IUCN management categories fail to represent new, multiple-use protected areas in Madagascar

Charlie J. Gardner

Abstract The IUCN protected area management category system provides an internationally-recognized, unifying framework for the description and classification of the world's diverse protected areas. It includes six main categories, of which category V has attracted debate because of its emphasis on the role of harmonious people–nature interactions in maintaining biodiversity within cultural landscapes. Madagascar's new generation of protected areas comprises sites mainly proposed as category V, with the joint management objectives of biodiversity conservation and the promotion of natural resource use for rural development. Here, I use a categorization decision tool to investigate the categorization of 10 new protected areas proposed as category V, and find that these sites fail to meet the criteria for any management category. I argue that category V is inappropriate for these new protected areas because their associated people–nature interactions are largely negative for biodiversity. I further argue that management of these new protected areas differs fundamentally from management of category V protected areas in Europe, and recommend the modification of the management category system to account for such distinctions.

Keywords IUCN, Madagascar, management, people–nature interaction, protected area category

Introduction

Protected areas form the central pillar of conservation strategies worldwide and covered at least 12.9% of the world's land surface by 2009 (Jenkins & Joppa, 2009). These areas are highly diverse in terms of their nomenclature, scale, spatial context, governance models, management objectives and management approaches, and great variation therefore exists in protected areas both within and between countries. Attempts to apply a descriptive framework to this array of approaches date back to 1933 (Phillips, 2004) and culminated in IUCN's *Guidelines for Protected Area Management Categories* (IUCN, 1994). Revised and updated in 2008 (Dudley, 2008a), the IUCN category system is now recognized by governments (Dillon, 2004) and conservation institutions as a unifying framework for the description, definition and comparison of the world's protected areas, and its use is endorsed and encouraged by the Programme of Work on Protected Areas of the Convention on Biological Diversity (SCBD, 2004). The system classifies protected areas into six main categories (Dudley, 2008a; Dudley et al., 2010), based on their primary management objective (Table 1).

Of the six management categories within the IUCN system, it is category V that has attracted much attention and debate (Locke & Dearden, 2005; Martino, 2005, Mallarach et al., 2008). The establishment of the World Commission on Protected Areas Category V Task Force and the publication of a number of outputs intended to clarify and promote the approach are testament to this debate. Uniquely among the six categories, category V focuses specifically on areas in which there has been a historical interaction between people and nature (Phillips, 2002), and where this interaction has produced the landscape characteristics that are the objects of the conservation intervention. The primary objective of the approach is to 'protect and sustain important landscapes/seascapes and the associated nature conservation and other values created by interactions with humans through traditional management practices'. Contrary to other categories, where the emphasis of management is placed on protecting what is seen as natural, the category V approach 'puts people at the heart of the operation—and indeed requires them to be there' (Phillips, 2002, p. 5). This idea is further developed in the IUCN guidelines (Dudley, 2008a, p. 21). Among the distinguishing features listed for category V 'a balanced interaction between people and nature that has endured over time and still has integrity' is stated as an essential characteristic. The core management philosophy of the approach (Phillips, 2002, p. 10) is to 'maintain the harmonious interaction of people and nature'.

The protected landscapes approach has been better established in Europe than elsewhere because of the continent's long history of settlement, the lack of remaining large natural areas, and the existence of many cultural landscapes with significant natural values (Phillips, 2002). As a category that reflects the increasingly dominant conservation paradigm (Büscher & Whande, 2007) of integrating local people into conservation initiatives and encouraging sustainable use rather than strict preservation (Wells & McShane, 2004; Locke & Dearden, 2005; Naughton-Treves et al., 2005) the category V model is seen

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TABLE 1 IUCN definitions of protected area categories.

