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IUCN WCPA WORLD COMMISSION ON PROTECTED AREAS

IUCN PROTECTED AREA DEFINITION, MANAGEMENT CATEGORIES AND GOVERNANCE TYPES

IUCN defines a protected area as:
A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

The definition is expanded by six management categories (one with a sub-division), summarized below.

Ia Strict nature reserve: Strictly protected for biodiversity and also possibly geological/ geomorphological features, where human visitation, use and impacts are controlled and limited to ensure protection of the conservation values.

Ib Wilderness area: Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, protected and managed to preserve their natural condition.

II National park: Large natural or near-natural areas protecting large-scale ecological processes with characteristic species and ecosystems, which also have 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, marine cavern, geological feature such as a cave, or a living feature such as an ancient grove.

IV Habitat/species management area: Areas to protect particular species or habitats, where management reflects this priority. Many will need regular, active interventions to meet the needs of particular species or habitats, but this is not a requirement of the category.

V Protected landscape or seascape: Where the interaction of people and nature over time has produced a 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, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non- industrial natural resource use compatible with nature conservation is seen as one of the main aims.

The category should be based around the primary management objective(s), which should apply to at least three-quarters of the protected area – the 75 per cent rule.

The management categories are applied with a typology of governance types – a description of who holds authority and responsibility for the protected area.

IUCN defines four governance types.

Governance by government: Federal or national ministry/agency in charge; sub-national ministry/agency in charge; government-delegated management (e.g. to NGO)

Shared governance: Collaborative management (various degrees of influence); joint management (pluralist management board); transboundary management (various levels across international borders)

Private governance: By individual owner; by non-profit organisations (NGOs, universities, cooperatives); by for- profit organsations (individuals or corporate)

Governance by indigenous peoples and local communities: Indigenous peoples' conserved areas and territories; community conserved areas – declared and run by local communities.

For more information on the IUCN definition, categories and governance type see the 2008 *Guidelines for applying protected area management categories* **which can be downloaded at: www.iucn.org/pa_categories**

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IUCN-WCPA's Best Practice Protected Area Guidelines are the world's authoritative resource for protected area managers. Involving collaboration among specialist practitioners dedicated to supporting better implementation in the field, they distil learning and advice drawn from across IUCN. Applied in the field, they are building institutional and individual capacity to manage protected area systems effectively, equitably and sustainably, and to cope with the myriad of challenges faced in practice. They also assist national governments, protected area agencies, nongovernmental organisations, communities and private sector partners to meet their commitments and goals, and especially the Convention on Biological Diversity's Programme of Work on Protected Areas.

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PARKS is published to strengthen international collaboration in protected area development and management by:

- exchanging information on practical management issues, especially learning from case studies of applied ideas;
- serving as a global forum for discussing new and emerging issues that relate to protected areas;
- promoting understanding of the values and benefits derived from protected areas to communities, visitors, business and others;
- ensuring that protected areas fulfil their primary role in nature conservation while addressing critical issues such as ecologically sustainable development, social justice and climate change adaptation and mitigation;
- changing and improving protected area support and behaviour through use of information provided in the journal; and
- promoting IUCN's work on protected areas.

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CONTENTS

EDITORIAL ESSAY:
PROTECTED AREAS AND ONE HEALTH

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ABSTRACT

Land-use change, globalisation and climate change are rapidly altering wildlife–livestock–human interfaces, increasing the rate of disease emergence and spread. To combat these risks, land managers and policymakers at all scales are increasingly aligning their activities with the One Health framework: "an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals, and ecosystems". One Health policy should explicitly incorporate protected and conserved areas (PCAs), because PCAs are widespread and important wildlife–livestock–human interfaces. PCAs vary in their priorities, resources, disease risks and other challenges, so there is an urgent need for research, funding and support that will allow PCA managers and planners to implement context-specific actions for minimising, mediating and monitoring infectious disease risks. This will require collaborations between health and environment ministries and PCA managers of all kinds. Therefore, IUCN WCPA has established a two-year Task Force on Protected Areas and One Health. Following careful evaluation, the Task Force will make recommendations regarding how WCPA and PCA managers can maintain or improve efforts to integrate One Health, and how One Health policy can better incorporate PCAs – both urgent needs for reducing the spread of pathogens among wildlife, domestic animals, and people.

Keywords: zoonotic, infectious disease

Whether pathogens spread more or less frequently in the coming decade will be largely determined by landscape and ecosystem management. Land-use change, globalisation and climate change are rapidly altering wildlife–livestock–human interfaces, increasing the rate of disease emergence and spread (Jones et al., 2008; Morand, 2022; Nova et al., 2022; Plowright et al., 2021). There is an urgent need to reduce or mediate these processes and thereby limit pathogen sharing among wildlife, domestic species and humans, which has negative impacts for all three groups (see examples in Table 1). Therefore, land managers and policymakers, from local to international scales, are increasingly aligning their activities with the One Health framework: "an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals, and ecosystems" (OHHLEP et al., 2022). Here, we overview how protected and conserved areas (PCAs) can be a nature-based solution for reducing pathogen spread, with emphasis on the relevance, challenges and untapped opportunities for integrating PCAs with One Health.

One Health policy is now widespread in international and national policy arenas. In 2022, the Quadripartite

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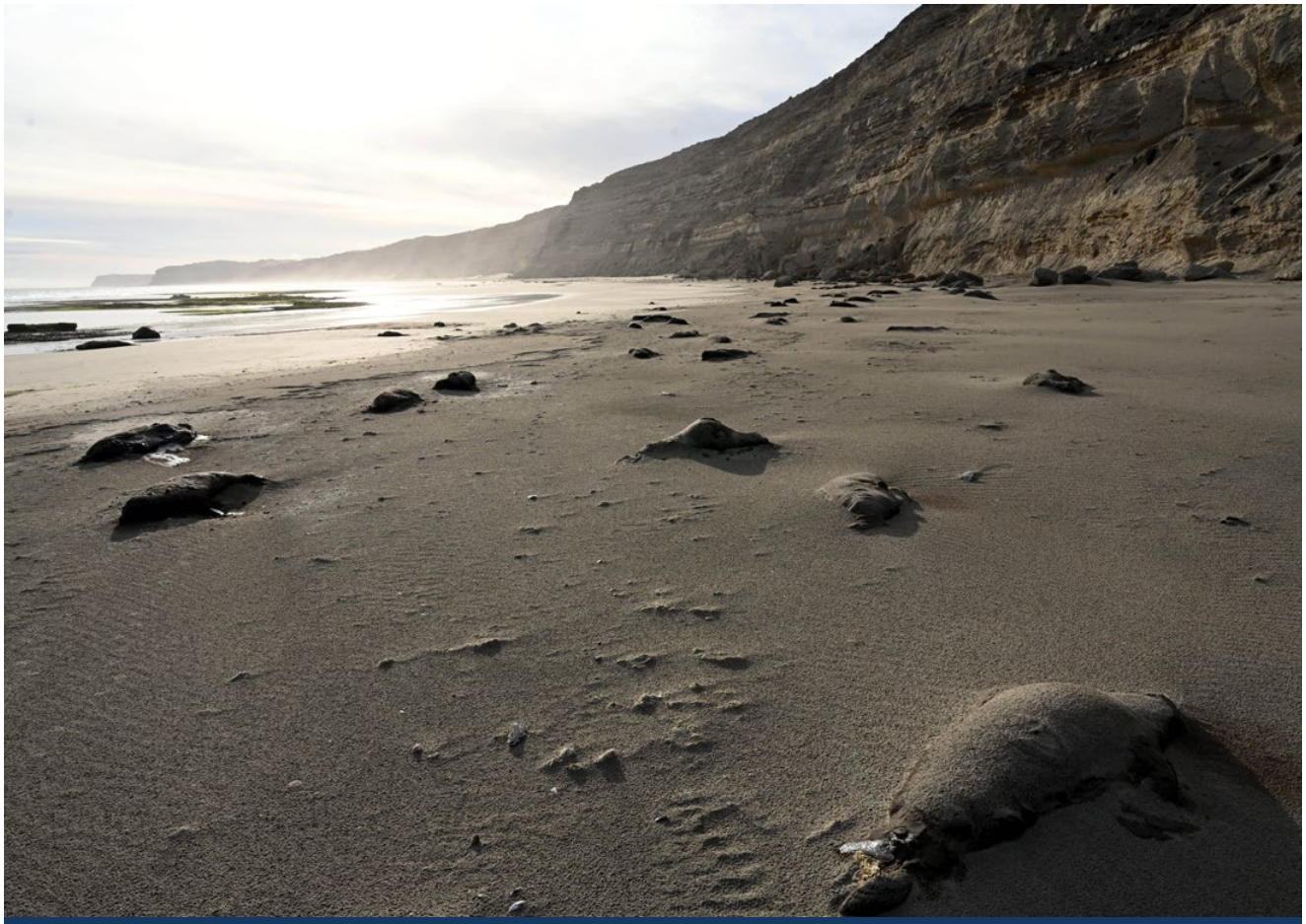
Table 1. Examples of infectious diseases shared between humans, domesticated animals and wildlife that have had major impacts on at least one of those groups.

