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Protected areas for conservation and poverty alleviation: experiences from Madagascar

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Moving beyond the 'conservation–poverty' debate towards on-the-ground implementation

Biodiversity conservation and poverty alleviation are two of the world's major challenges, and the search for synergies in the pursuit of both agendas is enshrined in their respective global policy frameworks – the Convention on Biological Diversity and the Millennium Development Goals. The 'conservation–poverty debate' has featured prominently in conservation discourses since the 1980s (Roe 2008), focusing primarily on issues such as the impact of conservation activities (particularly protected areas) on affected local communities, the role of conservation organisations in poverty alleviation, and the complex inter-relationships between biodiversity, ecosystem service provision and poverty. Much of the debate, however, has been theoretical in nature, and while it is widely acknowledged that conservationists should seek to reduce, or at least not aggravate, poverty through their actions, the literature remains sparse when it comes to illustrations of how poverty alleviation is pursued successfully in real-world conservation management. This comes at a time when there has been a substantive shift towards multiple-use protected areas, away from traditional strict reserves (Zimmerer, Galt & Buck 2004). Indeed, 44% of the world's protected area estate now comprises International Union for Conservation of Nature (IUCN) categories V and VI, which are characterised by their emphasis on sustainable extractive resource use by local communities (Jenkins & Joppa 2009). The paucity of guidelines for protected area managers tasked with achieving these twin goals is a manifestation of the researcher–practitioner divide; a well-known phenomenon to which practitioners contribute by both

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failing to share their experiences in open fora, and being unable to attract applied researchers to address knowledge gaps.

Here we present our experiences of actively pursuing biodiversity conservation and poverty alleviation in a rapidly expanding protected area system, using three instructive case studies. We outline the types of management interventions employed and explore the theoretical implications of our findings. Finally, we discuss priority actions required to stimulate and improve collaboration between applied researchers and managers, with the aim of instigating evidence-based protected area management.

Reconciling conservation, natural resource use and poverty alleviation in Madagascar's new multiple-use protected areas

Improving synergies between conservation and poverty alleviation is particularly important in Madagascar because not only is it amongst the world's poorest countries, it is also a leading global conservation priority (Brooks *et al*. 2006). Since 2003, the country has begun to triple the coverage of its protected area system – a process known as the Durban Vision. While the nation's first generation of protected areas, comprising 46 strictly protected sites (IUCN category Ia, II and IV) managed by the parastatal Madagascar National Parks, were principally established for biodiversity conservation, scientific research and recreation (Randrianandianina *et al*. 2003), the objectives of the expanded protected area system have been extended to incorporate maintaining the country's cultural heritage and promoting the sustainable use of natural resources for poverty alleviation and development. Almost 100 new protected areas have now been established within the Durban Vision framework, many in land- and seascapes containing large human populations that are heavily dependent on natural resources for subsistence and generating household income. Recognising this reliance, most

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new protected areas are designated as IUCN category V and VI multiple-use sites, in which sustainable extraction (of, for example, fuel and construction wood, non-timber forest products and bushmeat) is permitted according to a zoning plan, and are co-managed via agreements between non-governmental organisations (NGOs) and local community structures (Gardner 2011).

Protected areas with multiple objectives pose a huge challenge for site managers, who need to account for the interests of local communities by facilitating rural development and poverty alleviation, whilst ensuring the viability of fragile ecosystems and species. Working towards such goals has necessitated the development of new models of protected area management. Building on approaches such as integrated conservation-development projects and community-based natural resource management, the management of Madagascar's new generation of protected areas differs markedly from that of the state-managed network of strictly-protected sites. The major differences include: i) fewer access restrictions, as illustrated by the shift from strict to multiple-use protected area categories; ii) greater community participation in protected area governance, through the establishment of co-management structures and the empowerment of local users' associations; iii) an increased focus on community development activities within protected area management plans; iv) a new emphasis on the evaluation and mitigation of negative social impacts of protected area creation, with a novel (for Madagascar) legal requirement to develop a social safeguards plan, and; v) greater involvement with a diverse array of stakeholders across larger spatial scales, such as regional authorities and the private sector. The following three brief case studies (Fig. 1; Table 1), from the terrestrial, freshwater and marine realms, help illustrate the range of management approaches adopted within Madagascar's new generation of protected areas. All of them are designated as IUCN category V, defined as "a protected area where the

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interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values".

