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Review

Evidence for Biodiversity Conservation in Protected Landscapes

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Academic Editors: Jeffrey Sayer and Chris Margules
Received: 20 September 2016; Accepted: 26 October 2016; Published: 4 November 2016

Abstract: A growing number of protected areas are defined by the International Union for Conservation of Nature (IUCN) as *protected landscapes and seascapes*, or category V protected areas, one of six protected area categories based on management approach. Category V now makes up over half the protected area coverage in Europe, for instance. While the earliest category V areas were designated mainly for their landscape and recreational values, they are increasingly expected also to protect biodiversity. Critics have claimed that they fail to conserve enough biodiversity. The current paper addresses this question by reviewing available evidence for the effectiveness of category V in protecting wild biodiversity by drawing on published information and a set of case studies. Research to date focuses more frequently on changes in vegetation cover than on species, and results are limited and contradictory, suggesting variously that category V protected areas are better than, worse than or the same as more strictly protected categories in terms of conserving biodiversity. This may indicate that differences are not dramatic, or that effectiveness depends on many factors. The need for greater research in this area is highlighted. Research gaps include: (i) comparative studies of conservation success inside and outside category V protected areas; (ii) the contribution that small, strictly protected areas make to the conservation success of surrounding, less strictly protected areas—and vice versa; (iii) the effectiveness of different governance approaches in category V; (iv) a clearer understanding of the impacts of zoning in a protected area; and (v) better understanding of how to implement landscape approaches in and around category V protected areas.

Keywords: protected landscape; IUCN category V; biodiversity conservation

1. Introduction

A growing number of protected areas, particularly—but by no means only in Europe, are defined by the International Union for Conservation of Nature (IUCN) as *protected landscapes/seascapes*, or more formally as *category V protected areas*; "where the 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" [1]. IUCN identifies six different protected area management categories (see Table 1), of which category V, protected landscapes/seascapes, is the least strictly protected Category VI, the other less strict management regime, gives protection to

broadly natural ecosystems which nonetheless provide a sustainable off-take, such as fish or rubber tapped from native trees.

Table 1. The International Union for Conservation of Nature (IUCN) Protected Area Management Categories. Source: Dudley, 2008 [1].

No.	Name	Description
I_a	Strict nature reserve	Strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values.
I_b	Wilderness area	Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and 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 species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities.
III	Natural monument or feature	Areas 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.
IV	Habitat/species management area	Areas that aim to protect particular species or habitats and where 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 or seascape	An area where the 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.
VI	Protected areas with sustainable use of natural resources	Areas which conserve ecosystems and habitats, together with associated cultural values and 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 and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.

Category V protected areas are neither natural ecosystems nor "wilderness" areas, but rather cultural landscapes that in spite of, or even because of, their long history of human use often contain important biodiversity. Over the past two decades, protected landscapes have increasingly been designated as protected areas in many parts of the world [2]. Currently, there are about 7.3 million km^2 of protected areas reported under IUCN Category V, some 18% of total area of protected areas with an IUCN Category and a considerably higher proportion of terrestrial protected areas [3]. Governments are introducing new designations based on category V management objectives, using a range of governance types [4]. Since 1992 inclusion of a Cultural Landscape designation in the World Heritage Convention has led to the inscription of many World Heritage Cultural Landscapes, with considerable overlap between these sites and category V protected areas [5,6]. In parallel, conservation initiatives such *Satoyama*, a traditional form of land management originating in Japan and now promoted in other countries [7] and designations such as Globally Important Agricultural Heritage Systems are further advancing what might be referred to as a "protected landscape approach" [8], even if they are not all officially recognized as category V protected areas.

The earliest places now recognised as category V protected areas were established mainly to preserve scenic beauty, influenced by the aesthetics of Romanticism [9] and to provide urban populations with access to the countryside. The physical and political battles to access high moors above the cities of Sheffield and Manchester were an important stimulus for the 1949 National Parks and Access to the Countryside Act and helped create the UK's first protected landscape, the Peak

District National Park, designated in 1951 [10]. Throughout Europe [11] and North America [12] the earliest national parks were promoted primarily on the basis of scenery, access and recreation, rather than wildlife conservation [13].

