outcomes (Barnes et al., 2016). These elements also interact (Barnes et al., 2016).

Community participation and engagement

Community consultation and participation can be weak in PA establishment, administration and management. Pyhala et al. (2016) found that local communities were (reportedly) involved in management decisions in only 4 out of 34 sampled PAs in the Congo Basin; and, in only two cases were communities consulted before the establishment of a PA. The predominant approach has involved imposing strict top-down restrictions in terms of access to and use of forest resources, without tapping into customary conservation practices or traditional knowledge (Pyhala et al., 2016).

There are some examples of best practices in the Congo Basin, including establishment of dialogue mechanisms, community-based natural resource management initiatives in the periphery of protected areas, as well as attempts at involving local populations in management activities (Pyhala et al., 2016). However, these cases appear to be mostly symbolic, are clearly not part of a consistent policy and are certainly not representative of the typical situation in the region.

In the Limpopo National Park, Mozambique, the LNP's strategy did not include mechanisms for consultation about the way protected areas would be governed, which should have been negotiated as part of a territorial project (AFD, 2016). This partly stems from the LNP lacking the skills and capacity to undertake participatory planning and development (AFD, 2016).

There is some evidence that allowing people within PAs results in better livelihood outcomes. Clements & Milner-Gullard's (2014) study of PAs in northern Cambodia found that excluding outsiders from the PAs allowed local people to continue to use forest and land resources for their livelihoods based upon their legal rights under Cambodian law, including use of forest resources (especially resin) and farming within agreed land-use plans. No resettlement occurred (Clements & Milner-Gullard, 2014). Whilst livelihood opportunities were restricted in terms of limiting crop types and some land clearance, there were notable benefits for forest resource users (Clements & Milner-Gullard, 2014).

The two PAs were in remote forest areas and contained 16 long-established villages comprising mainly subsistence farmers practicing either rain-fed paddy rice cultivation or shifting cultivation, and dependent on forest resources both as a safety net and for cash income, mainly from sales of liquid resins from dipterocarp trees (Clements & Milner-Gullard, 2014). Cambodian law allows local uses of natural resources in PAs, but forest clearance, commercial logging and hunting or trade in threatened species are illegal (Clements & Milner-Gullard, 2014). PA authorities allowed villagers to expand agriculture to a limited extent within agreed land use plans (Clements & Milner-Gullard, 2014).

Community based natural resources management

There is mixed evidence related to community based natural resource management regimes leading to positive human well-being outcomes. There is some evidence from Tanzania that areas under community-based natural resource management (CBNRM) do not improve household wealth compared to areas not under CBNRM, but they do improve food security (Woodhouse & Bedelian, 2018). Studies of community managed forestry (CFM) suggest that it either brings improvements or no change to community wellbeing; the empowerment and participation of communities in decision-making either improved or remained the same; whilst, several systematic reviews found that overall CFM did not improve families' economic situation

(Burivalova et al., 2019). Outcomes are context-dependent: one study found that as a result of CFM, wealth inequality decreased in Mexico, did not change in Bolivia and Kenya, and grew worse in Uganda (Burivalova et al., 2019).

Community based natural resource management of wildlife can be effective for conservation. Lee (2018) evaluated the conservation effectiveness of the Burunge wildlife management area (WMAs) in Tanzania. WMAs in Tanzania involve multiple villages designating land and managing it for wildlife conservation in return for a portion of subsequent tourism revenues (Lee, 2018). Key findings from Lee's (2018) evaluation include:

- Burunge WMA contained significantly higher densities of wild ungulates relative to adjacent village lands outside the WMA and lower densities of livestock;
- Densities of wild ungulates increased and livestock densities decreased within the hunting block area after changes in management that increased resource protections were enacted there;
- Apparent survival and population growth rate of giraffes in the hunting block area increased after the changes in management there, relative to a control site in Tarangire National Park.

Factors contributing to ecological effectiveness include: the age of the WMA (it was established in 2006); the large ecotourism industry in Tanzania; the Burunge WMA's location close to two popular national parks on the main tourism circuit; and, the village game scouts and management of the WMA were supported by training, technical assistance, and capacity building (Lee, 2018).

