LINKING BIODIVERSITY CONSERVATION AND POVERTY REDUCTION: WHAT, WHY AND HOW?

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RESEARCH POSTERS PRESENTED

Relationships in crisis: cross-sectoral collaboration to conserve biodiversity and rebuild livelihoods following natural disaster and human conflict

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Natural disasters and human conflict threaten biodiversity both directly and in the immediate aftermath, when humanitarian response often fails to take into account environmental concerns. Conservationists need to respond rapidly to such events, working with partners outside of the conservation sector to ensure that pressing humanitarian issues can be met in an environmentally sustainable manner.

There is a need for those working in the humanitarian and development sector to be made aware of the importance of ecosystem services and the biodiversity that underpins them, for all, but particularly for the poorest and most vulnerable people in developing countries. Their direct dependence on natural resources can be increased during and after crisis, and the condition of ecosystems can thus affect both people's vulnerability to crisis and their ability to recover. Conservation organisations have a potentially positive role to play, not only in their humanitarian response but also in reducing risk and enhancing resilience.

FFI is working in a range of disaster and post-conflict scenarios where the development of a people-centred approach delivered through cross-sectoral partnerships is fundamental to the achievement of conservation goals. Focusing on a number of project sites in Africa, Latin America and Asia-Pacific, a 4-year USAID-funded project has enabled FFI to analyse the links between conservation and both natural disasters and conflict, and to reflect – alongside its partners – on the benefits and challenges of cross-sectoral collaboration.

Conserving biodiversity in the modernising farmed landscapes of Uganda: do farmers optimise ecosystem services provided by biodiversity?

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Coffee is one of the major agricultural exports in Uganda and is the main cash crop grown by many thousands of small-holder farmers. As such, a vibrant and productive coffee industry contributes significantly to livelihoods across much of the country. Recent agricultural policy shifts have encouraged intensification of coffee systems and the shift away from subsistence farming to more cash cropping.

Intensification of agriculture has led to a widespread loss of biodiversity in many parts of the globe. We studied biodiversity (birds, bees, butterflies, woody plants) and ecosystem services provided by aspects of biodiversity (pollination, carbon storage), land use, yields and farmer incomes in 26 sites (1km^2) in the banana-coffee systems of central Uganda. The relationship between both biodiversity and yield of coffee, and cropping intensity was not linear. At higher cropping intensities, pollination was limiting and yield and income went down. Bee diversity was lower in more intensive systems but the relationship with birds was non-linear, such that there was a threshold cropping intensity after which bird diversity rapidly declined. The optimum yield and income occurred at approximately two-thirds cropping, one-third fallow, before the threshold at which bird diversity dropped. Biodiversity is therefore of direct economic value to the livelihoods of farmers and improved landscape management in many of the more intensive small-holder coffee systems would increase incomes and improve livelihoods as well as minimise part of the biodiversity loss associated with intensifying agricultural systems.

Tenkile Conservation Program: integrating biodiversity conservation and social development in Papua New Guinea

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Scott's Tree-kangaroo, or Tenkile (*Dendrolagus scottae*), is the most threatened tree-kangaroo in the world and restricted to 150 km² in the Torricelli Mountains of north-west Papua New Guinea (PNG). The Tenkile Conservation Alliance (TCA) was established in 1999 to manage the conservation of the species, arising from a nationwide assessment of PNG's tree-kangaroos facilitated by the IUCN. The goal of the program that has since developed is to conserve the biodiversity of the Torricelli Mountains, using threatened tree-kangaroos as flagship species. Zoos Victoria is the TCA's main partner, providing funds, advice on field and social research, staff to facilitate project evaluation, and advocacy.

The program integrates wildlife conservation goals and social development needs. In recognition of the fact that these are remote, poor mountain communities and that over 97% of land in PNG is under customary ownership, active community engagement is crucial for program success. Facilitated training underpins data collection for wildlife research by 48 Distance Sampling Officers, an EU-funded health and hygiene project across 39 villages, schools and community-based education, and more than 200 villagers in local management committees for a 90,000ha Conservation Area being established in the core of the mountains.

A suite of poverty reduction actions are contributing to biodiversity outcomes – through direct employment (more than 100 people are employed, making the program the area's largest employer), sustainable alternative protein projects are improving people's diet, more than 80% reduction in diseases such as diarrhoea and scabies, and village-based sustainable timber production generates income and supports improved housing. Both people and wildlife are benefiting from these initiatives.