Over time the protected landscape concept has expanded to give greater prominence to nature conservation, cultural heritage, ecosystem services and sustainability models. As countries took a greater interest in biodiversity, managers of protected landscapes have investigated options for strengthening the conservation outcomes. The Satoyama Initiative, launched in Japan in 2010, aims to improve links between biodiversity conservation and cultural landscapes [14]. Natura 2000 legislation in the European Union means that many established protected landscapes are now required to deliver specific conservation objectives that were not always identified when they were first designated.

A seminal workshop held in 1987 in the English Lake District compiled a list of protected landscape values [15], which included the conservation of wild biodiversity; the relative importance of this aim has increased in the years since. A growing number of developing country governments are also attracted by the flexibility that category V offers, rather than more exclusionary conservation approaches, and because they can help to buffer or link more strictly protected areas [16,17]. While "national parks" are often seen in many countries as serving the interests of the rich at the expense of the poor, or as a vestige of colonial occupation, "protected landscapes" can claim to build more on local values and traditions and thus they often receive stronger support. In Madagascar, for instance, a "Malagasy-specific" definition of category V has been developed, suitable for the country's particular cultural and social conditions [18]. As part of Ecuador's new Law of Culture, the designation "Ecuadorian Heritage Cultural Landscape" has been proposed, based on values of Ecuadorian identity and sustaining biocultural diversity and heritage in the Andean sense of "patrimony" [19]. The province of Québec has created a designation called *paysage humanisé* (or "living landscape"), in keeping with category V and modelled after the Regional Nature Parks of France and Belgium, as a means of increasing biodiversity conservation while encouraging sustainable rural development [20].

The IUCN World Commission on Protected Areas has a Specialist Group focused on protected landscapes/seascapes, which serves as a platform for documenting and presenting experience worldwide, mobilizing global expertise, and developing guidance on protected landscapes. It was tasked with providing best practice guidance [21], documenting experience worldwide [8] and investigating different values of category V protected areas such as agrobiodiversity [22] and spiritual values [23].

But the concept has also had important detractors, claiming that protected landscapes are not sufficiently focused on delivering conservation benefits [24]. Critics have claimed that some governments see category V as an "easy option" that does not require major cost, and apply the concept casually and carelessly. In 2005, Locke and Dearden [25] argued that both protected landscapes and sustainable use reserves (IUCN category VI), whilst of cultural and often economic value, had no automatic biodiversity value and should not be "counted" as protected areas. These criticisms generated some considered responses [26], The ensuing debate helped to stimulate a thorough re-examination of the purpose and meaning of protected areas, including protected landscapes, and about the relative conservation benefits of different types of protected areas. Others have argued that the importance of protected landscapes in terms of conserving agro-biodiversity, cultural and spiritual values were additional reasons that justified the approach [22,23]. Critics of the category V protected area model remain sceptical about its value [27].

The biodiversity conservation effectiveness of category V protected areas is particularly important in those places where protected landscapes and seascapes make up a substantial proportion of the conservation estate. For example, in Europe over half the area of protected areas is designated as category V [11], If use of the protected landscape category does not conserve biodiversity then European conservation strategies are in deep trouble [28].

2. Do Protected Landscapes Conserve Biodiversity Effectively?

There are actually two related questions: do category V protected areas have a unique role in protecting culturally adapted wild biodiversity; and do protected landscapes work effectively in protecting wild biodiversity? [29]. Although "biodiversity" is stressed here, implying all ecosystems, species and genetic diversity, it is noted that most studies focus on a few species or particular habitat types.

2.1. Do Category V Protected Areas Have a Unique Role in Conserving Culturally Adapted Wild Biodiversity?

Some researchers regard category V sites as places where wild plant and animal species are so adapted to human management patterns that they will decline if management is removed.