Time lags

Creating and strengthening human capacities, and changing legal and institutional frameworks are fundamental aspects of establishing national parks that require time and very targeted development strategies (AFD, 2016). One of the key challenges faced by the Limpopo National Park in Mozambique is developing national competencies in conservation and development (AFD, 2016). When the park was established in 2001, Mozambique had to put in place an administration from scratch, and the legal framework was not adapted to the reality of national parks in Mozambique as it made no provision for the presence of human populations, even though they live in nearly every national park in Mozambique (AFD, 2016). The legal framework was also not conducive to management models based on the development of tourism activities (AFD, 2016).

Assumptions underpinning PAs contribution to biodiversity and poverty reduction, may need a long time to come to fruition. For example, wildlife repopulation, the benefits generated by ecosystem conservation, the development of new models of resource use and the adoption of a new legal framework all take time to establish (AFD, 2016).

Transboundary challenges

Issues that are truly transboundary in nature should be identified and governance structures created that directly address those issues (Petursson et al., 2013). Examining the case of Mount Elgon in Uganda and Kenya, Petursson et al. (2013) argue that establishing a transboundary management regime as one, fully integrated regional regime whereby there is joint governance of adjacent protected areas across boundaries between sovereign countries,

would be seriously constrained by the interplay of complex institutional factors. It also runs the risk of reintroducing old top-down conservation paradigms, counteracting community conservation attempts and alienating local communities.

There are a range of governance regimes in place for the one protected area in Uganda and the four in Kenya that comprise the Mount Elgon area (Petrusson et al., 2013).

Protected park areas on both the Ugandan and Kenyan side had been administered under a 'fortress' style approach, whereby local communities were not allowed access to the parks, but were supposed to benefit from the parks through a share of tourism-gate entry fees (Petrusson et al., 2013). However, tourism numbers were low on both sides (Petrusson et al., 2013). The two forest reserves on the Kenyan side were governed for extractive use of forest resources (including local community extraction for a fee), although like the park areas, they prohibit permanent settlement and hunting (Petrusson et al., 2013).

6. Wildlife trade

Focusing solely on regulation is an inadequate response as it fails to address the real drivers of international wildlife trade (IWT) (Challender, Harrop & MacMillan, 2015). Drivers include rural poverty, growing relative poverty nationally and internationally, and consumer demand (Challender, Harrop & MacMillan, 2015). A focus on regulation also reduces the complex nature of IWT, which is linked to poverty alleviation, tenure rights, rural livelihoods and cultural traditions, to a law enforcement problem (Challender, Harrop & MacMillan, 2015). A regulatory approach can dis-incentivise conservation by restricting the direct use of wildlife on which rural communities depend socio-economically and culturally (Challender, Harrop & MacMillan, 2015). There is some evidence that demand for highly-threatened and high-value species is growing in East Asia and may be price-elastic, consequently, trade controls may not be effective (Challender, Harrop & MacMillan, 2015).

Interventions to reduce wildlife crime are most effective when addressing the underlying motivations of people involved in those crimes (Travers et al., 2019). Poverty is often assumed to be the key driver to wildlife crime (Travers et al., 2019). However, evidence from communities surrounding two national parks in Uganda includes that better-off households, those subject to human-wildlife conflict and those that do not receive any benefits from the parks' tourism revenue sharing were more likely to be involved in certain types of wildlife crime, especially illegal hunting (Travers et al., 2019). Findings from Travers et al.'s (2019) combined scenario interviews and a choice experiment predict that the interventions likely to have the greatest impact on reducing local participation in wildlife crime include mitigating damage caused by wildlife and generating financial benefits for park-adjacent households.

Community engagement strategies to combat the IWT include: involvement in law enforcement; increasing incentives for wildlife stewardship; human-wildlife conflict mitigation; support for non-wildlife-based livelihoods; and, education and awareness raising (Roe & Booker, 2019). Interventions often employ more than one engagement strategy. For example, in the Greater Kilimanjaro Landscape (Kenya and Tanzania) strategies include involvement in law enforcement, incentives for wildlife stewardship and human-wildlife conflict mitigation (Roe & Booker, 2019). Lee (2018) found that training and support of village rangers to conduct anti-poaching activities and prevent livestock encroachment resulted in greater wildlife densities and lower livestock densities in the Burunge WMA. There is some evidence that PES do not change

the levels of illegal hunting, which would have direct consequences for biodiversity (Burivalova et al., 2019).