Example	Representative References
Canine distemper virus can be deadly in canids and has spread from dogs to endangered African carnivores, causing population declines.	(Marino et al., 2017; Viana et al., 2015)
Depending on the region, rabies virus may be primarily spread from domesticated dogs to wildlife and people, or from wildlife to domesticated species and people. Rabies has caused population declines for endangered species, economic burdens associated with lost livestock, and major loss of human life annually.	(Benavides et al., 2017; Marino et al., 2017)
Viruses and other pathogens can be spread from humans to endangered great apes, causing ape mortality.	(Kaur et al., 2008; Kondgen et al., 2017)
Mange spread from domesticated livestock to Vicuñas caused a population collapse in Argentina, with downstream impacts on vegetation, Pumas and Condors.	(Monk et al., 2022)
Peste des Petits Ruminants Virus causes economic losses due to sick livestock and causes population declines in wild ungulates, such as Saiga.	(Fine et al., 2020)
Before it was eradicated, rinderpest caused devastating plagues in livestock and wild ungulates, transforming ecosystems through the impacts on ungulate grazers.	(Cáceres, 2011; Holdo et al., 2009)
Anthrax has caused major historical plagues for livestock and humans, and continues to cause mortality in wildlife, livestock and humans in several regions.	(Bengis & Frean, 2014)
Several pathogens that spilled over from wildlife into human populations became leading global causes of human morbidity and mortality, such as HIV/AIDs and *Mycobacterium tuberculosis* (tuberculosis).	(Bos et al., 2014; Hahn et al., 2000)

Secretariat for One Health – comprising the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO), the World Organisation for Animal Health (WOAH) and the United Nations Environment Programme (UNEP) – signed the One Health Joint Plan of Action, which outlines plans to reduce the risk of zoonotic spillover and new emerging infectious diseases; control existing infectious diseases; improve food safety; and reduce the risk of antimicrobial resistance (FAO et al., 2022). The Joint Action Plan emphasises the critical importance of the environment to One Health, and the UN even declared that a healthy environment is a human right (Resolution A/76/L.75). Concordantly, more than 20 countries have implemented national One Health strategic plans (One Health Commission, 2024). These developments represent a paradigm shift in how governing bodies tasked to preserve human health and well-being consider ecosystem protection and management, which has created new pressures and opportunities for ecosystem managers to achieve health outcomes.

Conservation-oriented organisations have also launched international policy efforts that emphasise connections between ecosystem and human health. Examples include the Convention on Biological Diversity Global Action Plan on Biodiversity and Health (CBD, 2017) and the "healthy planet, healthy people" framework (Redford et al., 2022) for the Global Environment Facility (GEF), a multi-donor trust fund for generating global environmental benefits. The IUCN is also taking One Health action, following resolution WCC_2020_RES_135: "Promoting human, animal and environmental health, and preventing pandemics through the One Health approach and by addressing the drivers of biodiversity loss" (IUCN, 2020). Therefore, at the highest policy levels, there is clear messaging that human health and ecosystem health are linked, setting the stage for multi-sector collaborations to advance One Health at regional, national and local levels.

PCAs should be included in these One Health policy efforts due to their importance for ecosystem, animal and human health (IUCN & EcoHealth Alliance, 2022a; Terraube et al., 2017). For example, PCAs can support large wildlife populations with high genetic diversity, which are less likely to be decimated by infectious diseases than small or fragmented populations (de



Avian Influenza caused a massive die-off of Southern Elephant Seals along 300 km of the Patagonia coastline in Argentina in 2023
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Castro & Bolker, 2005; Heard et al., 2013). In turn, healthy wildlife populations may be less likely to pass their infectious diseases on to people or livestock, a concept recently referred to as "landscape immunity" (Reaser et al., 2022). PCAs can also create barriers to between-species transmission simply by separating most wildlife from most livestock and people, whereas new encroachment into habitats with limited human or livestock presence may create high risks for spillover of novel pathogens from wildlife to livestock/humans or vice versa (i.e., "land use induced spillover") (Plowright et al., 2021). For these reasons and more, protecting and conserving ecosystems is a nature-based solution that can simultaneously promote the health of ecosystems, animals and people (Herrera et al., 2017; Hopkins et al., 2022; Vora et al., 2023).

However, we must also recognise and manage potential infectious disease risks associated with PCAs. For example, for some infectious diseases, protected and conserved areas may be the places where people are most likely to be exposed through direct or indirect interactions with wildlife. This could include exposure to rodent or bat excrement in remote cabins or on cave tours (IUCN & EcoHealth Alliance, 2022b; Núñez et al., 2014); exposure to disease vectors such as ticks and mosquitos (Eisen et al., 2013); or exposure to wild animals attracted to human food or water sources (Atuheire et al., 2024; Reaser et al., 2021). Similarly, in areas where humans or domestic species are present, wildlife may experience especially high disease risks (e.g., ecotourism and great apes) (IUCN & EcoHealth Alliance, 2022b; Mitani et al., 2024). Importantly, wildlife and habitat conservation per se do not pose threats to health, rather it is human activities in and near PCAs that can exacerbate or mediate infectious disease risks. Given these risks and the above-mentioned health benefits of PCAs, it is critical to overcome traditional silos between public health and conservation. One Health needs to be incorporated into PCA management and planning at all scales, and PCAs need to be incorporated into regional, national and international One Health policies.

For PCA managers, there is already some published guidance on evidence-based methods for reducing infectious disease risks, which we summarise as "Minimise, Mediate and Monitor" (Figure 1). Minimising interactions between humans, wildlife and domestic animals may be the most effective way to reduce

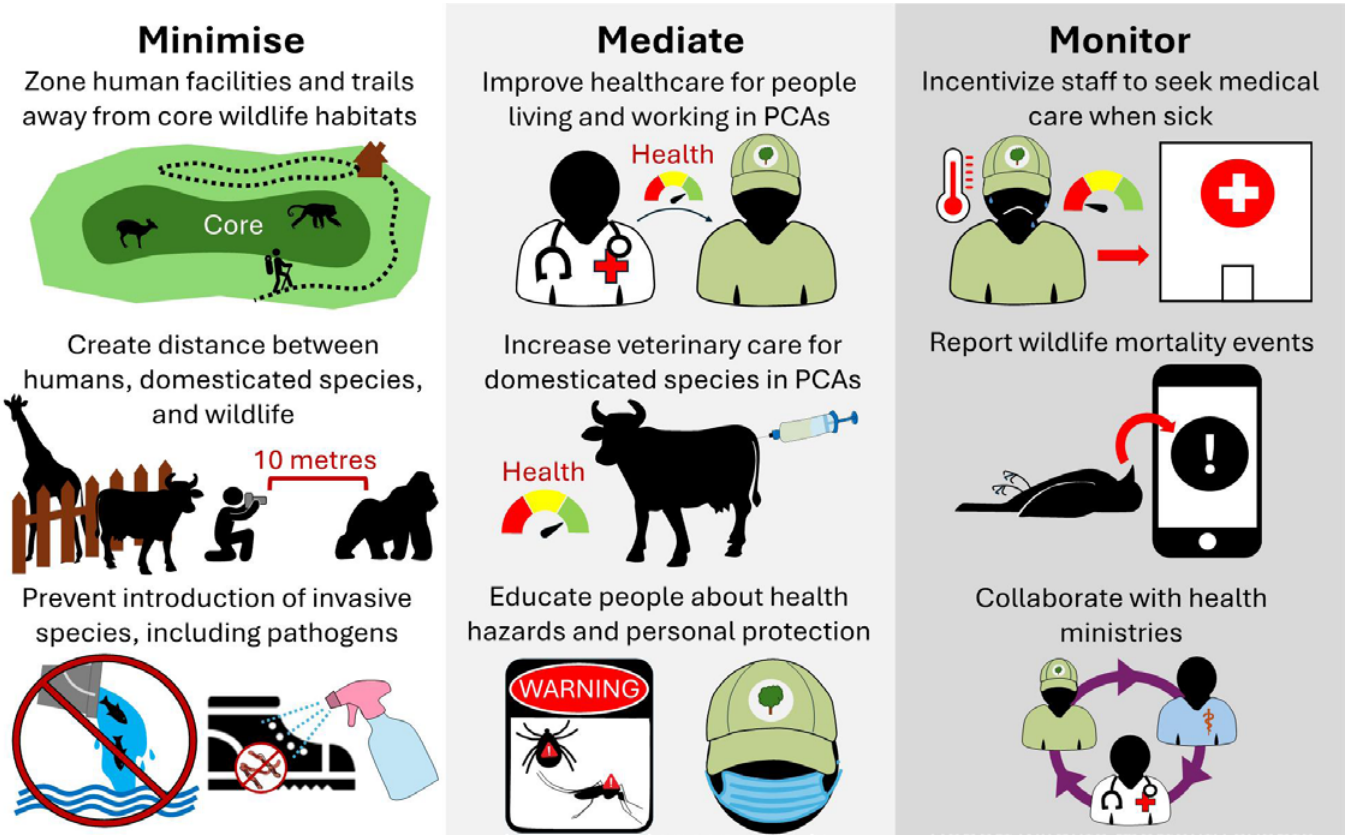

Figure 1. Examples of actions that PCA managers might take to minimise, mediate and monitor infectious disease risks.