This assumes a unique role for protected landscapes that could not be duplicated in more strictly protected reserves, and remains controversial. For example, many ecologists believe that the millennia-old landscape mosaic of traditional farming in the Mediterranean is now an essential factor in maintaining its biodiversity values. They argue that it is richer in diversity than the original ecosystem [30] and that abandoning (or changing) existing management would reduce biodiversity [31], both of animals [32], and plants [33]. Santos and Thorne [34] identify multi-purpose management as a necessary conservation strategy to avoid "over-maturity" of woodlands and scrub invasion. However, others argue that the emphasis on cultural systems in the Mediterranean under-values ecosystems that develop naturally [35]: a less managed ecosystem will likely have different species but not necessarily of less conservation value. Whether or not cultural landscapes are essential to maintaining biodiversity is therefore partly dependent on the conservation objectives. Category V may have an important role in maintaining those land use systems that give rise to cultural landscapes which are valued for their biodiversity. Examples include: flower-rich chalk pastures grazed by sheep; some upland moorland grazing systems that support good bird habitat; seasonally grazed Alpine pastures with abundant wild flowers; and productive Mediterranean cork oak agro-sylvo-pastoral systems, for example the Iberian dehesa. The role of protected landscapes in sustaining genetic diversity in the form of agrobiodiversity has been documented [36].

Protected landscapes may be important here in providing a policy and economic framework to support these values. Maintaining traditional management to conserve associated biodiversity is only possible if people managing the land agree to adhere to those traditions. Drivers in maintaining traditional (and often economically inefficient) management systems include long-standing cultural expectations, a personal sense of stewardship, and financial or other incentives. Negotiating the various trade-offs involved is a key element of protected landscape management [37].

2.2. Do Protected Landscapes Work Effectively in Protecting Wild Biodiversity?

A more fundamental issue is whether or not a protected landscape approach can help to maintain or restore wild biodiversity in a more general sense. This is particularly important because if a protected landscape is to be recognised as a protected area by IUCN, it must be managed in ways that give priority to the conservation of nature—though "nature" in this context includes geodiversity as well as biodiversity. It is known that protected areas do not invariably protect large mammals [38], but that well-managed protected areas are more effective conservation tools than most other management approaches [39,40]. However, relatively few comparative studies of effectiveness have addressed protected landscapes [41] or compared effectiveness across different IUCN categories.

Category V has to date been relatively under-represented in management effectiveness studies. To compound the problem, most management effectiveness methodologies are weakest in relation to reflecting biodiversity outcomes [42]. Moreover, some of the commonest assessment methods, such as the Management Effectiveness Tracking Tool, METT [43] and RAPPAM [44], base assessment mainly on the opinions of key stakeholders (usually the protected area manager and staff). Many academics, NGOs and governments assume that category V (and category VI) protected areas are less effective

in conserving biodiversity than stricter approaches in protected areas [45,46]. NGOs like WWF and Conservation International often simply omit categories V and VI from ecoregional plans and gap analyses, at least in the tropics.

However, a series of meta-studies and individual research projects have suggested that "softer", more community-based approaches can be more effective in conserving biodiversity, at least in some situations, than "harder", exclusionary conservation management.

A study from the World Bank used fire occurrence as a surrogate for deforestation and found that strict protected areas substantially reduced fire incidence in Asia and Latin America, but that multiple use protected areas, including indigenous peoples' reserves, were even more effective [47]. A recent meta-analysis comparing strictly protected areas with community-managed forests (a number of which were also defined as category V protected areas) suggested that the latter had lower and less variable annual deforestation rates [48]. A study across 49 protected areas in 22 countries found protected area category to be insignificant in predicting amount of land clearing [49]. Analysis of 1788 protected areas in Latin America found category V protected areas around the median of all categories in terms of vegetation loss [50]. Joppa et al. [51] looking at natural vegetation cover in protected areas found little difference between different categories, except in West Africa where categories V and VI performed less well than stricter forms of protection. A recent study of species richness and abundance inside and outside protected areas found no significant difference between different groups of categories [52]. The most recent global analysis of protected area performance based on individual management effectiveness studies considered over 8000 assessments of protected areas [53]. Although 86 per cent of protected areas surveyed showed at least some level of effective functioning, this global analysis did not attempt a detailed breakdown of effectiveness by category.