Using participatory methods to value wetland resource use at Koshi Tappu Wildlife Reserve, Nepal

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Understanding the socio-economic benefits of wetland ecosystem services is vital in understanding how wetland conservation activities can impact on human poverty. We assessed resource use by people living close to Koshi Tappu Wildlife Reserve in Nepal, to gain a better understanding of the socio-economic benefits of wetland ecosystem services at this internationally important site. A range of consumptive and non-consumptive uses of wetlands were identified that demonstrated the dependency of some communities on wetland resources. However, this dependency varied between four ethnic groups identified during the study. Households of the *Malaha* ethnic group were most dependent on fish for their livelihoods, whilst other groups were more dependent on labouring, *Typha* mat weaving and sales of driftwood and thatch grass. We used the results of this study to identify the key groups to target project activities, raise awareness of the value of wetland ecosystem services, and develop a community action plan in partnership with local wetland resource users. The participatory approach taken provides a useful model for developing wetland management practices that deliver sustainable management of wetland resources and support the livelihoods of local wetland resource users.

The biodiversity conservation role of Indigenous and Community Conserved Areas

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Indigenous and Community Conserved Areas (ICCAs) are natural sites, resources and habitats conserved in a voluntary and self-directed way through community values, practices, rules and institutions. Examples include indigenous territories, indigenous protected areas, cultural land- and seascapes, sacred sites and species, migration routes of mobile indigenous peoples, bio-cultural heritage territories, sustainable resource reserves, fishing grounds and community-managed areas. The global extent of areas under this type of governance is not clear and likely severely underestimated, leaving them vulnerable to external threats through lack of political and financial support. Recent international meetings, including the 2004 Programme of Work on Protected Areas of the Convention on Biological Diversity and the 2008 World Conservation Congress, have contributed to a reassessment of ICCAs as a main avenue to strengthen conservation and the participation of communities in global policy. As a result, UNEP-WCMC is working with partners to quantify relevant values of ICCAs as they relate to biodiversity and social indicators. The Philippines is one pilot country where this process is being tested. In future, this information will be accessible through the ICCA Registry, an online map and visualization tool designed to increase awareness and recognition of ICCA contributions to global conservation.

Assessing and compensating biodiversity loss due to agriculture in the North–South context

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Many products consumed in the developed world originate from developing nations. Agricultural commodities, such as cash crops and biofuels, create numerous social and environmental impacts in the country of origin. Of these impacts, biodiversity loss is amongst the most severe. I present the concept and early framework of a collaborative project from ETH Zurich and UNEP. The aim is to develop a method to quantify and mitigate the biodiversity loss caused by land and water use in agriculture in the Global South, specifically focusing on products sold on international markets. We

use *Life Cycle Assessment (LCA)*, a holistic tool to track the environmental impacts of products along complex supply chains. We will estimate biodiversity loss for different agricultural products and investigate mitigation measures, such as *compensation payments* from North to South. Such payments would reward local land stewardship and conservation in the region of production. Ideally, this could provide a crucial link between income and conservation. However, the drivers of poverty and biodiversity loss are often interlinked. Treating the symptom (biodiversity loss) without addressing the root causes could ultimately prove counterproductive by impeding true reforms. I demonstrate an early global framework for assessing biodiversity impacts and targeting payments based on the global conservation priorities and the ecoregion concept. The framework will ultimately incorporate global patterns of biodiversity, conservation priorities and costs, likelihood of success, and regional indicators of loss. This will be followed up by regional case-studies that illustrate both the positive and negative implications of such a scheme, based on LCA results.

Forest dependency and alternative livelihoods of Tandroy people in Madagascar's new protected areas

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Madagascar is renowned as both a biodiversity hotspot and one of the poorest nations in the world. Over the last 7 years, the hotspot status has led to a massive expansion of protected areas across the island. Most new terrestrial reserves are established for forest conservation, and are in areas of long-term human habitation and forest resource use. Common narratives of community-based conservation in Madagascar typically refer to 'forest dependency' by local people as a threat and the provision of 'alternative livelihoods' as a conservation strategy. However, examination of the information published by the large international NGOs who are behind the establishment of most new reserves illustrates that both concepts are often very ambiguous. This poster will present research conducted in three of Madagascar's new protected areas within the southern spiny forest. Household economic surveys among Tandroy communities within the new protected areas develop a more nuanced understanding of the importance of forests and environmental products for livelihoods. The work also illustrates that the combination of ecotourism, honey, tree planting and family planning, which are often the conservation organisations' alternative livelihood strategies, neither precede compulsory changes in local livelihood activities, nor are they adequate to compensate communities for the changes forced in by the state and international NGO partners. The communities and forests studied are now part of a REDD (Reducing Emissions from Deforestation and Degradation) pilot project, and reflection is made as to the potential and constraints that REDD faces in improving livelihood benefits for recipients of compulsory community-based conservation in southern Madagascar.