Category	Definition (after Dudley, 2008a)
Ia (Strict nature reserve)	Strictly protected areas set aside to protect biodiversity & also possibly geological/geomorphological features, where human visitation, use & impacts are strictly controlled & limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research & monitoring.
Ib (Wilderness area)	Usually large unmodified or slightly modified areas, retaining their natural character & influence, without permanent or significant human habitation, which are protected & managed so as to preserve their natural condition.
II (National park)	Large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species & ecosystems characteristic of the area, which also provide a foundation for environmentally & culturally compatible spiritual, scientific, educational, recreational & visitor opportunities.
III (Natural monument)	Set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave or even a living feature such as an ancient grove. They are generally small protected areas & often have high visitor value.
IV (Species/ habitat management area)	Aim to protect particular species or habitats & management reflects this priority. Many category IV protected areas will need regular, active interventions to address the requirements of particular species or to maintain habitats but this is not a requirement of the category.
V (Protected landscape/ seascape)	Where the interaction of people & nature over time has produced an area of distinct character, with significant ecological, biological, cultural & scenic value, & where safeguarding the integrity of this interaction is vital to protecting & sustaining the area & its associated nature conservation & other values.
VI (Sustainable use area)	Conserve ecosystems & habitats, together with associated cultural values & traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management & where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.

as 'an approach whose time has come' (Phillips, 2002, p. 13), and the application of the category and its management principles has been strongly promoted for adoption globally. To some extent, this reflects the fact that most large wilderness or natural areas have already been incorporated into protected areas (Leroux et al., 2010), and remaining areas available for new protected area creation often include substantial human populations whose needs must be reflected in appropriate management objectives and approaches (Hutton & Leader-Williams, 2003; Mallarach et al., 2008).

Here I seek to contribute to the process of reviewing the IUCN category system (recommended by Dudley et al., 2004, 2010, to ensure that protected areas can adapt and respond to global challenges) by examining the application of categories within the context of Madagascar's rapidly expanding protected area system. I first provide a brief history of protected areas in Madagascar and then use a categorization decision tool to explore the suitability of each management category to 10 case studies of new, multiple-use protected areas. Finally, I discuss the applicability of the existing category V model to new protected areas in Madagascar and provide recommendations for the modification of the IUCN system to ensure that protected areas of this type are adequately represented.

The Madagascar protected area system

Madagascar is considered a top conservation priority, harbouring high levels of endemism at species and higher taxonomic levels (Myers et al., 2000). Prior to 2003 Madagascar's protected area network consisted of 46 areas managed by the parastatal Madagascar National Parks (formerly Association Nationale pour la Gestion des Aires Protégées), in some cases in partnership with NGOs. With a total area of almost 1.7 million ha the network comprised three categories of protected area (Randrianandianina et al., 2003); Réserve Naturelle Intégrale (Strict Nature Reserve; IUCN category Ia), Parc National (National Park; category II), and Réserve Spéciale (Special Reserve; category IV). These areas were established with little regard to the resource requirements of adjacent communities (Durbin & Ralambo, 1994): the primary management objective of all categories was the conservation of biodiversity, alongside limited research and recreation (within categories II and IV), and all extractive use of biodiversity, except for scientific purposes, was strictly prohibited according to national law (Code des Aires Protégées; Government of Madagascar, 2001). At the 2003 5th World Parks Congress, the government of Madagascar declared its intention to increase the nation's protected area coverage to 6 million ha (the Durban Vision; Ravalomanana, 2003). The objectives of the new System of Protected Areas of Madagascar (SAPM), which comprises the established Madagascar

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National Parks network as well as the post-Durban generation of new protected areas, are threefold: to conserve the whole of Madagascar's unique biodiversity, to conserve Madagascar's cultural heritage, and to promote sustainable natural resource use for development and poverty alleviation (Commission SAPM, 2006).