This generally positive link with protected landscapes has not been found in all studies. Andam et al. [54] found deforestation less in category I and II protected areas than in other categories and Bradshaw et al. [46] report that stricter protection is more effective, as did Coetzee et al. [40]. Analysis of threatened species in Australia found that species overlapping category I–IV protected areas had a high number of stable or increasing populations, but found no comparable change in categories V and VI [55]. Comparison of categories in protected areas in four countries—Indonesia, Thailand, Costa Rica and Bolivia—found stricter protection reduced forest loss more than less strict protection, but the differences were not large and sometimes a function of site selection. The authors concluded that strictness of protection is not always more effective [56]. Finally research using the Management Effectiveness Tracking Tool identified a highly significant association between category and management effectiveness, with more strictly protected areas having higher scores for biodiversity conservation—categories I_a, I_b and II being most effective, III and IV in the middle and V and VI least effective [57]. The limitations here are that, as noted above, the METT is relatively weak at measuring biodiversity outcomes; also the proportion of category V protected areas in the sample was very small. METT data therefore need to be treated with some caution here.

Information is even more limited for marine environments. Research on sharks in the Australian Great Barrier Reef Marine Park found that they were only being effectively conserved in the strictly protected (category I_a) zones of the reserve [58]. On the other hand, an analysis of marine protected area (MPA) effectiveness throughout Australia discovered little difference between the categories [59]. A review of over a hundred studies showed strikingly higher fish populations inside the no-take reserves compared with surrounding areas [60], although no-take zones can be, and are, designated within category V MPAs. Effectiveness in MPAs has also been linked to a combination of strong governance structures and community engagement [61] suggesting that management objectives may be less influential than effectiveness of governance.

It should be noted that many studies are limited in the types of biodiversity that they consider, often focusing on forest cover or a few species. Many also tend to concentrate on ecosystems under stress, such as tropical forests, and thus do not provide an unbiased sample of conditions around the

world. Furthermore, categories V and VI are assessed together in some studies, although they are markedly different management regimes. All these factors highlight the need for more detailed studies.

Table 2. Examples of protected landscapes and seascapes conserving wild biodiversity. Source: Dudley and Stolton, 2012 [67].

Country	Protected Area	Ecology and Management	Key Species
Croatia	Lonjske Polje Nature Park	Semi-natural floodplains, with pastures, ecotourism connected with storks nesting	Many birds, black stork (*Ciconia nigra*), Eurasian spoonbill (*Platalea leucorodia*).
Spain	Somiedo Natural Park	Mountain pasture, upland agriculture and grazing, ecotourism	Natural forests preventing fragmentation; brown bear (*Ursus arctos arctos*) and capercaillie (*Tetrao urogallus*).
Germany	Lüneburger Heath Nature Park	Heathland area	Black grouse (*Tetrao tetrix*).
Mozambique	Matibane Forest Reserve	Coastal forest area	Threatened forest, especially endemic tree *Icuria dunensis*.
Colombia	Makuira National Park	Conserving forest partly through conservation of sacred places and taboo	Important biogeographical island with high levels of biodiversity, numerous forests including cloud forest.
Mexico	Oaxaca community conservation areas	Wide variety of vegetation types scattered throughout the state	Around 70% of mammal species found in community areas (compared to 60% in strictly protected national parks).
India	Khonoma Nature Conservation and Tragopan Sanctuary	Small area of forest conserved at village edge	Included in an Important Bird Area, species including Blyth's tragopan (*Tragopan blythii*) and mammals such as clouded leopard (*Neofelis nebulosa*).
Canada	Poplar River Initiative	Sustainable hunting reserve of First Nations, aimed for long-term management of beaver and other fur species	Beaver (*Castor canadensis*), lynx (*Lynx canadensis*) and wolf (*Canis lupus*).