Panacea or placebo? Evaluating the effectiveness of an expanding community conservation network in northern Kenya

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Community conservation seeks to conserve biological resources by providing biodiversity-linked benefits to society. Owing to inadequate evaluation, it remains unclear whether such initiatives genuinely alleviate threats to biodiversity or enhance rural livelihoods. A matched comparison evaluation is examining the livelihood and ecological outcomes of a community conservation initiative in northern Kenya.

The Northern Rangelands Trust (NRT) facilitates pastoralists to alleviate poverty through biodiversity-linked enterprise managed by community institutions in Kenya's arid rangelands. These institutions have the combined aims of conserving wildlife populations, which include both threatened and endemic species, maintaining ecosystem functioning and alleviating rural poverty.

Maximum entropy modelling on both ecological and socioeconomic variables matched conservancies with similar non-conserving communities. Conservancies are evaluated against their matched non-conservancy counterparts using field data gathered with participatory methods and integrated with remotely sensed assessments of habitat condition and ecological censuses.

Preliminary findings suggest conservancies are diversifying pastoralist livelihoods and enabling access to social and physical infrastructure, including education and medical care. Security provided by scout patrols has not only decreased threats to biodiversity, including Grevy's zebra (*Equus grevyi*) and African hunting dog (*Lycaon pictus*) but also decreased the risk to livelihoods from cattle rustling. The expansion of NRT over time suggests that a willingness to conserve spreads among the pastoralist community as the benefits of conservation are realised at each location.

While data collection is ongoing, emerging results indicate NRT conservancies are achieving simultaneous benefits for communities and biodiversity and highlight the potential of matched comparisons as a tool for evaluating poverty-conservation linkages.

Collaborative management of Important Bird Areas in Africa: benefiting birds, biodiversity and people

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Over the past 5 years, the RSPB has worked with BirdLife International partners to protect Important Bird Areas (IBAs) in six African countries focussing on collaborative management, education and alternative livelihoods. These projects demonstrate that biodiversity conservation plays a vital role in poverty reduction by providing ecosystem services such as clean water, soil conservation and income-generating activities.

IBAs are key sites for biodiversity conservation, identified using scientifically objective and internationally agreed criteria. In addition to holding a significant number of globally threatened and/or congregatory species, they are also important for the ecosystem services they provide.

There is no 'one size fits all approach' to conservation. We aim to protect biological diversity but must integrate cultural, social and ethnic diversity, diverse threats and tenure statuses of IBAs in our approaches. The most appropriate and cost-effective tools often combine collaborative management, poverty alleviation and alternative livelihood interventions.

Our partners collaborate with national and local authorities and local communities in or close to the conservation area. In Echuya Forest, Nature Uganda facilitated four community groups to develop projects of sustainable organic agriculture, soil/water conservation, mushroom and passion fruit growing and bee-keeping that improved the food security of over 2000 people. This, together with increased community ownership through collaborative management of the site, has improved the conservation of Echuya Forest by removing some of the pressure to overexploit.

Significant challenges remain to collect data and develop case studies that assess links between biodiversity conservation and poverty reduction, particularly at the regional and national level.

Poverty, conservation and the poverty of cost-benefit analysis

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Conservationists have argued that their efforts should be directed towards the tropics due to their high species richness and low costs. Economic analyses showing large positive benefits of conservation in developing countries have been used to support this argument. However,

conventional approaches to economic analysis may seriously underestimate the poverty implications of conserving biodiversity in developing countries.

We apply more realistic economic analysis to a case study of biodiversity conservation in Madagascar. In particular, we explicitly consider the efficiency of compensation mechanisms. The results demonstrate the substantial risk of irreversible welfare losses associated with conservation, which may dwarf expected benefits. The implications for the design and implementation of conservation projects in developing countries is discussed.