Steering committees established to advise on the implementation of the Durban Vision recognized that few isolated natural habitats remained and that substantial human populations depended upon most remaining natural areas for their subsistence and household income (Gardner et al., 2008). The established protected area models of categories Ia, II and IV were therefore seen as inappropriate for the majority of new protected areas and, with the support of IUCN consultants (Borrini-Feyerabend & Dudley, 2005), the IUCN category system was used to guide the development of new categories and governance structures for the country (although these were adapted to the Malagasy context). Protected areas legislation was revised to recognize category III, V and VI protected areas within SAPM, as well as to permit non-state bodies to promote, manage and govern new protected areas: most new protected areas are proposed as category V and are, or will be, governed under some form of co-management (Raik, 2007). Note that due to the political crisis that has left the country without a recognized legitimate government since early 2009, the revised Code des Aires Protégées has yet to be ratified and passed into law; all proposed category III, V and VI protected areas await this ratification before they can gain definitive protected area status (N. Ratsifandrihamanana, pers. comm.).

Methods

I selected a non-random sample of 10 newly-established or proposed protected areas that reflects the range of variation amongst sites proposed as category V in Madagascar (Table 2, Fig. 1) and applied Dudley's (2008b) categorization decision tool to assess the applicability of each management category to each site. This decision-tool was included in the final draft of Dudley (2008b) but was not included in the published guidelines (Dudley, 2008a) because it had not been sufficiently tested (N. Dudley, pers. comm.). Nevertheless, it remains the only available tool with which to deliberate categorization decision-making objectively. The tool presents a range of protected area characteristics (key issues) and a series of questions related to each (Table 3). Protected area managers are asked to select the question(s) that most clearly describes the state of each characteristic in the protected area in question: the compatibility of each characteristic-state with each category is presented as either particularly compatible, not incompatible, tends to be incompatible or never normally suitable. Scores are assigned based on these statements of compatibility (1, particularly compatible; 0, not incompatible; -1, tends to be incompatible and never normally suitable); cumulative scores indicate the suitability of each category to the protected area, with high positive scores indicating increasing suitability. The results of each decision-tool analysis were validated by experts with relevant management experience of the sites in question (see Acknowledgements). I then used the results of this scoring system to highlight two principal characteristics relevant to management, common to all sites, which influence categorization decision-making.

Results

Full results of the categorization scoring system exercise for the 10 case study protected areas are presented in Table 3, and Table 4 gives the total scores for each site by category. In all but one case the scoring system indicates that category V is the most suitable category for these sites. Closer analysis, however, reveals incompatibilities between the case study protected areas and each of the IUCN management categories (Table 5). Principally, their traditional human occupancy and management emphasis on sustainable resource extraction render them incompatible with categories I, II and III, and their focus on landscapes rather than specific habitats or species requiring management is incompatible with category IV: The two highest-scoring categories, V and VI, are those whose objectives are compatible with large-scale natural resource use. I investigate two protected area attributes, naturalness and people–nature interactions, in greater detail as they are critical to the designation of IUCN categories V and VI.

Naturalness

The key difference between category V and VI concerns the degree of human modification of the landscape. Whereas category V is suited to cultural landscapes shaped by human influence over time, category VI guidelines suggest that two-thirds of a protected area should be composed of natural or unmodified areas (defined as 'those that still retain a complete or almost complete complement of species native to the area, within a more-or-less naturally functioning ecosystem'; Dudley, 2008a, p. 12). The seven terrestrial case studies all probably fail to meet this criterion, having significant areas of deforested land and little undegraded forest within their boundaries; in many cases the limits of these protected areas have deliberately included significant areas of deforested land to permit development interventions within buffer zones of low conservation value. The ecosystems of Lac Alaotra have been altered by marsh drainage and burning, sedimentation and the introduction of invasive plants and fish

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TABLE 2 Summary details of the 10 case study protected areas (Fig. 1).