pathogen sharing, including spillover of novel pathogens from one species to another (IUCN & EcoHealth Alliance, 2022a; IUCN & EcoHealth Alliance, 2022b; Plowright et al., 2021; Reaser et al., 2021). However, minimisation is not always feasible or socially acceptable, and in cases where human–livestock–wildlife interactions cannot be reduced or eliminated, management actions can mediate the outcomes of these interactions by making the interactions safer. Minimisation and mediation are critical because preventing epidemics is always cheaper and more effective than controlling epidemics after they begin (Bernstein et al., 2022; Dobson et al., 2020; OHHLEP et al., 2023). Yet even when prevention is prioritised, some rare spillover events may still occur, and some endemic diseases will still persist. Therefore, it is also critical to monitor the health of wildlife, domestic species and humans in and near PCAs to rapidly identify outbreaks and to design effective disease control programmes (King et al., 2024; Pruvot et al., 2023; Stolton et al., 2023; Worsley-Tonks et al., 2022). There are many actions that might be used to minimise, mediate or monitor infectious disease risks in PCAs, and we provide a few examples in Figure 1.

Importantly, we do not expect there to be a "one-size-fits-all" approach for minimising, mediating and monitoring infectious disease risks in PCAs. PCAs vary widely in their priorities, the pathogens that circulate locally, the external pressures that are present (e.g., livestock grazing, poaching), and other factors, and approaches should be tailored to each context-specific scenario. This highlights a clear need for PCA management guidance documents informed by PCA managers' diverse experiences, which should address the practical challenges associated with balancing One Health with other priorities and with limited resources (Appleton et al., 2022; Stolton et al., 2023). Additionally, while most guidance has focused on management actions for existing PCAs, efforts to minimise, mediate and monitor infectious disease risks should also be built into planning efforts for the many new PCAs being created to achieve ambitious global area-based conservation goals, such as Target 3 of the Kunming-Montreal Global Biodiversity Framework (i.e., 30% of land, freshwater and sea conserved by 2030). This includes an urgent priority to understand how creating PCAs by restoring previously degraded or destroyed habitats (GBF Target 2) may shift pathogen dynamics, because there is limited evidence and sometimes conflicting evidence regarding how various restoration actions will impact disease risks and other outcomes (Prist et al., 2023; Reaser et al., 2021; Terraube et al., 2017). These are not issues that PCA managers can tackle alone, highlighting the need for collaborations between health and environment

Visitors to a national park decontaminate their boots to prevent the spread of Rapid ʻŌhiʻa Death (ROD), an invasive fungal pathogen that kills a keystone tree species on Hawai'i Island © M. Watanabe; released to the public domain by the US National Park Service.

ministries and PCA managers to develop context-specific actions that maximise the One Health benefits of ecosystem conservation and restoration.

Future multi-sector collaborations may be informed by successful efforts where PCA managers, NGOs, ministries of health, and local and Indigenous communities have already been working together to improve the health of people, wildlife and ecosystems. For example, co-designing health, livelihood and/or economic support programmes with local and Indigenous communities has both improved the well-being of local peoples and reduced logging and/or poaching in nearby PCAs (Jones et al., 2020; Kalema-Zikusoka & Byonanebye, 2019; Novick et al., 2023). Importantly, these efforts have not prioritised reducing novel zoonotic spillover risks from wildlife to people; reducing spillover is unlikely to be a top priority for PCA managers or people living in rural poor areas and experiencing other stressors, such as food insecurity or high burdens of endemic diseases (e.g., malaria, diarrhoeal diseases) (Lehman et al., 2017). But establishing programmes that support staff and communities living in or near PCAs may have co-benefits, including reducing spillover risks and building public support for conservation (Hopkins et al., 2022; Vora et al., 2023). These examples are particularly important because responsibilities were not laid solely on already overburdened PCA managers, who have limited resources and limited power outside PCA boundaries. Instead, these examples illustrate how capacity building, coordination, collaboration and communication among government agencies, NGOs and communities can have sustained One Health impacts.

Given the importance and urgency of the One Health issues described above, IUCN WCPA has established a two-year Task Force on Protected Areas and One Health with support from the Gordon and Betty Moore Foundation. This Task Force will assess how PCAs are currently being incorporated into One Health policy and initiatives at all levels, and then make recommendations for how to maintain or improve the inclusion of PCAs in the One Health policy landscape. The Task Force will also assess how One Health is already being incorporated into PCA management, including the challenges, opportunities and successes associated with these efforts.

To accomplish these goals, we will be synthesising published and grey literature, as well as connecting with policymakers, practitioners and stakeholders who impact or are impacted by One Health and PCAs, all to better understand their experiences and needs. This includes not only PCA managers at all levels, but also local and Indigenous peoples, NGOs, health and environment ministries, and One Health academics. Following careful evaluation, the Task Force will make recommendations regarding how WCPA and PCA managers can maintain or improve efforts to integrate One Health, and how One Health policy can better incorporate PCAs – both urgent needs for reducing the spread of pathogens among wildlife, domestic animals and people.

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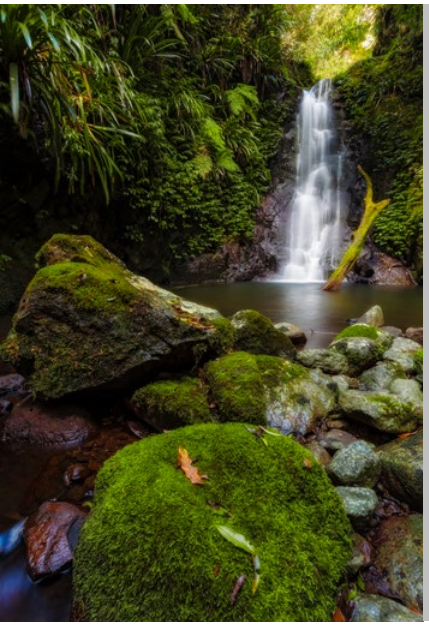
RESUMEN

Los cambios en el uso del suelo, la globalización y el cambio climático están alterando rápidamente las interfaces entre la fauna salvaje, el ganado y el ser humano, lo que aumenta la tasa de aparición y propagación de enfermedades. Para combatir estos riesgos, los gestores del territorio y los responsables políticos a todas las escalas están alineando cada vez más sus actividades con el marco "Una sola salud": "un enfoque integrado y unificador que pretende equilibrar y optimizar de forma sostenible la salud de las personas, los animales y los ecosistemas". La política de "Una sola salud" debe incorporar explícitamente las áreas protegidas y conservadas (APC), ya que estas zonas son importantes y están muy extendidas como interfaz entre la vida salvaje, el ganado y el ser humano. Las áreas protegidas y conservadas varían en cuanto a prioridades, recursos, riesgos de enfermedad y otros retos, por lo que existe una necesidad urgente de investigación, financiación y apoyo que permita a los gestores y planificadores de las áreas protegidas y conservadas aplicar medidas específicas para cada contexto con el fin de minimizar, mitigar y controlar los riesgos de enfermedades infecciosas. Para ello será necesaria la colaboración entre los ministerios de sanidad y medio ambiente y los gestores de PCA de todo tipo. Por ello, la CMAP de la UICN ha creado un Grupo de Trabajo de dos años sobre Áreas Protegidas y Una Salud. Tras una cuidadosa evaluación, el Grupo de Trabajo formulará recomendaciones sobre la forma en que la CMAP y los gestores de las ACP pueden mantener o mejorar los esfuerzos para integrar "Una sola salud", y sobre la forma en que la política de "Una sola salud" puede incorporar mejor a las ACP, ambas necesidades urgentes para reducir la propagación de patógenos entre la fauna silvestre, los animales domésticos y las personas.