ANJOZOROBE-ANGAVO AND LOKY-MANAMBATO

The ethos in these two protected areas, which are co-managed by the Malagasy NGO Fanamby and local community institutions, is centred on engendering innovative partnerships between communities and the private sector in order to promote development and reduce pressures on biodiversity. At Anjozorobe-Angavo, Fanamby have created Saha Forest Lodge, which is run by a professional tourism operator under an agreement with the neighbouring village. The terms of the relationship set out a land rental contract, as well as mutually determined local employment and market gardening production quotas for the hotel. At both sites, Fanamby have been exploring other entrepreneurial opportunities through organic and fair trade certification, having created a commercial venture, Sahanala, to broker markets and provide technical support to producers. Starting with ginger and red rice from Anjozorobe-Angavo and vanilla from Loky-Manambato, the enterprise has since expanded into producing essential oils and additional high-value crops adapted to local growing conditions and community interests. In 2010, a deal was negotiated with Air Madagascar to provide passengers with organic-labelled cashew nuts grown by producer cooperatives associated with Loky-Manambato.

TSIMEMBO-MANAMBOLOMATY

This wetland and dry forest complex is co-managed by The Peregrine Fund (TPF) and local communities, with a focus on empowering traditional users to manage their resources more

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sustainably. Historically, the fishing season and permitted activities have been decided by a *tompondrano*, a local keeper of the lakes, which helped to maintain healthy fish stocks and protect the surrounding forests. An influx of migrants during the 1990s, however, resulted in the abuse of traditional rules and lead to overfishing and forest degradation that threatened local livelihoods (Watson & Rabarisoa 2000). Seeking to reinvigorate traditional practices and strengthen the capacity and power of resident communities to manage their resources, TPF and regional ministry representatives initiated the legal transfer of management rights from the state to two community users' associations, which formalised the traditional rules that existed prior to the influx of migrants. This provided the communities the legal power to ensure respect for their customs, which are vigorously enforced through the payment of fines in the traditional form (the payment of zebu cattle and rum).

The re-establishment of traditional fishing rules at Manambolomaty, such as restrictions on fishing within spawning grounds and respecting the fishing season defined by the *tompondrano*, is believed to have stabilised lake fish stocks. Total annual revenues from fishing, based on market prices for dried fish, were estimated at US$ 1,562 fisher^{-1} year^{-1} in 1995, approximately 750% of mean national income at the time (Watson & Rabarisoa 2000). Sales of fish to wholesale buyers are taxed by the site's two communes and represent an estimated 56% of revenue (Rabearivony *et al*. 2008). Local incomes from fishing are thought to have increased as a result of community management. Although little is known about the distribution of such income within the community, its impact is illustrated by the growth of commercial activity in the village of Soatana between 2000 and 2004, during which time the number of small groceries in the village grew from one to seven. Both community management associations possess bank accounts in which income from fines, the sale of fishing and trading permits, and association membership is deposited. In turn, this finance is

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used to buy rice for subsidised resale to association members during the annual rice shortage season, as well as for local development micro-projects.

VELONDRIAKE

Velondriake is now one of the largest community-managed marine protected areas in the Indian Ocean, but grew from a single trial closure of the local economically important octopus *Octopus cyanea* fishery in 2004. The perceived success of the initial closure led 23 neighbouring villages to participate in the model, followed in 2006 by the creation of the formal Velondriake Management Association to govern closures (Harris 2007). The model has since spread across the nation and region. Temporary closures capitalise on the rapid growth of octopus and broad participation in the fishery; they are coordinated across the protected area, and a partnership with a seafood export company provides a guaranteed buyer when closures are opened. Preliminary evaluation of the closures over the past eight years indicate that catch per unit effort (CPUE) effects are significant and that most village's 'investment' (in terms of foregone catch during the closures) is recouped within a short period after re-opening if the closures are well-managed (K. Oleson, unpublished data). Additional management zones created following the success of the octopus management include permanent reef reserves closed to all fishing, temporary mangrove reserves, and areas for the development of aquaculture (sea cucumbers and algae) and ecotourism, while the protected area's managers have also implemented social programmes including education and population, health and environment outreach.