Protected area	Principal ecosystems	Size (ha)	Proposed category	Protected status (June 2010)
Amoron'i Onilahy	Spiny forest	163,000	V (including category III zones)	Temporary
Anjozorobe-Angavo	Humid forest	52,200	V	Temporary
Ankodida	Spiny & transitional forest	10,744	V (including category III zones)	Temporary
Bombetoka	Freshwater wetlands, mangroves, dry forest	46,000	V	Temporary
Lac Alaotra	Freshwater wetlands	42,478	V	Temporary
Loky-Manambato	Transitional humid/dry forest	70,837	V	Temporary
Menabe Antimena	Dry forest, mangroves	125,000	V (including category III zones)	Temporary
Montagne des Français	Dry forest	6,092	V	Temporary
PK32-Ranobe	Spiny forest, freshwater wetlands	151,000	V	Temporary
Velondriake	Marine & coastal	c. 80,000	V (potentially including zones of multiple categories)	Proposed

(Andrianandrasana et al., 2005; Ranarijaona, 2007), and Velondriake's ecosystems have been altered by overfishing that has transformed trophic dynamics and provoked phase shifts from coral to algal cover (Harris, 2007). Beyond these sites it is debatable whether any area of Madagascar possesses a 'complete complement of species native to the area', given the relatively recent (< 2,000 years) extinctions of the island's mammal, bird and reptile megafauna (Crowley, 2010). All potential conservation areas could therefore be termed cultural landscapes.

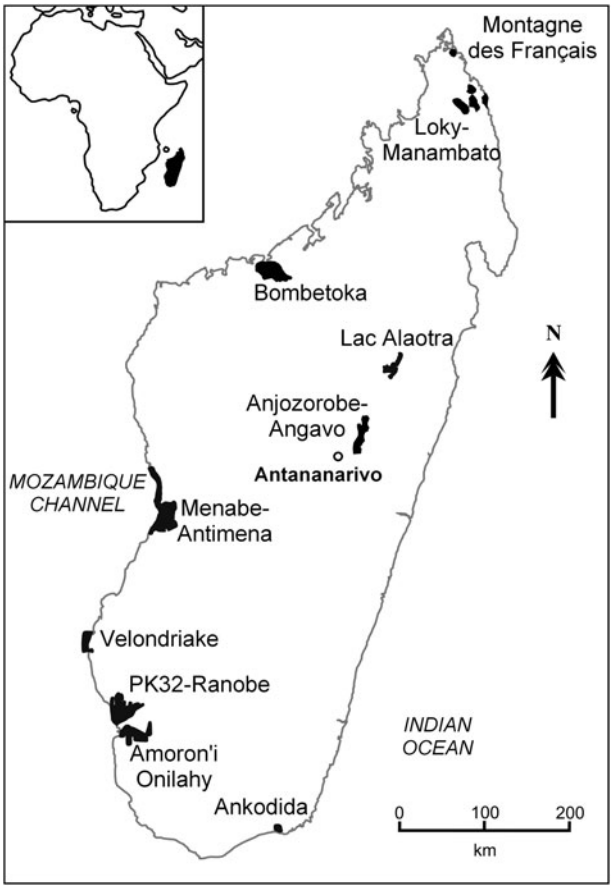

FIG. 1 Madagascar, showing the locations of the 10 case study protected areas (Table 1). The inset shows the location of Madagascar off the south-east coast of Africa.

People–nature interactions

Human influence on Madagascar's ecosystems has been largely negative for biodiversity (Gardner, 2009; Irwin et al., 2010), with two major impacts apparent: the extinction of the megafauna (Crowley, 2010) and the loss of forest cover. Although the extent of original forest cover is disputed (Virah-Sawmy, 2009) up to 84% is thought to have been lost since human colonization, through anthropogenic deforestation (Harper et al., 2007). Deforested landscapes comprise primarily species-poor grasslands and bushlands, with little value for endemic biodiversity (Lowry et al., 1997). As the majority of the island's biota is restricted to forests (Goodman & Benstead, 2005), the overall impact of human land-use over the last 2 millennia has been negative for the majority of the island's endemic species. Two examples from the case studies, Lac Alaotra and Southern spiny thicket, serve to illustrate such impacts.

Lac Alaotra The largest body of freshwater in Madagascar and a Ramsar site since 2003, the lake and its associated marshes include the entire global range of the Critically Endangered Alaotra gentle lemur *Hapalemur alaotrensis*, as well as the only known breeding area of the now extinct Alaotra little grebe *Tachybaptus rufolavatus* and (until recently) the Critically Endangered Madagascar pochard *Aythya innotata*. The human population of the Alaotra watershed increased five-fold from 1960 to 2003

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Table 3 Categorization decision-tool showing results of analyses for 10 case study protected areas.