Carbon, biodiversity and livelihoods

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Emissions from land-use change, mainly forest loss, contribute to up to 17.4% of total anthropogenic greenhouse gas emissions. The UN Framework Convention on Climate Change is currently discussing incentives for Reducing Emissions from Deforestation and forest Degradation in developing countries; including forest conservation, the sustainable management of forests and the enhancement of forest carbon stocks (REDD+). In addition to securing carbon, REDD+ can deliver co-benefits, including conservation of forest biodiversity and maintenance of ecosystem services, which secure livelihoods. However, there may also be trade-offs involved in terms of population. To help ensure co-benefits from REDD+, avoid costs to and/or enhance livelihoods, it is useful to find out where high carbon, people, high biodiversity and other ecosystem service values overlap. This will aid selection of areas for REDD+ that maximise the co-benefits and avoid costs. It can also be used as a basis to discuss ways to manage these areas.

REDD Alert? Livelihood impacts of forest conservation policy in Tanzania

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Most of the world's tropical forests continue to be degraded by the unmonitored extraction of natural resources. These resources directly support the livelihoods of 90% of the 1.2 billion people living in poverty, yet are rarely quantified. With the implementation of UN REDD (payments for Reduced Emissions from Deforestation and Degradation) policy and resulting conservation initiatives, the implications for rural communities may be considerable. As a new international initiative, there is currently no strategy to guide implementation of a REDD framework into the management of natural resources in the developing world. This research aims to examine the implications of alternative implementation strategies for REDD management and biodiversity conservation. In our primary focal area, we will investigate the implications for increasing protected status of a forest of high biodiversity value on surrounding villages in the Eastern Arc Mountains of Tanzania. We will apply environmental valuation and participatory GIS techniques to examine the linkages between biodiversity and livelihoods, and investigate the sustainability of methods for generating alternative natural resources, such as agro-forestry and tree planting. Management activities, local perceptions and forest health will be contrasted between our primary study area and other areas with alternative management strategies in place. This will allow us to identify potential socio-economic indicators of conservation success and explore the synergies between socio-economic and established ecological indicators. This research will determine the cost of sustainability for a rural community in the face of protective legislation and will contribute to the growing debate surrounding the perceived co-benefits of carbon-based forest conservation schemes.

Expanded micro-enterprise program to address economic development and promote conservation, Budongo Forest Reserve, western Uganda

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Budongo Forest Reserve lies in the northern part of the Albertine Rift, an area known for high biodiversity. It is also an important chimpanzee habitat and corridor link. Threats to Budongo Forest Reserve are partially driven by the area's significant human poverty as people supplement their incomes. In collaboration with The Jane Goodall Institute-Uganda and other conservation organizations, Village Enterprise Fund (VEF) created an expanded model of its micro-enterprise program that both stimulates economic development and promotes conservation to reduce reliance on forest resources.

Joint messaging and environmental teaching have been added to each of the core tools in VEF's model: required pre-funding training, incentive-structured grants, and on-going mentoring. In two-and-a-half years, over 400 small businesses (2,000 owners) in over 40 villages near the forest have been trained, mentored and supported. Formal assessments are planned for fall 2010–spring 2011, but partners report attitude shifts and decreases in illegal activities.

Keys to success include addressing individual household poverty (in addition to community poverty), respecting local "ownership", and filling the gap between conservation information and environmental knowledge. The program team is currently working on: (1) additional training modules, (2) geographic expansion plans, (3) assessment design and (4) integration and analysis of VEF and conservation survey data for strategic planning and impact evaluation.

The goal is to increase the knowledge and lift the standard of living of the people who live around the Budongo Forest so that they feel empowered to live sustainably with the forest and protect local resources against future threats.

Linking vicuña conservation and poverty reduction: challenges and opportunities

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Vicuñas (*Vicugna vicugna*) are South American camelids, the commercial exploitation of which has untapped poverty alleviation potential. Vicuña fibre is produced by extremely low income communities that inhabit the harsh environment of the high Andes in Argentina, Chile, Peru and Bolivia. Affluent consumers are willing to pay high prices for apparel made of vicuña fibre. Vicuña management projects follow the logic of community-based wildlife management. The rationale for vicuña conservation through sustainable use is that commercial utilization of fibre obtained from life-shorn individuals will generate sufficient economic benefits to outweigh the costs of conservation, and contribute to community development and poverty alleviation. However, while conservation efforts have been extremely successful with vicuñas having recovered from the brink of extinction, the socio-economic achievements have thus far proved modest. Most of the benefits are being captured by traders and international textile companies, rather than local communities. In addition, the high market value of vicuña fibre has attracted a number of groups interested in its production. This threatens the conservation of this wild species, the exclusive rights of Andean communities and might undermine the spirit of the Vicuña Convention. This paper explores multiple-objective projects that address vicuña conservation and poverty alleviation. In doing so, it analyses the tensions that exist between these objectives, as well as the factors that limit a more equitable distribution of benefits among stakeholders.