Generic lessons to be learnt from the Malagasy case studies

The case study protected areas share a number of characteristics. They are all: i) managed for multiple uses, so natural resource extraction is therefore permitted over much of their spatial

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extent; ii) either managed or co-managed by local communities and an NGO, and; iii) support initiatives with the aim of improving livelihoods through the legal or technical empowerment of local resource users. Where they differ is the way in which biodiversity is exploited in order to support local economic growth: the management of Tsimembo-Manambolomaty is concerned with enhancing the productivity and sustainability of an economically-important natural resource base, while within Anjozorobe-Angavo and Loky-Manambato the emphasis is on reducing local dependence on natural resources through the development of alternative income sources. Velondriake, meanwhile, employs both approaches, improving the management of the octopus fishery while instigating alternative livelihoods to lessen reliance on it and other fisheries resources. Notably, two of the case studies involve partnerships with the private sector aimed at adding value to local production.

Experiences from Madagascar's new generation of protected areas can feed into, and inform, the long-standing debates around the role of sustainable natural resource use in both poverty alleviation and conservation. While advocates believe that it can generate positive incentives for conservation among local communities (Rosser & Leader-Williams 2010), a dependence on economically marginal natural resources may form a 'poverty trap', preventing users from escaping hardship (Angelsen & Wunder 2003). Indeed, Sayer (2009) suggests that significant improvements in livelihoods tend to stem only from new opportunities generated by external investments, markets and new infrastructure, rather than marginal improvements to existing livelihoods, and that "one should not focus on what the poor are doing now but on what they might do in the future in growing economies". While they may not provide a basis for development, however, it is clear that natural resources provide a critical safety net preventing many rural communities from slipping further into destitution (Kaimowitz & Sheil 2007).

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For managers of these new, multiple-use protected areas seeking to reconcile conservation with the needs of local populations, the choice of which development alternatives to promote is, of course, context specific. It is noteworthy that, among our case studies, improved management of natural resources has been the objective within aquatic ecosystems, whereas the target in terrestrial protected areas has been to diminish people's use of the forest. Freshwater and marine resources are generally more rapidly renewable than trees and, critically, aquatic ecosystems cannot be "owned" and converted into productive anthropogenic systems as easily as terrestrial areas can. While the interests of users and conservationists can be closely aligned in aquatic environments – both benefit from healthy, productive ecosystems – this may be harder to achieve in forests.

If, in many tropical terrestrial environments, the use of natural resources from functioning ecosystems cannot lift people out of poverty yet acts as a critical safety net, then how can biodiversity conservation contribute meaningfully to poverty alleviation? Historically, traditional land use in Madagascar has been a hotly debated, but significant, driver of both massive deforestation and the extinction of the endemic megafauna (Dewar & Richard 2012). This has occurred without lifting rural people out of poverty, and the island remains one of the poorest nations in the world. If the country's natural capital is being depleted without an accompanying reduction in the destitution experienced by the population, it follows that it must be replaced with alternative forms of capital if poverty alleviation is to be achieved successfully. Boserup's (1965) theory of agricultural development suggests a mechanism – induced innovation – for how the required changes may occur. The basic premise is that the availability of natural resources permitting a subsistence lifestyle hinders technical advancement or intensification, but, that their absence provokes the innovation required for economic development. We believe that the evolution of land-use systems will occur in any

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scenario; when resources run out and users must innovate in response, or if the global community, particularly the conservation movement, is prepared to provide financial and technological expertise to support the transition before they do so. Nonetheless, development strategies alone are insufficient because beneficiaries may invest their increased wealth in the continued unsustainable over-exploitation of ecosystems. Therefore poverty alleviation actions must be accompanied by robust rules, including access restrictions, if protected areas are to contribute to both conservation and development goals. Any legitimate losses or opportunity costs incurred as a result of such actions, however, must be fully and fairly compensated, and the critical importance of natural resources to rural populations as a safety net in times of hardship must be recognised. It is anticipated that the multiple-use nature of Madagascar's new generation of protected areas will allow them serve as safety nets as required, while more sustainable and productive forms of resource use are stimulated and bought to fruition.

Our first-hand experience in the establishment and management of multiple-use protected areas in Madagascar highlights the need for increased alignment with the applied research community if the combined pursuit of conservation and poverty alleviation is to have a solid foundation in evidence. The paucity of empirical quantitative and qualitative data presented in the case studies, even after ten years of the Durban Vision, draws attention to a glaring weakness of these new protected area initiatives; they do not sufficiently monitor their ecological, cultural and socio-economic impacts, either in the short- or long-term. If we fail to evaluate the outcomes of our actions, then we will not be able to maximise their effectiveness in terms of conserving biodiversity or alleviating poverty, or optimise our interventions through an adaptive management cycle. However, the design and

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implementation of robust monitoring programmes requires applied research capacity that may not be available to managers.