Questions (by key characteristic/issue)	Category*							Question(s) within each characteristic/issue most appropriate for each protected area									
	Ia	Ib	II	III	IV	V	VI	Amoron'i Onilahy	Anjozorobe-Angavo	Ankodida	Bombetoka	Lac Alaotra	Loky-Manambato	Menabe Antimena	Montagne des Français	PK32-Ranobe	Velondriake
Naturalness																	
Entire area in more-or-less natural state	√	√	√	√	–	‡	†										
Most of area in more-or-less natural state	–	–	√	√	–	†	√		X								
<50% of area in more-or-less natural state	†	†	–	–	–	–	‡	X		X	X	X	X	X	X	X	
Entire area resulting from people–nature interaction over time	†	†	–	–	–	√	†										X
Area requiring management to maintain biodiversity	‡	‡	–	–	√	–	–										
Scale																	
Site large enough to conserve an ecosystem	√	√	√	–	–	–	–	X	X		X	X	X	X	X	X	X
Site not large enough to conserve an ecosystem	–	–	‡	–	–	–	–			X							
Site designated to conserve specific feature	–	–	–	√	–	–	–										
Connectedness																	
Connected with other protected areas or similar habitats	–	–	√	–	–	–	–	X	X		X					X	X
Unconnected with other protected areas or similar habitats	–	–	†	–	–	–	–			X		X	X	X	X		
Biodiversity																	
Many species requiring natural conditions	√	√	√	–	–	‡	–	X	X	X	X	X	X	X		X	
Most species able to live in human-modified areas	–	–	–	–	√	√	–			X	X				X	X	X
Key species need active management intervention (e.g. fire, grazing) to survive	‡	‡	–	–	√	–	–										
Some wild species routinely used in extractive manner	‡	‡	†	–	–	√	√	X	X	X	X	X	X	X	X	X	X
Regeneration																	
Ecosystem capable of regeneration	–	–	–	–	√	√	√		X		X		X				X

Table 3 (Continued)

Questions (by key characteristic/issue)	Category*							Question(s) within each characteristic/issue most appropriate for each protected area									
	Ia	Ib	II	III	IV	V	VI	Amoron'i Onilahy	Anjozorobe-Angavo	Ankodida	Bombetoka	Lac Alaotra	Loky-Manambato	Menabe Antimena	Montagne des Français	PK32-Ranobe	Velondriake
Ecosystem difficult to regenerate to original quality	√	√	√	–	–	†	–	X		X		X		X	X	X	
Environmental services																	
Providing environmental services (e.g. water, soil)	–	–	–	–	–	–	–	X	X	X	X	X	X	X	X	X	X
Not providing environmental services	–	–	–	–	–	–	–										
Social values (livelihoods, economic etc.)																	
Providing few socio-economic values	√	√	√	–	–	†	†										
Providing non-extractive socio-economic values (e.g. tourism)	–	–	√	√	–	–	–	X	X	X	X	X	X	X	X	X	X
Providing extractive renewable resources	‡	‡	†	–	–	√	√	X	X	X	X	X	X	X	X	X	X
Providing extractive mineral resources	‡	‡	†	†	†	–	–	X			X		X	X		X	
Traditional occupancy																	
Comprising traditional settlement/migration routes	†	†	†	†	–	√	√	X	X	X	X	X	X	X	X	X	X
Empty of traditional settlements/migration routes	√	√	√	–	–	–	–										
User needs & wants																	
Users wish to practise resource extraction	†	†	–	–	–	√	√	X	X	X	X	X	X	X	X	X	X
No users wishing to extract resources	√	√	–	–	–	†	‡										
Tourism																	
Many tourists expected to use the site	‡	‡	√	–	–	√	–	X	X		X	X	X	X	X	X	X
Few if any tourists expected to use the site	√	√	–	–	–	–	–			X							
Sacred & cultural values																	
Sacred or culturally valuable sites that are not regularly visited	√	√	–	–	–	–	–	X			X	X	X	X	X	X	X
Sacred or culturally valuable sites that are regularly visited	†	†	–	√	–	–	–		X	X		X					
Without sacred or culturally valuable sites	–	–	–	–	–	–	–										