Bats – What, why and how to conserve for poverty reduction

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Bats are the most diverse and synanthropic mammals in many developing countries, having the ability to exploit anthropogenic landscapes and structures, and forming the largest aggregations of any terrestrial vertebrate, and with the most extensive ecosocial relationship of any non-domestic commensal. Bats directly reduce poverty by contributing to alternative livelihoods through sales of guano as fertiliser and indirectly as keystone pollinators, seed dispersers and insect pest/disease vector regulators. Bats are also consumed and traded, both locally and internationally as bushmeat.

Given this high diversity and the many pro-poor services provided by bats it is a priority to determine what species to conserve, why they should be selected for conservation and how best to conserve them.

A new approach in Rwanda: engaging local institutions in conservation and development through payments for ecosystem services

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An Ecosystem Services approach to analysing, valuing and managing areas with high biodiversity appears to be a promising way to link conservation with poverty alleviation. Payments for Ecosystem Services (PES) is one means by which local institutions can become active players in this linkage, as parties and as brokers in negotiated contracts for service provision. However, the theoretical potential for PES systems is not easily achievable in the real world and there are particular challenges to ensuring that costs and benefits are appropriately distributed and that those most dependent on provisioning services do not become further marginalised by the prioritisation of biodiversity. Our poster provides a case study from the Nyungwe National Park in Rwanda, where we have introduced an experimental PES scheme. The design is different to the best known PES schemes in Latin America, because (1) the service providers are not individuals but communities, (2) performance is monitored collectively, though with much of the payment distributed at household level and (3) the service provided relates to conservation of public rather than private lands. This is a challenging model for PES, for example, due to free-riding possibilities, but it is also one which is particularly relevant *if* PES is to play a role in the conservation of high-priority biodiversity sites in central Africa. Key issues that our poster addresses are: working as a government-NGO-university partnership; the role of community representatives in contract negotiations; determining payments distribution – i.e. household distribution versus public goods; dealing with intra-community differences in opportunity costs; designing rigorous and legitimate monitoring and evaluation systems.

Parks and people: biodiversity and socio-economic factors in Amazonian Kichwa communities in Ecuador

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The negative social impacts and limited conservation success of many protected areas have inspired initiatives that attempt to integrate the improvement of local economic and social dependence on natural resources (development) with local conservation goals. Development and conservation, however, remain rooted in distinct disciplinary approaches and projects successfully fusing conservation with development are rare. I use an interdisciplinary approach to investigate how the dynamics of socio-economic and political factors affect forest health in indigenous Kichwa communities in the Ecuadorian Amazon and contribute to the current protectionist debate by comparing biodiversity inside the communities with that of an adjacent protected area.

Sustainable forest management for poverty reduction through agroforestry options in the uplands of eastern Bangladesh

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In eastern Bangladesh high population growth has led to a drastic reduction in the recycling period for slash-and-burn cultivation. The practice is contributing to deforestation, which is closely linked to poverty. Agroforestry is one of the few options to lift people out of the poverty trap and protect the existing forest. This research is conducted in two villages in eastern Bangladesh using RRA, PRA, FGD, and a structured survey of 140 households.

Agroforestry systems have the capacity to protect existing forest and provide positive cash flow; however, the adoption rate remains low, even when an agroforestry project has been carried out in the past. Common economic reasoning is that adoption is hampered by capacity constraints i.e., lack of capital, knowledge, land, and so on, at the farmer level. Our data allow us to argue that it is not capacity constraints but rather the farmers' motivations that are key. We conclude that underlying institutional structures are highly non-conducive to agroforestry. Action for agroforestry should first focus on building supportive institutions (rules and organizations) before focusing on trees and projects, if needed at all.