There is also a small but growing number of studies of individual category V protected areas. Research in Catalonia, Spain found that protected landscapes provided habitat for rare species, including predators like bear and lynx [62]. Studies by the Royal Society for the Protection of Birds in the UK found that there were quantifiable benefits for wild species in British category V protected areas [63]. Evidence on the positive role of traditional farming methods in conservation has long existed in the Mediterranean region [64]. Research in the Lombardy plain in Italy found that natural habitats declined less, and bird diversity was significantly higher, in protected landscapes than in areas outside protection [65]. The protected landscape approach has more generally been used successfully as the basis for species conservation strategies under the European Union's Natura 2000 network, particularly in the Mediterranean, including maintaining corridors between more strictly protected areas [66]. Dudley and Stolton [67] collected case studies that describe in detail links between protected landscapes and wild biodiversity conservation around the world (Table 2).

3. Discussion

Given the importance attached to protected landscapes and seascapes as conservation vehicles, for example in Europe where they make up over half the protected area estate [11], it is surprising and rather alarming how comparatively few attempts have been made to assess their effectiveness. Furthermore, many of the studies that have taken place are simple comparisons of biodiversity (usually species or ecosystem types) inside and outside protected areas, without taking account of other

potential variables. Lack of consideration of counterfactuals further limits confidence in the conclusions. Apart from a few very regionally specific studies, there is still insufficient quantitative evidence about whether or not protected landscapes and seascapes are successful in protecting threatened biodiversity. Even those studies that use the IUCN categories in analysing management effectiveness generally do so by using groups of categories rather than considering individual ones, such as protected landscapes. While the examples collected here show that there are clearly cases where a protected landscape approach has likely been successful (and successful where other stricter approaches would probably have failed), there is also evidence which suggests that this is not always the case. Unless a clearer picture is developed of what is happening in protected landscapes and why, what works and does not work, and the steps that can help to improve the chances of success, there is a risk of seeing further decline in biodiversity.

A series of research projects are needed to fill gaps in knowledge. Amongst the issues that need to be addressed are the following [41]:

(i) comparative studies of conservation success inside and outside established protected landscapes and seascapes, including comparisons with analogous protected areas in more restrictive management categories;
(ii) identifying the contribution that small, strictly protected areas or core zones make to the conservation success of surrounding, less strictly protected areas—and vice versa;
(iii) comparison of the effectiveness of different governance types and governance approaches within protected landscapes with respect to both effectiveness of conservation and long-term motivation to protect biodiversity;
(iv) a clearer understanding of the impacts of zoning within a protected area; and
(v) a better understanding of how to implement landscape approaches [68]: within protected landscapes and seascapes; between category V protected areas and other protected areas in different categories; and between category V protected areas and surrounding management types which are not protected areas.
(vi) the specific legal and technical tools, including dedicated monitoring programmes, which are required for protected landscapes management. See Mallarach et al. [26].

This research needs to be conducted in parallel with other actions to strengthen information about protected areas of all kinds. One issue, well recognized but poorly quantified, is that countries apply protected area categories in different ways; some places that are designated as category II are managed more like category V for example, further confusing attempts at understanding relative effectiveness.

While all these analyses will be challenging, none should be impossible. The fact that many protected landscapes are found in the richer countries means that time-series data will often already be present, enabling mapping of the relative success of bird and plant conservation inside and outside protected areas, even at a fine scale. The growing interest in "other effective area-based conservation measures", following their emergence as a topic of investigation from within the Convention on Biological Diversity, means that many governments are adopting more imaginative ways of addressing conservation [69].