Table 3 (Continued)

Questions (by key characteristic/issue)	Category* Ia	Ib	II	III	IV	V	VI	Question(s) within each characteristic/issue most appropriate for each protected area: Amoron'i Onilahy	Anjozorobe-Angavo	Ankodida	Bombetoka	Lac Alaotra	Loky-Manambato	Menabe Antimena	Montagne des Français	PK32-Ranobe	Velondriake
People–nature interaction																	
Historically present	†	†	–	√	–	√	–	X	X	X		X	X	X	X	X	X
Historically absent	√	√	√	–	–	†	†				X						
Mostly negative with respect to desired biodiversity	√	√	√	√	–	‡	†	X	X	X	X	X	X	X	X	X	X
Mixed results with respect to desired biodiversity	–	–	–	–	–	–	–										
Mostly positive with respect to desired biodiversity	–	–	–	–	–	√	√										
Very positive results with respect to desired biodiversity	†	†	†	†	√	√	√										

*Compatibility of each attribute state (questions within each key characteristic/issue) with each protected area category: √, particularly compatible; –, not incompatible; †, tends to be incompatible; ‡, never normally suitable

(Bakoariniaina et al., 2006). The forested hills of the watershed have mostly been cleared, and subsequent erosion and siltation has resulted in lake acidification and a reduction in lake area to 20% of its original size by 2000 (Bakoariniaina et al., 2006). Most of the lake's marshes have been converted to rice cultivation and remain threatened by burning (Copsey et al., 2009), introduced plant and fish species have altered aquatic vegetation dynamics, and overfishing remains a serious problem (Andrianandrasana et al., 2005). This range of pressures on the lake's ecosystems has had extreme impacts on the locally-endemic biodiversity: *T. rufolavatus* has not been recorded since 1982 (Wilmé, 1994; IUCN, 2010) and *A. innotata* had not been recorded since 1991 and was presumed extinct until recently rediscovered elsewhere (René de Roland et al., 2007). The population of *H. alaotrensis* has declined from an estimated 10,710 in 1994 to an estimated 2,480 in 2002 (Ralainasolo, 2004).

Southern spiny thicket The spiny thicket ecoregion of southern Madagascar was, prior to the Durban Vision (and the establishment of PK32-Ranobe, Amoron'i Onilahy and Ankodida of the case study protected areas), the least represented biome within the country's protected area system (Fenn, 2003a). People–nature interactions within the ecoregion take various forms, including pastoralism, timber and non-timber forest product extraction, charcoal production, and slash-and-burn agriculture (*hatsake*; Seddon et al., 2000; Gardner et al., 2008). Although the *hatsake* system of agricultural production may have been sustainable at low population densities and under certain social institutional conditions (Elmqvist et al., 2007), increased rates of forest conversion because of changing macroeconomic conditions (Casse et al., 2004; Minten et al., 2006), population growth and increasing migration (Rabesahala Horning, 2003; Kaufmann & Tsirahamba, 2006) have led to the region suffering the fastest rates of forest loss in the country since 1990 (Harper et al., 2007). In the only existing study on the impacts of forest loss on biodiversity within the ecoregion, Scott et al. (2006) found that species richness of lizards, small mammals and birds declined by 50, 40 and 26% respectively, and species turnover also resulted in shifts in community composition from habitat specialists to generalist species. Of the three case studies within the region, all are primarily threatened by *hatsake* and charcoal production. In all three cases the interaction between people and nature has been negative for the ecological and biological values of the site as well as for certain environmentally favourable cultural values, such as the preservation of culturally and spiritually important forest areas (Fenn, 2003b; Bodin et al., 2006; Gardner et al., 2008). Other cultural values, however, such as the opportunity to derive a livelihood from ancestral lands (Keller, 2008), are enhanced by the interaction.