Conservation agreements: a strategy for linking habitat conservation and livelihoods in Northern Western Ghats of India

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The rate of biodiversity loss has reached critical levels worldwide; however, the efforts to conserve biodiversity have been restricted mainly to providing legal protection to diversity-rich forest areas. Besides providing important habitats to plant and animals, these protected areas have served as playgrounds to conservation researchers and are popular destinations for tourists. Though this has resulted in improved understanding of biodiversity and provided livelihood options to tour operators and guides, this approach has often failed, especially in highly populated countries like India because communities' interests and needs in and around these forests were inadequately addressed. Moreover, the conservation community at large appears helpless while dealing with the biggest threat to biodiversity – deforestation outside the protected areas. The Northern Western Ghats have been facing rampant deforestation on account of livelihood needs, energy needs of

small industries and land-use conversion. It is a very peculiar forest landscape in India: less than 3% of forest area is owned by government and receives some kind of protection, while the rest of the forest belongs to communities or individuals and is managed through open-access governance. After working for participatory conservation of Sacred Groves over a decade in this region, the AERF carried out prioritization studies in the area for initiating conservation action for protecting private forests. AERF implemented a pilot project using incentive mechanisms for long-term protection of private forests in the Ratnagiri district of Maharashtra, India. The project findings suggest that a multi-stake holder approach is crucial for long-term sustainability of conservation projects and that through incentives (cash and non-cash) a healthy link could be established between poverty and habitat conservation.

A new livelihood function for bushmeat in a West African cocoa farming system

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Bushmeat is considered an important source of income and protein for the rural poor. However, most studies have focused on forest areas with abundant wildlife and few alternative livelihood options. We assessed the livelihood role of bushmeat within a West African forest-farm mosaic with depleted wildlife populations and cocoa farming as the main livelihood activity.

We conducted 800 repeated socio-economic interviews with 65 cocoa farming households using 24hr recall. Data collection covered 12 months comprising three agricultural seasons (before, during and after cocoa harvest) with distinct household income pattern.

Bushmeat harvest was recorded in 15% of interviews. Of the harvested bushmeat, 63% of bushmeat value was consumed within the hunter's household, 29% was sold and 8% was given away as a gift. On average, meat expenditure comprised 22% of total daily household expenditure. It was positively correlated with household wealth and was lowest before the cocoa season when households had little monetary income. Due to high consumption rate of bushmeat and despite low harvest rate, bushmeat harvest reduced meat expenditure by 30% across seasons and wealth groups, thereby enabling households to save on otherwise incurred expenditures, especially during times of income shortage.

Island environment protection and livelihood enhancement: a Seacology-supported project in Madagascar (2005–2009)

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In the Mangoro region of Madagascar, Seacology funded the repair of 11 primary schools and seven municipal offices in exchange for the local community's protection of ten Madagascar flying fox roosts totalling 321 acres for 10 years. Because of hunting for bushmeat, uncontrolled fires and logging, many roosts of the Madagascar flying fox, which is an important pollinator, have disappeared. In the Mangoro Region, a close network of 12 small forest fragments holds up to 4,000 of these bats. Seven nearby communities are working with local organizations [Arongam-panihy - Culture, Communication and Environment (ACCE), and Lamin'asa Fiarovana Ramanavy sy Fanigy] to implement a dina, or social contract, to protect the roosts. In exchange for this agreement, Seacology provided funding for badly-needed repairs to each of the seven community municipal offices and 11 primary schools near the roosts.

Through ‘win-win’ projects like this (Seacology has 200 island projects in 41 countries across the world, of which 87% are on islands recognized as economically challenged), Seacology has helped preserve almost 2 million acres of threatened island habitats. These ecosystems are not only a precious global treasure, but comprise the lifeblood of these communities.

Community-based biodiversity conservation, ecological restoration and ecotourism at Kuyucuk Lake, Kars, Turkey

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Turkey is the only country in the world mostly covered by three biodiversity hotspots, but also entirely covered by "crisis ecoregions". Northeastern Turkey is the most impoverished part of the country. Average income in Kars province is $843/person/year. The province has low population density, traditional agro-ecosystems, and high biodiversity, but overgrazing, erosion, and illegal hunting are widespread. KuzeyDoga Society works with local people, students, volunteers and scientists to conserve and promote biodiversity in the region by integrating village-based biodiversity research and nature tourism with community-based conservation, monitoring, ecological restoration and environmental education. Kuyucuk Lake Wildlife Reserve is a globally important bird area surrounded by rangelands and wheat fields. We documented over 40,000 birds of 212 species, but extensive overgrazing and unsustainable agricultural practices have caused erosion, water reduction and the disappearance of most vegetation. Cattle exclosure experiments led to the rapid recovery of shoreline vegetation. We work with the local villages to restore the shoreline vegetation while monitoring birds, amphibians, plants and insects. We converted an old road bisecting the lake into Turkey's first bird nesting island. In 2009 Kuyucuk was chosen as eastern Turkey's first Ramsar wetland and Turkey's 2009 European Destination of Excellence, which increased visitors. Restoring an abandoned building as a village-run tourist guesthouse and promoting traditional dining with village families generated a new income stream for villagers and increased local support for nature conservation. With the help of volunteers from 16 countries, Kuyucuk Lake has become a major environmental research, education and community-based ecotourism center and the attitudes towards conservation have improved greatly. The first of its kind in Turkey, the Kuyucuk Lake community-based conservation project (www.kuyucuk.org) provides valuable lessons for other integrated biodiversity conservation and poverty reduction projects in the developing world.