RÉSUMÉ

La modification de l'utilisation des sols, la mondialisation et le changement climatique modifient rapidement les interfaces entre la faune sauvage, le bétail et l'homme, augmentant ainsi le taux d'émergence et de propagation des maladies. Pour lutter contre ces risques, les gestionnaires des terres et les décideurs politiques à toutes les échelles alignent de plus en plus leurs activités sur le cadre One Health : "une approche intégrée et unificatrice qui vise à équilibrer et à optimiser durablement la santé des personnes, des animaux et des écosystèmes". La politique "Une seule santé" devrait explicitement intégrer les zones protégées et conservées (ZPC), car ces zones sont des interfaces importantes et largement répandues entre la faune, le bétail et l'homme. Les priorités, les ressources, les risques de maladies et les autres défis varient d'une APC à l'autre. Il y a donc un besoin urgent de recherche, de financement et de soutien qui permettra aux gestionnaires et aux planificateurs d'APC de mettre en œuvre des actions spécifiques au contexte afin de minimiser, d'atténuer et de surveiller les risques de maladies infectieuses. Cela nécessitera des collaborations entre les ministères de la santé et de l'environnement et les gestionnaires d'APC de toutes sortes. C'est pourquoi la CMAP de l'UICN a mis en place un groupe de travail de deux ans sur les zones protégées et One Health. Après une évaluation minutieuse, le groupe de travail fera des recommandations sur la façon dont la CMAP et les gestionnaires d'APC peuvent maintenir ou améliorer les efforts d'intégration de One Health, et sur la façon dont la politique de One Health peut mieux intégrer les APC - deux besoins urgents pour réduire la propagation des agents pathogènes parmi les animaux sauvages, les animaux domestiques et les personnes.



THE BENEFITS OF THE IUCN GREEN LIST FOR IMPLEMENTING EFFECTIVE PARK MANAGEMENT IN QUEENSLAND, AUSTRALIA

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ABSTRACT

The Queensland Government in Australia is applying a values-based approach to park management across the State's protected areas based on international effective and equitable management principles. To showcase successful park management in practice and to identify areas requiring improvement in the approach, the Queensland Government is participating in the IUCN Green List programme. Nomination of Lamington National Park, Australia's first World Heritage protected area to be assessed, has shown the importance of linking strategic planning to in-park operations, the advantages of working collaboratively internally and externally, the importance of capacity for park management and establishing long-term goals and investment, effective ways to 'close the gap' on adaptive management, and the flow of benefits to other protected areas across the State.

Key words: effective management, evaluating success, adaptive management, protected areas, World Heritage

INTRODUCTION

A global biodiversity crisis is looming, and a significant driver is habitat loss and fragmentation (Secretariat of the Convention on Biological Diversity, 2020). One of the significant instruments in managing this crisis is area-based conservation with protected areas being recognised as a key tool in aiding conservation (IPBES, 2019; Watson et al., 2023; Woodley et al., 2019). Effectively managed protected areas have been proven to halt the decline of threatened or endemic species and provide a place for evolution and future ecological adaptation, including adapting to climate change, protection and delivery of ecosystem services, preservation of cultural values and cultural practices, and supporting local and regional economies (Dudley, 2008; Lopoukhine & de Souza Dias, 2012; Watson et al., 2014; Woodley et al., 2019).

Global conservation targets to set aside a global protected area network are aimed at stemming the current and future rates of biodiversity loss. The Kunming-Montreal Global Biodiversity Framework includes a target for adopting nations to set aside 30 per cent of their land and sea areas under protected areas that are effectively conserved and managed to reduce key drivers of biodiversity loss (Convention on Biological Diversity, 2022; Woodley et al., 2019). Setting both quantity and quality targets is required to achieve biodiversity conservation (Green et al., 2019; Woodley et al., 2019). Well designed, governed and managed areas should recognise the rights of Indigenous Peoples and local communities, be established on areas of key biodiversity, support ecological networks, and be well designed, governed and managed (Watson et al., 2023; Woodley et al., 2019; Woodley et al., 2021).

Many protected areas around the world, however, are not managed effectively (Visconti et al., 2019; Watson et al., 2014; Woodley et al., 2021), with reports of around half or more of protected areas globally having deficiencies in management (Leverington et al., 2010; Watson et al., 2014). For protected areas to achieve biodiversity outcomes, effective management of protected areas is essential, and to date there have been a number of guidelines and processes employed with the aim of encouraging and assessing protected area management

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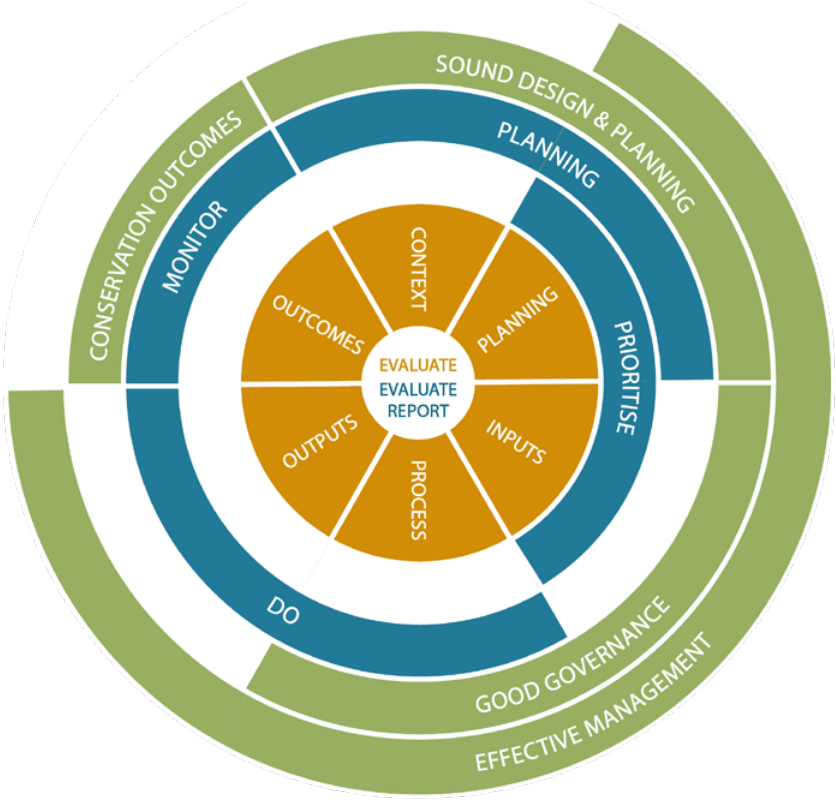


Figure 1. VBMF achieves protected area management effectiveness using principles structured according to six distinct stages (inner circle – orange) (Hockings et al., 2006) through planning, prioritising, doing, monitoring with evaluating and reporting (middle circle – blue) (Queensland Government, 2023).

The IUCN Green List's four components of successful nature conservation in protected and conserved areas are used to assess how the VBMF achieves adaptive management and management effectiveness (outer circle – green) (WCPA, 2017).

effectiveness (Bialowolski et al., 2023; Coad et al., 2015; Hockings et al., 2006; Leverington & Hockings, 2004; Stolton et al., 2007).

The IUCN Green List of Protected and Conserved Areas Standard is a set of criteria that describes best practice for managing protected areas and conserved areas effectively and equitably with the aim of increasing the number of those areas delivering successful conservation outcomes (Hockings et al., 2019; WCPA, 2017). The standard is made up of four components, 'good governance', 'sound design and planning', 'effective management' leading to 'successful conservation outcomes' (Hockings et al., 2019; WCPA, 2017). Nominated sites are assessed against this international benchmark, with sites meeting the sustainability standard recognised as part of a global community for delivering fair and effective nature conservation.

Effective and equitable management of Queensland's protected area estate

To instil good governance and management, the Queensland Government, Australia, is successfully applying a values-based approach to park management across the State's protected areas (Department of Environment and Science, 2020) through the Values Based Management Framework (VBMF). The VBMF is an adaptive management system based on international effective and equitable management principles (Hockings et al., 2006) and builds upon previous park management practices to improve management across Queensland's protected area estate. Targets set by the Queensland Government focus on embedding the VBMF approach in national parks and other protected areas, building a monitoring, evaluation, reporting and improvement system, and participating in the IUCN Green List programme.

Queensland's participation in the IUCN Green List programme is two-fold, showcasing management of national parks and other protected areas, and identifying gaps to improve VBMF alignment with best practice. The VBMF enables Queensland's park managers to prioritise the most important values, provide strategic management direction through planning, prioritising, doing, monitoring, evaluating and reporting (Figure 1).