TABLE 4 Results of categorization decision-tool analyses (see text for further details), showing total scores by protected area (Fig. 1, Table 2) for each category (Table 1).

	Category					
Protected area	Ia	II	III	IV	V	VI
Amoron'i Onilahy	-3	3	1	-1	3	1
Anjozorobe-Angavo	-4	4	4	1	4	5
Ankodida	-3	-1	3	0	3	2
Bombetoka	-2	3	0	1	4	2
Lac Alaotra	-4	2	3	0	3	2
Loky-Manambato	-4	0	1	0	5	3
Menabe Antimena	-3	1	1	-1	3	2
Montagne des Français	-3	1	2	1	5	2
PK32-Ranobe	-3	2	1	0	4	2
Velondriake	-4	2	2	2	8	3
Mean	-3.3	1.7	1.8	0.3	4.2	2.4

Discussion

The analysis suggests that the 10 case study protected areas do not fall neatly into any of the IUCN management categories. Of the two categories compatible with large-scale natural resource extraction, category VI appears unsuitable because of the degree of human modification of the land- and seascapes in question, and the negative impact of land and resource use on biodiversity violates the key principle of category V, the category to which they have been proposed. The choice between category V and VI, at least for some terrestrial case studies, is complicated by the deliberate inclusion of degraded and deforested areas within protected area boundaries. Such areas have been incorporated into protected areas because (1) they are seen as valuable for the promotion of economic development to reduce dependence on unsustainable resource use, and (2) they often occur in a mosaic pattern within higher quality habitat, making their exclusion from protected areas spatially complex. Excluding such areas would lead to these sites more closely matching the criteria for category VI, although categorization must be based on site-specific realities, and as such category V remains the most suitable based on the decision-tool analysis. With regards to human impacts on biodiversity, I do not suggest that no examples of harmonious people–nature interactions of the type envisaged in the protected landscapes model exist in Madagascar but rather that the case study areas are not typified by such interactions. Possible examples of harmonious interactions include the sclerophyllous scrub and alti-montane prairies of Andringitra, which are at least partly maintained by cattle grazing and fires (Rabetaliana & Schachenmann, 1999), the fire-maintained Tapia woodlands of the central highlands (Kull, 2004), forest management by Mahafaly pastoralists (Kaufmann & Tsirahamba, 2006), and the suppression of the invasive endemic vine *Sarcostemma viminale* (Asclepiadaceae) by cattle grazing within Beza Mahafaly Special Reserve (Sussman & Rakotozafy, 1994).

TABLE 5 Principal sources of incompatibility between case study protected areas and IUCN management categories.

Category	Incompatibility with case study protected areas
Ia (Strict nature reserve)	Established in least human-impacted areas, & strictly controls human visitation & use to ensure protection of conservation values. Case study areas are established in cultural landscapes & permit a range of human uses.
Ib (Wilderness area)	Established in large, unmodified landscapes without significant habitation & managed to retain natural condition. Case study areas are generally too small & too modified to qualify as wilderness.
II (National park)	Established in large, natural areas primarily to ensure conservation at ecosystem scale, with limited human use apart from recreation. Case study areas are generally on a smaller scale & permit a range of human uses.
III (Natural monument)	Generally small & established to protect specific natural features or culturally important natural sites. Management of case study areas is focused on conservation of landscapes or seascapes rather than specific features.
IV (Species/habitat management area)	Established to protect specific habitat or species & usually requires active management. Management of case study areas is focused on conservation of landscapes or seascapes rather than specific habitats or species, & does not include active species or habitat-focused interventions.
V (Protected landscape/ seascape)	Established to maintain people–nature interactions that enhance conservation value in cultural landscapes. In the case study areas, people–nature interactions generally diminish conservation value (in terms of viability of endemic species & communities).
VI (Sustainable use area)	Established in predominantly natural areas & permits low-impact resource use. Case study areas are established in predominantly cultural landscapes & permit human uses that have a greater impact on natural habitats.