Ten years of adaptive community-governed conservation: evaluating biodiversity protection and poverty alleviation in a West African hippopotamus reserve

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Although community-based natural resource management has been accused of failing on social, economic, or ecological grounds, balanced assessments are rare. We examined the first 10 years of Ghana's Wechiau Community Hippo Sanctuary using an evaluation framework that considers socioeconomic and ecological outcomes as well as resilience mechanisms. The initiative at Wechiau, which builds on traditional, local taboos against the killing of hippopotamus, has attempted to conserve an imperilled large mammal, protect biodiversity and alleviate abject poverty amidst a bushmeat crisis and complex ethnic diversity. We found that the Sanctuary has improved local livelihoods by spurring economic diversification and infrastructure development rates two to eight times higher than in surrounding communities. Simultaneously, threats to biodiversity have subsided, hippopotamus numbers have remained stable and the Sanctuary's riparian habitats now harbour more bird species than comparable areas nearby. Improved social capital, true empowerment, an equitable distribution of benefits, ecological awareness among the next generation and support for the Sanctuary even amongst community members who were disadvantaged by its creation indicate good long-term prospects. Risks remain, some of which are beyond the community's control, but evidence of socio-ecological resilience provides hope for sustainability. Lessons learnt lead to recommendations for future community-based conservation initiatives.

The Gorilla Organization

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The Gorilla Organization works in DR Congo, Uganda and Rwanda to protect gorillas in their natural habitat. We work with African partners to engage local communities living around gorilla habitat in conservation projects that help generate income, development and education and encourage the use of alternative natural resources.

Gorilla Organization projects include:

FUEL-EFFICIENT STOVES
The use of wood for charcoal production has a devastating effect on the forest, but the construction of fuel-efficient 'Jiko' stoves reduce fuel consumption by around 75%, reducing reliance on the gorilla habitat.

TREE-PLANTING
To reduce the impact of deforestation more than 1.5 million trees have been planted around the Kahuzi-Biega National Park, DR Congo, which is home to eastern lowland gorillas.

WILDLIFE CLUBS
Wildlife clubs engage children in environmental protection through developing school gardens, arts and crafts, music, drama and dance, discussions and competitions. Children also visit the national parks, where they gain first-hand experience of conservation in action.

INDIGENOUS COMMUNITIES
We help indigenous people who have been evicted from national parks to grow their own crops and earn an income. Also, social workers provide health and hygiene education.

AGRICULTURAL DEVELOPMENT
Communities are being trained in organic agriculture so they can grow crops and rear livestock, reducing poverty through income generation, enabling children to attend school.

GORILLA PROTECTION
The community is involved in managing the forest reserve at Walikale and rangers are carrying out gorilla research activities, including a census. Rangers also work at Mount Tshiaberimu to monitor gorillas and remove snares.

Community management of wetland biodiversity

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Unlike many other threatened eco-systems, local communities have a direct interest in maintaining wetland biodiversity for sustainable use by the poor and are motivated to use their local knowledge and capabilities in collective action to manage wetland resources in ways that address poverty and conserve biodiversity. Since 2007 a network of 250 community-based organisations (CBOs) in Bangladesh has shown a growing interest in conserving fish and other aquatic life for the benefit of poor people. By developing and sharing their own knowledge and good practices, tangible ecological and developmental benefits have been derived. A third of CBOs have banned hunting and a few have added a supplementary income from tourism, 59% of these CBOs have created small fish sanctuaries, 10% have re-introduced scarce fish. In 91% of these sites local people consider the CBO has improved access of the poor to natural resources and 64% of members of the CBOs are poor, and almost all CBOs consult with the poor in decision making. The main threats come from external factors: attempts by the powerful to take control of fisheries away from CBOs, pressure to pay government to lease water bodies, and uncoordinated and unregulated development that blocks fish movement, drains and pollutes wetlands. As such, many of the

challenges represent challenges of governance rather than management. Through the development of a network the CBOs seek to address these challenges and influence policy and practice to address conservation and poverty issues.