World Heritage listed Lamington National Park (Lamington) is Queensland's first protected area nominated for Green Listing. The associated assessment process has brought about significant benefits for both park management at Lamington and across Queensland's protected area estate. Lamington is managed by the Queensland Parks and Wildlife Service (QPWS), an agency within the Department of Environment, Science and Innovation. The purpose of this paper is to discuss how the Green List process supported the implementation of the VBMF at Lamington and the key lessons learnt and applied during the process, including:

- The importance of linking strategic planning through to park operations;
- The effectiveness of working together across all levels and areas of the agency and with external

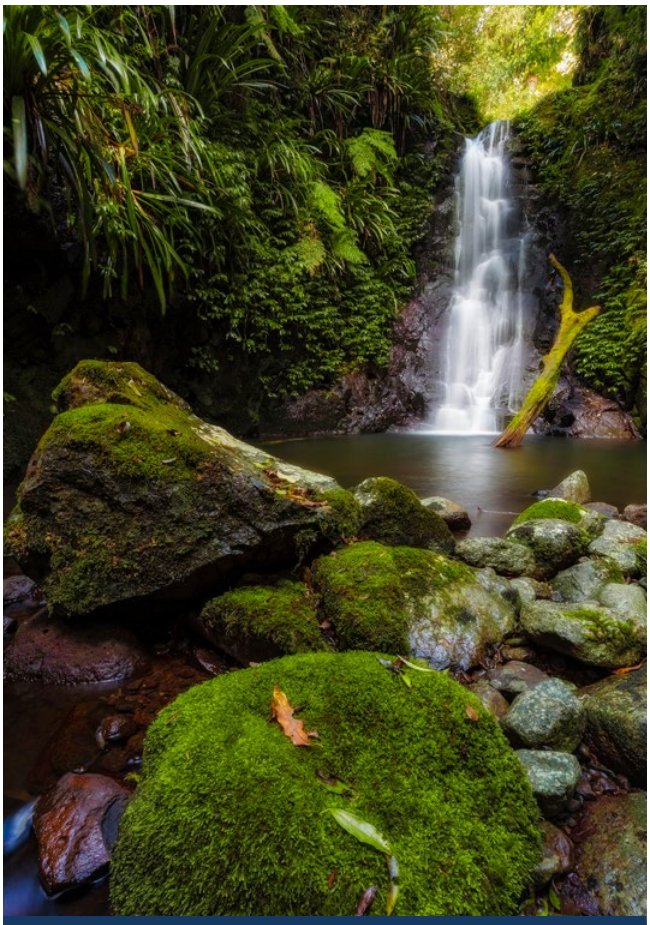
stakeholders;
- The importance of capacity to undertake park management, address long-term goals and secure investment;
- Understanding the condition of park values and how to use that information to 'close the gap' in adaptive management; and
- Advantages to the region and management of the entire protected area estate.

This paper is based on the experience of undertaking the Green List accreditation process for Lamington and information gathered at a follow-up workshop of rangers, regional technical staff, and central/head office planning staff discussing the Green List accreditation process. Anonymous quotes from workshop participants are indicated throughout the paper using double quotation marks and designated with an 'a' for Lamington park staff, 'b' for regional staff and 'c' for central/head office staff.

Linking strategic planning to park operations

Understanding the link between actions and outcomes is an important part of adaptive management, but significant connections are not always obvious. Therefore, having strong links between good planning and park operations is a key step in evaluation. Prior to VBMF, direction from the executive level did not always align with planning and operations at the park level, meaning there was uncertainty around the agreed outcomes for park management. This resulted in reduced clarity around management actions, priorities and agreed outcomes across different sections of the agency. There was also a weak connection between rangers' park observations and the subsequent planning required to prioritise actions, making it difficult for rangers to obtain appropriate resources in a timely manner to implement effective management.

The VBMF provides a two-way process to prioritise and communicate decisions. To develop clear adaptive management objectives that accurately address the needs and concerns of a protected area, data and knowledge are required from all levels of staff, particularly those with direct understanding of a park's issues (Allen et al., 2019). The VBMF provides a means for transfer of that knowledge, comments received from rangers included: "My gut was telling me what we were doing was not what we should be doing, VBMF is strong, you can make a much better argument for where you should be putting your resources"[b], "it gives us better transparency and not going on ranger intuition or experience"[a], and "[it gives us the] ability to succinctly communicate our management actions"[b].



Gwongurai Falls along the Tooloona Creek Circuit at Lamington National Park © Gareth McGuigan

One of the barriers rangers said they experienced was "no consistent approach, executives not 'singing from the same song sheet' with aligning planning and priorities to the business planning level"[a]. Not applying and using planning, evaluation and management tools in delivering on-ground actions is a common issue in effective protected area management (Leverington et al., 2010). The "VBMF is forcing that line of sight and linkages all the way down so that you're tracking the delivery of the plan"[b]. Having a strong framework in place supported by all levels of the agency is providing the mechanism to set well informed priorities and agreed outcomes. This leads to having a more transparent and accountable process and improved communication across the agency.

Staff felt there was a focus on management of critical infrastructure with very little emphasis on conservation or natural resource management objectives. As one staff member stated, there is a "constant challenge, [management of] 150 kilometres of walking tracks is hard work, somehow you have to balance that with the other work that needs to be done"[a]. Identifying key values through the VBMF, and prioritising objectives across conservation and asset maintenance, refocused management intent and embedded the priorities in

planning. This helps justify and communicate to stakeholders internally and externally that "our core fundamental business is conservation and you're going to see us prioritising conservation actions over certain other things" [b].

The Green List assessment process was the platform that enabled QPWS to look more closely at the linkages between planning and operations. "I don't think we would have done such a deep dive into operationalising work that we've been doing without Green List to trigger those conversations" [b]. The process identified gaps, and, as one staff member stated, it "helped us to better understand all the moving parts and build the rest of [VBMF]" [b]. How planning is integrated into business and used to inform resourcing was identified as a weak point, with one staff member stating that the "Green Listing process specifically for Lamington highlighted how we still haven't got that right" [b].

'It takes a village…' - the benefits of working together as a 'community'

Governance of protected areas is no longer solely the responsibility of government authorities, with contemporary approaches to park management now including informal arrangements and support from non-government organisations, local communities, academia, private contractors, or co-management in partnership with First Nations (Lockwood, 2010). It is recognised that it 'takes a village' to manage a protected area and that better conservation outcomes are achieved when integrating stakeholders such as local communities (Maxwell et al., 2020). The phrase 'it takes a village…' is very relevant to management of Lamington. A complex, highly biodiverse protected area, Lamington receives input and support from a wide range of branches within the agency as well as external stakeholders and rightsholders.

Applying the Green List assessment identified gaps in communication that were limiting the agency's ability to implement the VBMF and achieve strategic management outcomes for the park.

Communication internally

Lamington has two operational work bases and requires a significant amount of support from the regional and central/head office. Effective communication is required to appropriately manage Lamington's high biodiversity and multifaceted vegetation, complex fire and pest management requirements, significant assets, and very high visitor and compliance obligations. Prior to VBMF being implemented, Lamington's management priorities within the region and State were not well prioritised when compared with other parks, which had precedence due to social and political pressures.

Introducing VBMF resulted in improved agency coordination from better communication of management requirements, both 'bottom up' (i.e. what is happening in the park and what needs prioritising through the regional process) and 'top down' (i.e. what are the state-wide and regional priorities and how do they fit in with on-ground management). This is an important aspect of protected area management for ensuring unified management objectives and strategies (Allen et al., 2019).

Applying the Green List indicators drove many communication improvements within the agency. "The Green Listing process was so thorough and robust that we had to bring everybody in that you know holistically across Lamington into that discussion" [b]. It provided a mechanism for Lamington's rangers to be more aware of adaptive management and management effectiveness principles and to gain better understanding of why VBMF is important and how it relates to their day-to-day operations. The process also significantly improved communication and networking between park staff and other areas of the agency. Staff members said: "it's a lot easier to get help", "I think it's made things easier to access and getting support from [regional and central/ head office staff]" [a].

Communication externally

Lamington has historically involved a large number of external stakeholders and has significant visitor interest, and these characteristics remain in evidence today. Effective park management requires incorporating the views and interests of local communities, using results of scientific research in planning, and managing protected areas in partnership with First Nations People. With complex parks such as Lamington, outside assistance from non-government organisations, neighbours and volunteers helps bring about more positive conservation outcomes.