In building a research portfolio, category V protected areas offer additional options for working with resident communities in data collection, both in deciding what to measure and how. Recognising that long settled local communities and indigenous peoples often know more about resident wild species than incoming scientists, collaborative approaches that incorporate traditional ecological knowledge will be key. The role of community monitoring in category V protected areas is being developed and refined [70], with work focusing on the best indicators related to particular knowledge within communities [71] and the social process of agreeing indicators [72]. Such monitoring will only be successful if stakeholders are comfortable about sharing information [73], which in turn relates to the overall governance structure, power relations and social interactions within the landscape.

The process of deciding what data to collect can itself be a valuable learning process for managers and communities, as has been recognised in Australia [74].

This review also suggests that there is still much to be learned about management of protected landscapes and that some traditional ideas may need to be modified. "Safeguarding the integrity of the interaction" means more than simply freezing things as they are. It would be fair to say that managing change in protected landscapes remains a challenge that has still to be successfully addressed by many managers and policy makers. In changing conditions, managers might take the cultural landscape as a starting point but then build in deliberate interventions to increase the chances of particular species and groups surviving, whilst acknowledging that management will change over time—as will the biodiversity features. Instead of halting management at a particular historical juncture, innovative category V plans will need to acknowledge that management within a landscape will change and that managers must work, often with many different types of landowners, to implement a landscape approach to conservation: for example altering grazing patterns, retaining old trees, conversely opening up woodland habitats, restoring wetlands, replanting slopes and so on. Protected landscapes play a role here, both within the wider landscape approaches and by providing exemplars of how conservation might take place in other places with longstanding cultural management traditions. The fact that so little is known about the conservation benefits from such sites is a cause for concern. Filling these knowledge gaps needs to be a priority for conservation research over the next few years.

4. Conclusions

The rather limited data available on the effectiveness of protected landscapes and seascapes gives results that suggest variously that they are better than, worse than or the same as more strictly protected categories in terms of conserving wild biodiversity. This may imply that differences are not particularly dramatic, or that effectiveness varies depending on many other factors such as biome, the particular management regime in place, or the attitudes of resident and nearby human communities. It is also clear from this survey that decisive evidence is still lacking.

Category V protected landscapes are often applied in situations where stricter forms of protection are politically or socially impossible; to some extent comparing them with strict reserves is irrelevant because in many cases the choice will be between category V and no protected area at all. Nonetheless, as long as national and regional conservation strategies rely on category V for biodiversity conservation strategies it remains important to know how well they perform at this particular task.

The research gaps identified in the discussion section above, relating to comparative effectiveness of category V, role of smaller reserves, impacts of governance and the most effective management frameworks, all need to be addressed with some urgency. Other issues, such as the potential for protected landscapes to provide connectivity, for instance along migration routes, and the potential for category V areas to enhance socio-ecological resilience in the face of climate and other changes might also usefully be explored. At least some of the information required to build a more complete picture of the role of protected area landscapes and seascapes is probably already available, but—it seems—still needs to be fine-tuned, brought together and analysed. Doing so should help to strengthen management in a type of a protected area that is being used more and more.

Acknowledgments: We are grateful to the German Federal Ministry for Economic Cooperation and Development (BMZ) for funding the set of case studies outlined in Table 2, and to José Alba, David Barton Bray, Fikret Berkes, Miguel Neema Pathak Broome, Brioes-Salas, Elvira Duran, Goran Gugic, Nandita Hazarika, Ben Hoffmann, Jörg Liesen, Rito Mabunda, Agnieszka Pawlowska, Martina Porzelt, Julia Premauer, James Robson, Steve Roeger, Phil Wise, Dijana Zupan and Irina Zupan for preparing the studies. We are also grateful to the members of the World Commission on Protected Areas Protected Landscapes Specialists Group for many discussions on these issues over the last decade. No funding was received for the current paper.

Author Contributions: N.D. wrote the initial text, which was then edited and modified by A.P., T.A., J.B. and S.S.

Conflicts of Interest: The authors declare no conflicts of interest.

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