Keeping stingless bees (Meliponini) in a tropical forest: conservation in practice

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Guaraqueçaba Environmental Protection Area (Parana State, Brazil), part of UNESCO's Biosphere Reserve Program, comprises 300,000 ha of the best-preserved, continuous Atlantic Forest. Approximately 8,300 people live in Guaraqueçaba's core area, but environmental regulations and the extent of protected native forests limit economic options for the local population. As a consequence, some detrimental activities such as buffalo ranching, hunting, animal trafficking and illegal harvesting of palm heart (*Euterpe edulis*) are common and threaten the integrity of Guaraqueçaba. A local conservation NGO (SPVS), seeking to create a sustainable supplement to the income of its employees, sponsored the creation of a meliponiculture (beekeeping with stingless bees) cooperative. Stingless bees (Meliponini) are ubiquitous in the Neotropics, very important pollinating agents and kept by native populations throughout the Americas for honey and resins. With proper training, a small start-up fund, marketing support and proper husbandry practices, Guaraqueçaba's Meliponiculture Cooperative has demonstrated that forest resources can be sustainably exploited, generating a small but significant source of income, helping change the view of the forest as an obstacle to development, promoting biodiversity awareness and becoming a source of pride for local residents.

Conservation and sustainable use of wild *Coffea arabica* in Ethiopia – linking biodiversity and poverty reduction issues

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Coffea arabica originates from the Ethiopian afromontane rainforests, where its wild forms still exist. Their gene pool constitutes a basis for future new *Coffea arabica* varieties, while the crop itself is an important source of income for local communities. However, over utilisation, due to population pressure and poverty, threatens the existence of the remaining rainforests in Ethiopia. In an integrative research project the ecological and socioeconomic conditions, including genetic variability of wild coffee, species diversity of different rainforest locations, forest utilisation practices, etc, were investigated. In a parallel process, through local, institutionalized stakeholder involvement, including relevant governmental institutions and development initiatives, new approaches for conservation and sustainable use were developed and are now implemented in the south-western parts of Ethiopia. Awareness-raising and capacity development, such as a children competition award and training on spatial planning, contributed to broaden the stakeholder basis and the overall local acceptance of the activities. Meanwhile, to provide a basis for long-term engagement and international recognition, applications for nominations of biosphere reserves have been submitted to UNESCO’s Man and the Biosphere Programme. Lessons learned underpin the assertion that conservation and poverty reduction activities can be supplementary, if efforts are undertaken to engage relevant stakeholders and to institutionalize the engagement, thereby providing a platform to reveal and negotiate conflicting interests and to develop mutually agreed solutions seems to be crucial. In general, flexible conservation concepts offer a much better opportunity for linking conservation and poverty reduction than more exclusive approaches. The process also showed that an integrative research project can be a useful basis for linking conservation and poverty reduction efforts in a sustainable manner.

Lebialem Hunters' Beekeeping Initiative

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More than 40 mammal species are hunted and traded as bushmeat in Lebialem Division, Southwest Region, Cameroon. Five threatened primate species, including the critically endangered Cross River gorilla (*Gorilla gorilla diehli*) are among the mammals hunted. Bushmeat is primarily of economic importance to hunters in this rural area, with the majority being sold to create income rather than consumed. However, mammal populations are perceived to be depleting and hunters often struggle to return with adequate catches to financially support their families. The Lebialem Hunters' Beekeeping Initiative was established in 2007 in collaboration with a Cameroonian NGO called the Environment and Rural Development Foundation (ERuDeF). The aim of the project is to reduce financial reliance on bushmeat and the volume of species harvested by providing hunters with an alternative income source through beekeeping. The objectives of the project are to: (1) train hunters in beekeeping and supply them with the necessary equipment and technical support, (2) establish cooperatives in participating communities and a beekeeping association in Lebialem to enable collective marketing of honey and bee products, (3) implement a conservation education programme using films to explain to communities why emphasis is being placed on reducing reliance on bushmeat and why the harvesting of threatened species is being discouraged and (4) evaluate the effectiveness of beekeeping as an economic alternative to bushmeat hunting. To date, the project has trained 139 hunters as beekeepers and established Common Initiative Groups (CIGs) in seven communities.