For example, Lamington's two volunteer organisations, the Lamington and the Green Mountains Natural History Associations, have existed for over 40 years (IUCN, 2019; Panorama, 2020) and are often the first point of contact for park visitors at information centres. It is important that the volunteers have a good understanding of park management and planning, through formal training and informal communication. The Lamington Green List assessment identified communication gaps in the support QPWS provided to the volunteer groups. In response, QPWS introduced steps to ensure volunteers had awareness of Lamington's key values, threats and

Figure 2. Example of a poster case study showcasing management of the endangered Eastern Bristlebird (*Dasyornis brachypterus*).The case study provides an example of the planning process, link to on-ground management, and conservation outcomes. The case study posters are found at the two information centres. © Eastern Bristlebird (Grant Fraser, QPWS), fires (Wil Buch, QPWS).

how QPWS is managing them, and delivered 'health check' days showcasing how monitoring is undertaken to inform park management.

The Green List process also initiated the use of tools such as poster case studies (Figure 2) that showcase adaptive management in action. These tools are now used by volunteers in the information centres to give visitors an understanding of Lamington's management priorities and how park management operates.

The Green List process assisted in stakeholder engagement. As one staff member said, "the key thing through the Green Listing was our stakeholder management and our cross-landscape collaboration" [b]. It is important for park staff to be able to communicate park management objectives, issues and policies, balanced with the complexities of maintaining visitor experience, accessibility and services. The range of different uses at Lamington places a high demand on managing walking tracks (trails), and other recreational activities and services. VBMF planning supports QPWS decision-making and justification. Staff stated, "that's the benefit, we're more transparent and can explain and demonstrate those priorities in a better way" [a]; and "doing 20% less on walking tracks [now and] prioritising conservation actions (i.e. health checks and bushfire recovery), I used exactly those words with stakeholders in response to questions about track maintenance [and was able to justify that] fire management is priority one over the next two months" [a].

What does 'capacity' mean for Lamington National Park and how does that help achieve effective park management?

Capacity, in its simplest form, is the ability to deliver what is needed. For effective protected area management, this occurs on multiple levels from individual, organisational, through to societal, and is essential for achieving conservation goals (Porzecanski et al., 2022). Understanding the capacity requirements of Lamington has been a gap for some time. As a staff member stated, "[Lamington is] an exceptional World Heritage park. What does the level of resourcing look

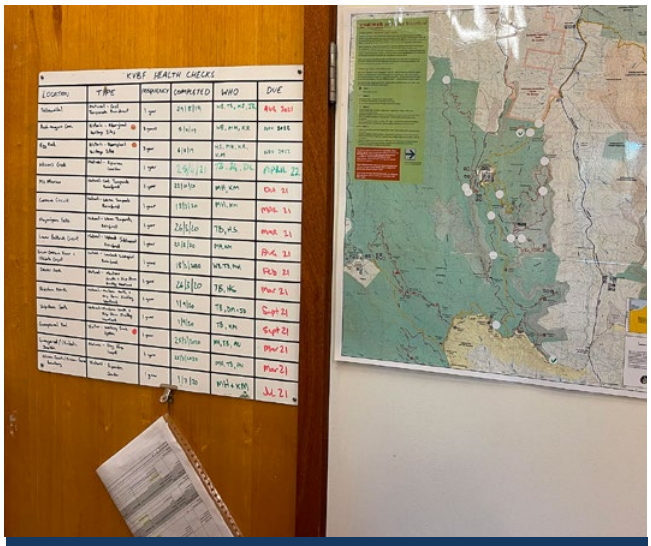
Rangers undertaking health checks in Lamington National Park's rainforest key values © Sherri Tanner-McAllister

like for a park like that?" [b]. Having a good planning and evaluation framework in place is beginning to provide those answers. A staff member noted "the VBMF has helped identify all the different moving parts of operations and what that looks like in terms of system support, resource support and all the different programs that we are managing" [b].

Ad hoc capture and transfer of knowledge, with high staff turnover rates, reduces the capacity of QPWS staff to manage Lamington effectively and makes planning and management vulnerable. One of Lamington's obstacles is "retention of staff given the nature of the work and access to the park" [a]. Having VBMF well implemented and using the Green List process "our work plan at Lamington is pretty steady, I feel like it's stable, like we have set the targets that we have to do every year no matter what" [a], a QPWS staff member reflected. This has assisted in knowledge transfer. One park staffer said "I don't think there would have been a lot of understanding of even our vegetation types or values for a lot of those rangers coming through and even the permanents now" [a]. The VBMF system also aided successional planning, as stated by a ranger, "to step in as Ranger in Charge would have been tricky, harder … but because we've got those strategies in place now with fire, visitors, I think that makes it easier" [a].

The Green List assessment identified gaps in the use of systems to support the staff knowledge base and a lack of adequate training in system use. For example, with the QPWS Asset Management System, it became evident that rangers were not comfortable using it; therefore, the information in the system needed to be cleaned up, and was not used fully to support the ranger's work. As staffers noted, it was shown through "Green Listing and effective park management that it does take additional resources to do this completely, e.g. like getting the systems up to date" [b], but "it's highlighted that it's all well and good to plan and say we're doing these things, if our systems can't give us the data to be able to assess those objectives, the whole thing falls apart" [b]. Another aspect highlighted by staff about the Green List process was that "there should be some structure to how we do business for operational rangers and their line managers, they should be able to go from [one] management unit to another and understand the core fundamentals and framework" [b] such as the use of key systems for fire, pest and asset information.

Lamington National Park rangers undertaking health checks
© Sherri Tanner-McAllister



Monitoring schedule in Lamington National Park's office
© Sherri Tanner-McAllister

'Closing the loop' and why this is important for adaptive management

Research, monitoring and evaluation of park management is required to be incorporated back into planning to 'close the loop' for adaptive management. Monitoring and setting thresholds with triggers for management response provide the mechanisms to do that. The use of monitoring data enhances robust decision-making and informs planning to improve management effectiveness. As part of the VBMF, Queensland has an established monitoring approach using 'health checks' as the foundation for efficiently and routinely monitoring the condition of key values (Melzer et al., 2019). As a statewide monitoring system embedded into day-to-day operations, it provides a consistent method to track the condition of key values, expose new and emerging threats, and provide a mechanism for identifying research needs.

Monitoring has historically not been a strong aspect of Queensland's park management. As staff members stated, "we have had a variety of monitoring options, but they've never taken root in operations because they never involved all the staff" [a]. Prior to the VBMF and the Green List, staff stated that "condition of values, we had an idea, but I don't think it was tracked or written down" [a]; and "historically conservation projects have all been an ad hoc collection of pet projects, there was no standardised way to know what was special about the park and what was a condition and trend" [b]. Participants noted that with systematic planning and consistent monitoring and research strategies, QPWS has now begun to deal with those historical issues. "Health checks are the first step of drawing long bows [linking] action and outcome and having that consistently documented through a health check program means that we've at least started that process at Lamington" [b]. "VBMF and the Green List made us take the evaluation step even further and try and complete loop" [b].

Staff also noted that "the element that Green Listing helped us do is dive into linking health checks, seeing how those actual conservation outcomes can then inform future planning and what we need to do, showing that full cycle" [b]. Monitoring is a key step in the VBMF evaluation process: "having health checks, in a way, they're forcing that evaluation, to stop and think about what you're doing with your programs is a change for us" [b]. A consistent approach allows for comparable results as part of a State-wide evaluation programme ensuring a more consistent prioritisation of resources and support. One staffer said: "it's really standardised the approach to what is a value, what is a standard condition for these values, assessed at a range of scales from site specific to across the State" [b].

Linking monitoring outcomes to planning, and directly to park operations, encourages adaptable management and better decision-making. For example, staff noted that the VBMF supports the ranger's ability to re-prioritise and react quickly to stochastic events such as bushfires and storms: "being able to tweak the strategies after a major event to get funding...seamless" [a]. "If that bushfire event happened and you didn't have a framework to justify decisions, is there strength there to say that funds are being allocated appropriately?" [b]. With increasing bushfires and storm events predicted under a changing climate, the adaptive approach of VBMF is an important framework to begin dealing with those impacts and changes.

Providing a systematic process for 'closing the loop' has resulted in better governance and higher trust in the system for QPWS staff. Building trust amongst park staff and management builds commitment to management

Pathogen hygiene station on Lamington National Parks walking tracks © Sherri Tanner-McAllister

processes (Allen et al., 2019). During Lamington's Green List process, a list of recommendations was provided by the assessors. As staff noted, "I think the [agency] acknowledged that but were able to take that on board and adjust our work programs and our head space around how we work"[a]. "The Green Listing forced us to push it all the way through and go all the way down to the action planning level, prioritisation and how to measure successes"[b]. Having that solid framework in place and substantial planning, as well as a public commitment to Green Listing helps provide a resilience to government changes and deliver long-term conservation outcomes.