There is a clear need to improve the contribution of conservation science to the practice of protected area management since, while much research takes place within protected areas, the majority is of limited practical value in real world contexts. Given that protected areas are the predominant conservation strategy worldwide, it is amazing how little we know about how to manage them realistically. As our case studies have illustrated, approaches may focus on enhancing the management of the natural resource base, or attempting to decouple its use from development, but we know little about what works in which contexts. Local, rather than larger-scale, analyses are desperately needed to inform decision-making, with more scientists adopting an applied 'problem-solving' angle to their work. This can only be achieved by actively engaging with protected area managers in order to identify and implement appropriate research agendas; academic institutions, publishers and funders all have a role to play in changing the incentive structure to encourage them to do so (Gibbons, Wilson & Green 2011).

Protected area managers spend their time putting out fires, literally or figuratively, and have restricted time to peruse the academic literature for solutions to their challenges (Pullin *et al.* 2004). If we are to build a strong evidence base for protected area management and develop best practice, we must encourage practitioners to share their experiences, particularly their mistakes, be it through journal publications or other social learning fora. Currently, this is hampered both by institutional disincentives (practitioners are rarely rewarded for publication) and the priorities of academic journals, which favour "blue-skies" research over local case studies (Hulme 2011). However, the recent creation of fora such as *Conservation*

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Evidence and the Practitioner's Perspective rubric in the *Journal of Applied Ecology* testify that this need is increasingly being recognised.

As conservationists from ecological backgrounds, we also need to improve our ability to dialogue with local communities (Sayer 2009) to ensure that our strategies are as appropriate as possible. In this respect we need greater constructive collaboration with social scientists, particularly our critics, and to systematically make use of their tools and approaches in the planning of protected area management. While the Velondriake and Tsimembo-Manambolomaty case studies have demonstrated potential win-win scenarios for poverty alleviation and conservation, it is clear that the interests of conservationists and resource users will not be the same in general, and that trade-offs will be the norm. In such cases, explicit, participatory mechanisms through which both sides can debate their case and reach a resolution must be instigated (McShane *et al*. 2010). However, these honest negotiations must be informed by sound information regarding the likely ecological and social impacts of the management options being explored, in turn requiring the implementation of targeted applied research programmes. As Brockington, Igoe & Schmidt-Soltau (2006) state, "the ultimate challenge facing conservationists today is not only to reconcile errors of the past but also to determine how to shape human interactions with nature in landscapes of which people are a part". The increased engagement of the applied research community in protected area management is critical if this challenge is to be met, both in Madagascar and globally

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Biosketch

Charlie Gardner, Martin Nicoll, Tsibara Mbohoahy, Nanie Ratsifandrihamanana, Lily-Arison René de Roland, Malika Virah-Sawmy and Bienvenue Zafindrasilivonona have been

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involved in the establishment and management of a range of new protected areas throughout Madagascar, in various policy and implementation roles; Martin Nicoll, Nanie Ratsifandrihamanana and Joelisoa Ratsirarson also have experience of protected area policy and management in the pre-Durban Vision network. Charlie Gardner, Kirsten Olesen, Joelisoa Ratsirarson, Malika Virah-Sawmy and Zoe Davies are academics with research interests including the social dimensions of protected area management.

Figure legend

Figure 1: Location of the case study multiple-use protected areas in Madagascar. Inset indicates the position of Madagascar in relation to Africa.

Table 1: Characteristics of the case study multiple-use protected areas in Madagascar

	Anjozorobe-Angavo	**Loky-Manambato**	**Tsimembo-Manambolomaty**	**Velondriake**
Year established	2005	2005	2008	2008
Area (ha)	52,200	250,000	62,745	67,782
Human population	30,000	59,000	12,609	7,260
Percentage of the human population benefiting from conservation-livelihood activities	20	64	75	71
Key ecosystems	Humid forest	Humid forest; deciduous dry forest; littoral forest	Freshwater wetlands; deciduous dry forest; mangroves	Coral reefs; seagrass beds; mangroves
Key species (*IUCN Red List status*)	Indri *Indri indri* (Gmelin, 1788) (*EN*); diademed sifaka *Propithecus diadema* Bennett, 1832 (*EN*); Madagascar serpent eagle *Eutriorchis astur* (Sharp, 1875) (*EN*)	Golden-crowned sifaka *Propithecus tattersalli* Simons, 1988 (*EN*); Daraina sportive lemur *Lepilemur milanoii* Louis *et al.* 2006 (*DD*); white-breasted mesite *Mesitornis variegatus* Geoffroy Saint-Hilaire, 1838 (*VU*)	Madagascar fish eagle *Haliaeetus vociferoides* Des Murs, 1845 (*CR*); Madagascar teal *Anas bernieri* (Hartlaub, 1860) (*EN*); Decken's sifaka *Propithecus deckenii* A. Grandidier, 1867 (*VU*); Madagascar side-necked turtle *Erymnochelys madagascariensis* (Grandidier, 1867) (*CR*)	Five marine turtles, 18 shark species and 54 coral species on IUCN Red List