Roe & Booker's (2019) evidence review on community engagement strategies identified 50 case studies, however, only 19 of these include data on effectiveness. Of this sample 14 case studies reported that they were effective, although in four cases this effectiveness was partial (Roe & Booker, 2019). Overall, the review argues that there are examples of community engagement initiatives reducing poaching and/or improving wildlife numbers (Roe & Booker, 2019). **Common lessons from this body of evidence to inform best practice include** (Roe & Booker, 2019: 8):

- Initiatives should be locally driven and responsive to the local context: Involving communities in actually defining solutions, not just engendering a culture of passive reliance on externally provided benefits, was reported to be key.
- Community ownership and a voice in decision-making.
- A need to understand the root causes of poaching and developing proactive, rather than reactive, strategies to address it.
- Where poaching is driven by poverty, functioning, sustainable benefits flows need to be put in place and benefits need to be realised early on. These benefits do not necessarily need to be financial.
- A long-term relationship between project implementers and local people based on shared objectives, trust and reciprocity is important.
- Multi-stakeholder partnerships were often central to successful initiatives, not just to get the necessary support for community engagement (e.g., through government endorsement) but also to generate the necessary mix of skills, science, technical and financial support, transparency, and accountability.
- Identifying and building on cultural norms.

7. References

- AFD (2016). *Ex Post Written and Audiovisual Evaluation of the Limpopo National Park Development Project*. Ex Post evaluation N. 61. <https://issuu.com/objectif-developpement/docs/61-va-evaluation-capitalisation>
- Barnes, M.D., Craigie, I.D., Dudley, N. and Hockings, M. (2017). Understanding local-scale drivers of biodiversity outcomes in terrestrial protected areas. *Annals of N.Y. Academy of Science*, 1399, pp. 42-60. doi:10.1111/nyas.13154
- Muñoz Brenes CL, Jones KW, Schlesinger P, Robalino J, Vierling L (2018) The impact of protected area governance and management capacity on ecosystem function in Central America. *PLoS ONE* 13.10. <https://doi.org/10.1371/journal.pone.0205964>
- Bottazzi, P.; Jones, J.P.G.; Crespo, D.; Wiik, E. (2018). Payment for environmental "self-service": exploring the links between farmers' motivation and additionality in a conservation incentive programme in the Bolivian Andes. *Ecological Economics*, 150, pp. 11-23, <https://doi.org/10.1016/j.ecolecon.2018.03.032>
- den Braber, B, Evans, KL, Oldekop, JA. (2018). Impact of protected areas on poverty, extreme poverty, and inequality in Nepal. *Conservation Letters*, 11. <https://doi.org/10.1111/conl.12576>
- Challender, D., Harrop, S., & MacMillan, D. (2015). Towards informed and multi-faceted wildlife trade interventions. *Global Ecology and Conservation*, 3, pp. 129-148, <https://doi.org/10.1016/j.gecco.2014.11.010>
- Clements, T. & Milner-Gulland, E.J. (2015). Impact of payments for environmental services and protected areas on local livelihoods and forest conservation in northern Cambodia. *Conservation Biology*, 29, pp. 78-87. doi:10.1111/cobi.12423
- Demschen, E., Fletcher, R., Hadda, N., Levey, D., Orrock, J., Resasco, J., & Tewksbury, J. (2019). Ongoing accumulation of plant diversity through habitat connectivity in an 18 year experiment. *Science*, 27. <https://www.ncbi.nlm.nih.gov/pubmed/31604279>
- Edwards, D.P., Gilroy, J.J., Woodcock, P., Edwards, F.A., Larsen, T.H., Andrews, D.J.R., Derhé, M.A., Docherty, T.D.S., Hsu, W.W., Mitchell, S.L., Ota, T., Williams, L.J., Laurance, W.F., Hamer, K.C. and Wilcove, D.S. (2014), Land-sharing versus land-sparing logging: reconciling timber extraction with biodiversity conservation. *Global Change Biology*, 20, pp. 183-191. doi:10.1111/gcb.12353
- Eklund, J. and Cabeza, M. (2017). Quality of governance and effectiveness of protected areas: crucial concepts for conservation planning. *Annals of N.Y. Academy of Science*, 1399, pp. 27-41. doi:10.1111/nyas.13284
- Endamana, D., Boedhihartono, A. K., Bokoto, B., Defo, L., Eyebe, A., Ndikumagenge, C., Sayer, J. A. (2010). A Framework for Assessing Conservation and Development in a Congo Basin Forest Landscape. *Tropical Conservation Science*, 262–281. <https://doi.org/10.1177/194008291000300303>
- Geldmann, J, Coad, L, Barnes, M, et al. (2018). A global analysis of management capacity and ecological outcomes in terrestrial protected areas. *Conservation Letters*, 11, <https://doi.org/10.1111/conl.12434>