Benefits for Queensland park management

The primary benefit of undertaking the Green Listing process was that it contributed to a comprehensive benchmarking assessment of protected area management at the State level in Queensland, as well as at the regional level. Protected area agencies do not often take the time to evaluate management to this extent across the key pillars of management effectiveness. Strong and effective management can only occur with investment in all components of management effectiveness. This process highlighted that most of the limitations for QPWS were because of a lack of good governance and investment in monitoring that could facilitate robust evaluation. Working through the Green Listing process to identify key gaps, and implement steps to rectify the gaps, has significantly improved QPWS's management at Lamington. The assessment and benchmarking process is a very useful tool for park managers for continual improvement, even if there is no intent to formally apply for the Green List.

A secondary benefit was that it fast tracked the implementation of strategic planning and raised awareness of the overarching management goals for Lamington down to the operational work unit. It helped communicate connections from broad strategic planning to on-ground action plans and operational delivery. In the past there has been disconnect between strategic park management planning and operational work programme delivery. Connecting all rangers, at every level (not just senior operational staff), with strategic thinking has greatly improved their understanding of the park, their role as rangers and how their on-ground actions are contributing to strategic goals for Lamington. This increases staff connection to the park and improves job satisfaction. These lessons are applicable not only to Lamington, but across the region, State, agency, and throughout Australia and globally.

Where to from here?

Lamington's journey through the Green List assessment was hugely beneficial to both the park and to Queensland's State-wide protected area management programme. The assessment process provided the driver to apply the VBMF. As noted by a staffer, "I think the Green Listing helped us further prioritise actions at Lamington [and] make some strong decisions that we might not have done without the attention of Green List and the involvement of our executives in the process" [b]. The Green List process also identified where QPWS can still improve implementation of the VBMF and effective park management. As noted by another staff member, "there's a big piece of work that we need to learn from the Green List and try and apply that more broadly across the State" [c]. There is a need to become more mature in communicating when things are not going well and to take responsibility to say management is not quite meeting the targets. This information needs to be available at executive level to inform strategic decisions and resourcing. As noted by one QPWS staffer, "we need a bit more maturity, intelligence, what does all of this look like long-term" [c].

One of the areas for improvement is further developing and evaluating capacity to determine the extent to which the agency and individual protected areas have adequate staff with the skills, qualifications, knowledge, training and licences to deliver the park management plan. It is recognised that there is still an urgent need for development and changes in this area to improve management effectiveness (Allen et al., 2023; Nielsen, 2012; Porzecanski et al., 2022). Lamington's management and the VBMF need further refinement to understand current capacity to effectively manage, and to identify gaps. As one staff member asked, "strengthening elements such as field management capability – how do we evaluate it?" [c], with another noting "we don't have any data, we don't have any tool that quantifies [field management capability] for us or any tools to help us assess it" [b].

There needs to be a shift within the agency to become more at ease with having priorities identified by good planning driving the work and resourcing. There is a common phrase of 'under-promise, over-deliver' which is "the complete opposite of what VBMF is trying to achieve" [b], said a staffer who also noted, "they're really not comfortable with setting high benchmarks" [b]. The agency needs to get comfortable with being accountable and transparent on where resources are going, why things are prioritised the way they are. As explained by a staffer "why didn't we deliver X, Y and Z – because we didn't have this level of input that we needed, that's why the output only equates X" [b], and "communicating when we're not doing well" [b].

The Green List accreditation process for Lamington has been a journey of reflection and improvement. It provided the structure needed to deep dive into the VBMF and its implementation identified areas where the park, and the QPWS in general, are doing well, and areas for improvement. The Green List process has helped strengthen the agency's adoption of VBMF and improved conservation outcomes for Lamington National Park. The team involved in this process believes the experience of Lamington National Park and the QPWS can provide valuable lessons to other protected areas and conservation agencies contemplating the adoption of management effectiveness frameworks or considering assessing some of their parks and reserves for inclusion on the IUCN Green List.

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RESUMEN

El Gobierno de Queensland (Australia) está aplicando un enfoque basado en valores a la gestión de parques en todas las áreas protegidas del Estado, basándose en principios internacionales de gestión eficaz y equitativa. Para mostrar en la práctica el éxito de la gestión de los parques e identificar las áreas que requieren mejoras en el enfoque, el Gobierno de Queensland participa en el programa de la Lista Verde de la UICN. La nominación del Parque Nacional de Lamington, la primera área protegida del Patrimonio Mundial de Australia en ser evaluada, ha mostrado la importancia de vincular la planificación estratégica a las operaciones dentro del parque, las ventajas de trabajar en colaboración interna y externamente, la importancia de la capacidad para la gestión del parque y el establecimiento de objetivos e inversiones a largo plazo, formas eficaces de "cerrar la brecha" en la gestión adaptativa y el flujo de beneficios a otras áreas protegidas en todo el Estado.

RÉSUMÉ

Le gouvernement du Queensland, en Australie, applique une approche de la gestion des parcs fondée sur des valeurs dans toutes les zones protégées de l'État, sur la base des principes internationaux de gestion efficace et équitable. Le gouvernement du Queensland participe au programme de la Liste verte de l'UICN afin de présenter une gestion réussie des parcs dans la pratique et d'identifier les domaines nécessitant une amélioration de l'approche. La nomination du parc national de Lamington, première zone protégée australienne inscrite au patrimoine mondial à être évaluée, a montré l'importance de lier la planification stratégique aux opérations dans le parc, les avantages de la collaboration interne et externe, l'importance de la capacité de gestion du parc et de l'établissement d'objectifs et d'investissements à long terme, les moyens efficaces de "combler le fossé" en matière de gestion adaptative et le flux de bénéfices vers d'autres zones protégées de l'État.

GEOVISUALISATION FOR EFFECTIVE MANAGEMENT OF INVASIVE SPECIES: BRIDGING THE KNOWING–DOING GAP

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ABSTRACT

Invasive species are a major threat to protected areas, as they disrupt native ecosystems and contribute to biodiversity loss. Invasive species management is faced with a challenge known as the 'knowing–doing gap', which refers to the disconnect between scientific research and its application in conservation efforts. Addressing this challenge requires collaboration between stakeholders (including researchers, managers, policymakers and the public), creating a need for tools that can clearly communicate invasive species and strategies to diverse audiences. Realistic, immersive geographical visualisations (geovisualisations), have the potential to serve a role in bridging this gap. This study engages people with management- and place-based relationships in a provincial park in British Columbia, Canada in the use of a novel geovisualisation tool for supporting invasive species management efforts. Using focus group methods, the research collects insights and perspectives on the usefulness of the developed tool. The results indicate that geovisualisations have the potential to engage and educate stakeholders in management options; however, it is important for geovisualisations to maintain realism and account for the diverse backgrounds of users. The paper concludes with suggestions from study participants on how to improve geovisualisation tools in ways that increase their effectiveness and appeal to park and protected area stakeholders.

Key Words: stakeholder collaboration, interactive tools, virtual environments, scenario assessment, landscape visualisation

INTRODUCTION

Participatory approaches and stakeholder engagement are crucial in the management of biological invasions due to the complex interplay of environmental challenges, such as climate change, land degradation, pollution and invasive alien species, which necessitate equal consideration of ecological and social processes (Shackleton et al., 2019a). However, including a variety of actors in effective management practices can be challenging, given that translating knowledge into practice in landscape conservation and ecological restoration requires overcoming existing gaps between 'knowing' and 'doing', where scientific research does not always result in on-the-ground conservation action (Matzek et al., 2014). This 'knowing–doing gap' (Lavoie & Brisson, 2015) is common in invasive species management (Funk et al., 2020). Despite the availability of scientific research on biological invasions (Matzek et al., 2015), there can be a lack of effective applications in conservation and natural resource management due to a focus on the advancement of basic research rather than considering mechanisms for conveying knowledge to relevant practitioners (Esler et al., 2010). The disconnect between research outcomes and effective management decisions can hinder the development and implementation of evidence-based solutions (Matzek et al., 2015). Closing this gap requires a coordinated effort by stakeholders in the invasive species community, including researchers, managers, policymakers and the public, to ensure that the knowledge generated about invasive species is translated into effective action.