The key difference between category V in Madagascar and the model as conceived and implemented in Europe concerns the role of people–nature interactions within present and future protected area management. In the protected landscapes model human–nature interactions are seen as intrinsic to the landscape and essential for the maintenance of conservation values (Phillips, 2002). In Madagascar, however, such interactions are largely negative for the maintenance of conservation value and, if left

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unchecked, could result in the near complete loss of natural habitats and areas of high biodiversity value. The justification for protected area creation, therefore, is undermined by the impact of local communities on the landscape. Rather than maintaining the interaction, management of category V areas in Madagascar is focused on modifying and reducing the type and intensity of natural resource use to promote sustainability and minimize the negative impacts of resource use (Harris, 2007; Gardner et al., 2008). Harmonious people–nature interactions, in these cases, are a desired future state to be fostered, rather than an existing dynamic to be maintained. This distinction is not purely semantic and has real and important management ramifications. In the European model of category V a balanced interaction between man and nature has been reached and the management challenge is to maintain traditional land use in the face of more destructive modern practices (Phillips, 2002). In Malagasy category V areas, however, the interaction between people and nature has not yet reached a balance and the challenge is to adapt these into more benign, harmonious forms before further biodiversity is lost. This fundamental difference in approach is particularly important given that category V has been promoted by the IUCN for adoption worldwide; emphasizing the maintenance of traditional livelihood practices will not result in conservation gains if such practices negatively affect biodiversity and it is therefore essential to distinguish harmonious from negative people–nature interactions both in practice and in theory. Furthermore, the masking of these differences diminishes the utility of the category system as a framework for the description and comparison of protected areas, its primary function.

Given the incompatibilities between Malagasy protected areas proposed as category V and each of the six main IUCN categories, how should these sites be categorized? These protected areas need to incorporate the livelihood needs of local communities in management decision-making and, consequently, must accept certain activities that, unless carefully managed, have the potential to negatively affect the conservation values they were established to maintain. Such protected areas are likely to become more common in an ever-modernizing world in which remaining natural ecosystems become increasingly small and fragmented and where increasing numbers of rural people depend on resources from such areas for their well-being (Mallarach et al., 2008). My analysis suggests that protected areas established in such a context, where human land and resource use may diminish the viability of species and ecosystems but must nevertheless be accepted in the initial stages of protected area establishment, are not adequately represented by the IUCN protected area management categories. By failing to recognize the fundamental differences between category V protected areas of the type proposed in Madagascar and those prevalent in Europe, the system fails to acknowledge the former for what they are: valuable areas for the conservation of biodiversity that are threatened, rather than maintained, by human agency. Pigeon-holing these sites into other categories may result in failures amongst conservation scientists, practitioners and policy-makers to recognize the critical role played by this emerging type of protected area in maintaining biodiversity while promoting development within human-dominated landscapes, as well as the immense challenges associated with achieving such outcomes in these circumstances.

I therefore suggest that the IUCN category system be modified to recognize formally the intrinsically different nature of such protected areas. Two possibilities suggest themselves: (1) That the definition of category V be relaxed so as to reduce the emphasis on people–nature interactions that are positive for biodiversity and to include all protected areas in which people–nature interactions (of any type) are dominant features of the landscape. Rather than insisting on the existence of a harmonious people–nature interaction as a key criterion of a protected landscape, guidelines could simply require the potential for such an interaction to be restored or fostered. (2) That an additional category or subcategory (such as Vb) be created and defined so as to account specifically for the types of protected area in which human–nature interactions must be transformed rather than maintained to meet protected area management objectives.

Of these proposals (1) would meet the goal of recognizing new protected areas of the type prevalent in Madagascar but would nevertheless fail to make the distinction between them and category V protected areas as managed in Europe. Proposal (2), however, would specifically recognize the unique management objectives and approach of Malagasy-type protected areas, a necessary first conceptual step if we are successfully to employ the protected area approach to conserve biodiversity in human-dominated landscapes.

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