Hall, J.M., Burgess, N.D., Rantala, S., Vihemaki, H., Jambiya, G., Gereau, R.E., Makonda, A, F., Njilima, F., Sumbi, P. & Kizaji, A. (2014). Ecological and Social Outcomes of a New Protected Area in Tanzania. *Conservation Biology*, 28, pp. 1512-1521. doi:10.1111/cobi.12335

Integra Government Services International LLC. (Integra) (2017). *Midterm Evaluation of Phase III of the USAID Central Africa Regional Program for the Environment*.

https://www.climatelinks.org/sites/default/files/asset/document/2017_USAID_Midterm%20Eval%20of%20Phase%20III%20of%20USAID%20CARPE.pdf

Jayachandran, S., J. de Laat, E.F. Lambin, C.Y. Stanton, R. Audy, and N.E. Thomas. 2017. Cash for Carbon: A Randomized Controlled Trial of Payments for Ecosystem Services to Reduce Deforestation. *Science* 357 (6348), pp. 267–73.

https://www.sciencemag.org/careers?_ga=2.79972190.85277976.1584625610-897546285.1583498253

Lee, D.E. (2018). Evaluating conservation effectiveness in a Tanzanian community wildlife management area. *Journal of Wildlife Management*, 82, pp. 1767-1774. doi:10.1002/jwmg.21549

Petursson, J. G., P. Vedeld, and A. Vatn. (2013). Going transboundary? An institutional analysis of transboundary protected area management challenges at Mt Elgon, East Africa. *Ecology and Society*, 18.4, p.28.

<http://dx.doi.org/10.5751/ES-05729-180428>

Pyhala, A., Orozco, A. O. & Counsell, S. (2016). *Protected areas in the Congo Basin: Failing both people and biodiversity?* Rainforest Foundation: London.

<https://www.mappingforrights.org/files/38342-Rainforest-Foundation-Conservation-Study-Web-ready.pdf>

Travers, H., Archer, L.J., Mwedde, G., Roe, D., Baker, J., Plumptre, A.J., Rwetsiba, A. and Milner-Gulland, E. (2019). Understanding complex drivers of wildlife crime to design effective conservation interventions. *Conservation Biology*, 33, pp. 1296-1306. doi:10.1111/cobi.13330

Wilebore, B., Voors, M., Bulte, E.H., Coomes, D. and Kontoleon, A. (2019). Unconditional Transfers and Tropical Forest Conservation: Evidence from a Randomized Control Trial in Sierra Leone. *American Journal of Agricultural Economics*, 101, pp. 894-918. doi:10.1093/ajae/aay105

Woodhouse, E. & Bedelian, C. (2018). *Challenging common myths in protected area management*. Policy Brief. Ecosystems service for poverty alleviation.

<https://www.espa.ac.uk/publications/challenging-common-myths-protected-area-management>

Zanamwe, C., Gandiwa, E., Muboko, N., Kupika, O. L. & Mukamuri, B.,B. (2018). Ecotourism and wildlife conservation-related enterprise development by local communities within Southern Africa: Perspectives from the greater Limpopo Transfrontier Conservation, South-Eastern Lowveld, Zimbabwe. *Cogent Environmental Science*, 4.1. doi: 10.1080/23311843.2018.1531463

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