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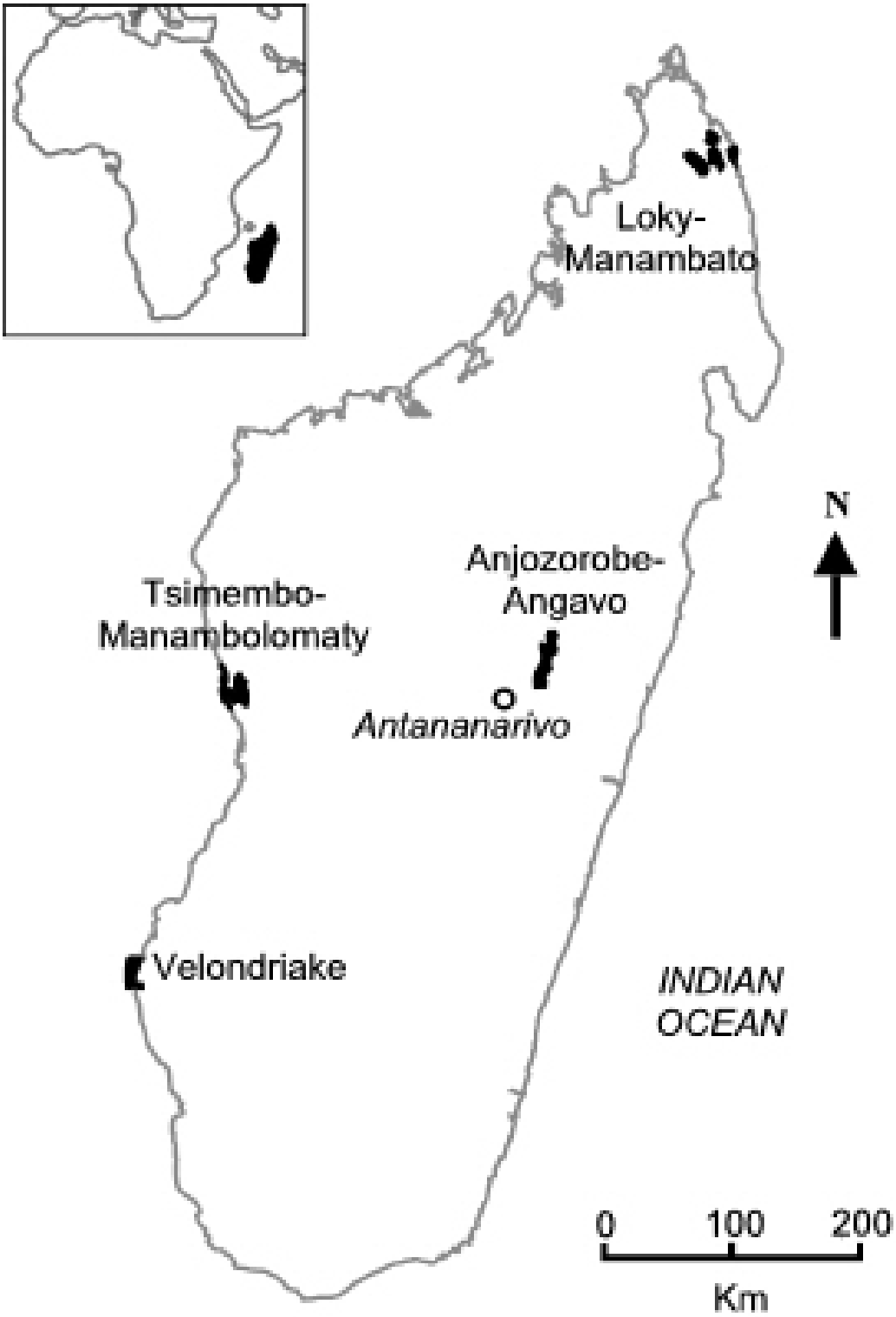
Figure 1.



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