Increasing stakeholder engagement and ensuring that communications are accessible and applicable to management audiences have been identified as key

factors for improving invasive species management practices (Beaury et al., 2020). Shackleton et al. (2019b) suggest ways to improve collaboration in natural resource management, such as promoting co-design and social learning, providing feedback to stakeholders, and enhancing partnerships beyond academia. Such co-design, feedback processes and partnerships can be supported by using geovisualisation tools that communicate how research-based practices can potentially lead to different management outcomes. Advancements in geographic information systems (GIS) and media technologies have enabled the creation of realistic place-based tools, enabling a deeper understanding of local planning and management issues (Newell & Canessa, 2015). Geovisualisations can provide a first-person perspective of different scenarios applied to a particular location, offering levels of detail that can help people better relate to the issues and landscape depicted (Appleton & Lovett, 2003). Geovisualisations can help to communicate complex ideas, data and concepts to broad audiences, including those who may not have a technical background. For example, complex climate change data and issues can be made more comprehensible to diverse stakeholders through scenario development and visualisation in community engagement and participatory planning processes (Jenkins et al., 2020). When created as 3D realistic scenes, geovisualisations hold advantages over conventional methods for representing geographic information, such as 2D maps, by allowing people with different backgrounds and technical knowledge to see and better understand proposed management options (Lewis & Sheppard, 2006). Note that the term 'geovisualisation' in other studies can refer to any visual representation of geospatial data, including maps, map-like displays, multimedia, plots and graphs that facilitate an understanding of geographic information (Çöltekin et al., 2018). However, in the context of this paper, geovisualisations refer to 3D digital representations of real-world places.

The majority of studies on geovisualisation as tools for planning, management and stakeholder engagement focus on urban contexts (Al-Kodmany, 2002; Jaalama et al., 2021; Newell et al., 2020). While some research has been performed in parks and protected areas (Canessa et al., 2015; Newell & Canessa, 2017; Newell et al., 2017), the degree to which geovisualisations can assist with bridging the knowing–doing gap specifically in invasive species management is lacking. This paper examines how geovisualisation tools can close the knowing–doing gap among a diverse group of stakeholders.

This study developed and tested the utility of Mitlenatch Island Visualisation (MIVis), a geovisualisation tool, for improving stakeholder understanding of the implications of management options for Himalayan Blackberry (*Rubus armeniacus*) on Mitlenatch Island, British Columbia (BC), Canada.

METHODS

Study area

Mitlenatch Island Nature Provincial Park (hereafter Mitlenatch Island) is a 155 ha protected area located in the northern Strait of Georgia, British Columbia (Figure 1). The park is located on the territory of the We Wai Kai First Nation, Wei Wai Kum First Nation, Xwemalhkwu (Homalco) First Nation, K'ómoks First Nation, Klahoose First Nation and Tla'amin Nation. It is characterised by semi-arid conditions due to its location in the rain shadow of Vancouver Island, receiving less than 750 mm of rain per year (BC Parks, n.d.). The park is home to a diverse array of wildlife, including various seabirds, marine life, and land animals (BC Parks, n.d.). The park also holds significant cultural value to local First Nations communities, with it traditionally serving as a site for foraging and gathering (Maslovat et al., 2019).

Mitlenatch Island is unique in its abundance of traditionally-used vegetation species due to previous generations of Indigenous resource management practices (Maslovat et al., 2019). The park is only accessible by boat, and the only human infrastructure on the island is a small cabin for daytime volunteer activities. Mitlenatch Island is thus an interesting case study for geovisualisation research by allowing users to experience and interact with the island remotely.

Himalayan Blackberry

Himalayan Blackberry is native to the Caucasus region of Eurasia (Caplan & Yeakley, 2006) and was introduced to British Columbia in the 19th century as a berry crop (Metro Vancouver, 2021). Himalayan Blackberry is difficult to control or eradicate because of its robust and rapid reproduction (Soll, 2004). On Mitlenatch Island, Himalayan Blackberry has traditionally been controlled by hand-cutting, which is mainly done by volunteers every two weeks during the growing period (Maslovat et al., 2019). The cut stems are then broken into smaller segments and left on the ground to decompose. While this method has proven effective, it is also very labour intensive. Managers are considering using other methods, such as prescribed burning, to control Himalayan Blackberry on Mitlenatch Island, but to date there has been no evaluation of the feasibility of these alternatives.

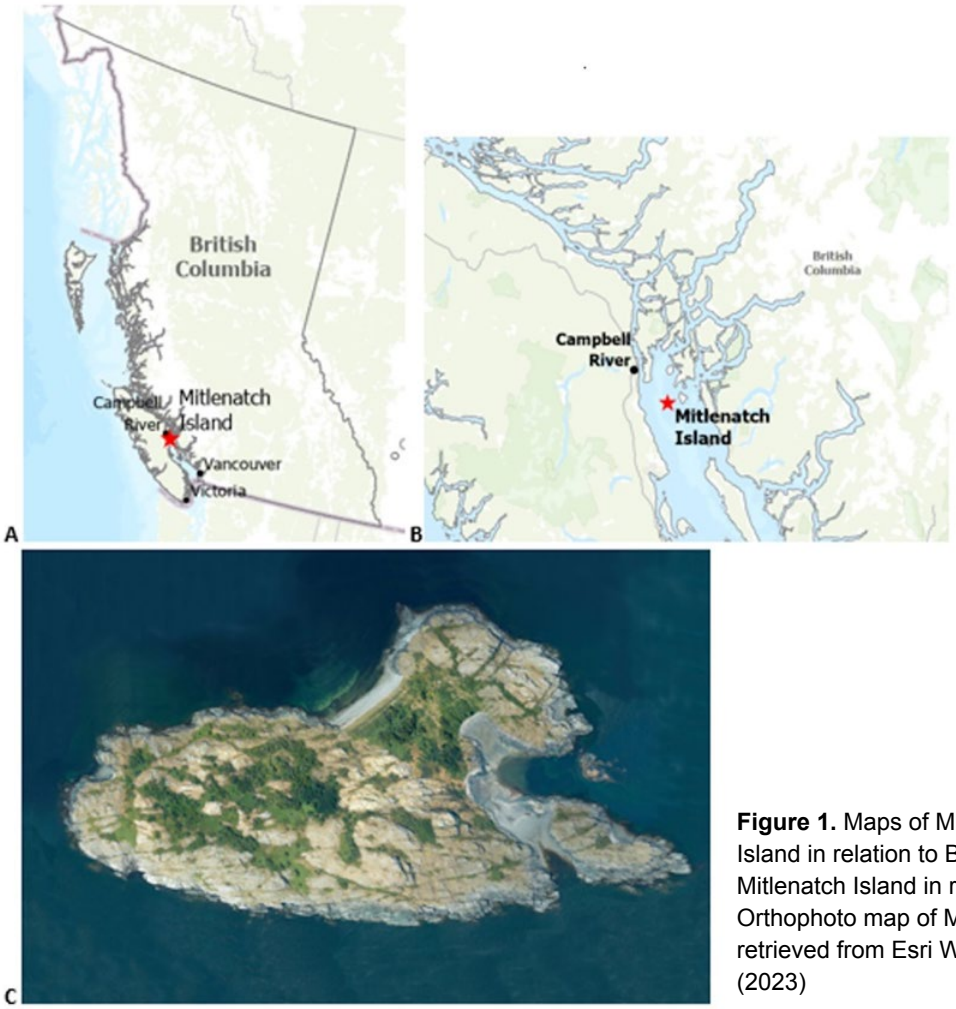

Figure 1. Maps of Mitlenatch. Location of Mitlenatch Island in relation to British Columbia (A); Location of Mitlenatch Island in relation to Vancouver Island (B); Orthophoto map of Mitlenatch Island (C). Basemap retrieved from Esri World Topographic Canada Style (2023)

Table 1: Summary of the scenarios included in MIVis

Visualised states	Scenario description
Current state	The state of the area before any management
Directly after treatment	The state of the area immediately following the implementation of one of four management strategies (hand-pulling, mowing, burning, and mowing and burning)
After one growing season	The changes that have occurred in the area after a full growing season following a chosen management strategy
Future unmanaged	How the Himalayan Blackberry might look if they were unmanaged

Geovisualisation and scenario creation

MIVis communicated potential outcomes of Himalayan Blackberry management options on Mitlenatch Island. A map provided by BC Parks, fieldwork photos and GIS data, and online images were used to identify the locations and appearance of Himalayan Blackberry. Management scenarios included in MIVis were based on the current strategies being used and those that practitioners were interested in exploring (Maslovat et al., 2019). The scenarios were developed using data and findings from previous studies on Himalayan Blackberry management done in the Pacific Northwest (Chow, 2018; Clark & Wilson, 2001; Ensley, 2015). Specifically, the studies on the management of Himalayan Blackberry examined changes in plant density and counts before and after implementing various management strategies, and these data were used to develop MIVis with respect to numbers and densities of plant elements visualised.

The Himalayan Blackberry management scenarios incorporated three key factors essential to understanding invasive species management: the impact of invaders, the consequences of management strategies, and the potential for secondary invasions (Pearson et al., 2009). As shown in Table 1, visualisation options include viewing (1) the current state of the landscape, (2) the landscape immediately following a particular management strategy and (3) the landscape a season after treatment, and (4) the landscape if left unmanaged. Detailed description of the scenarios can be found in Supplementary Material 1.

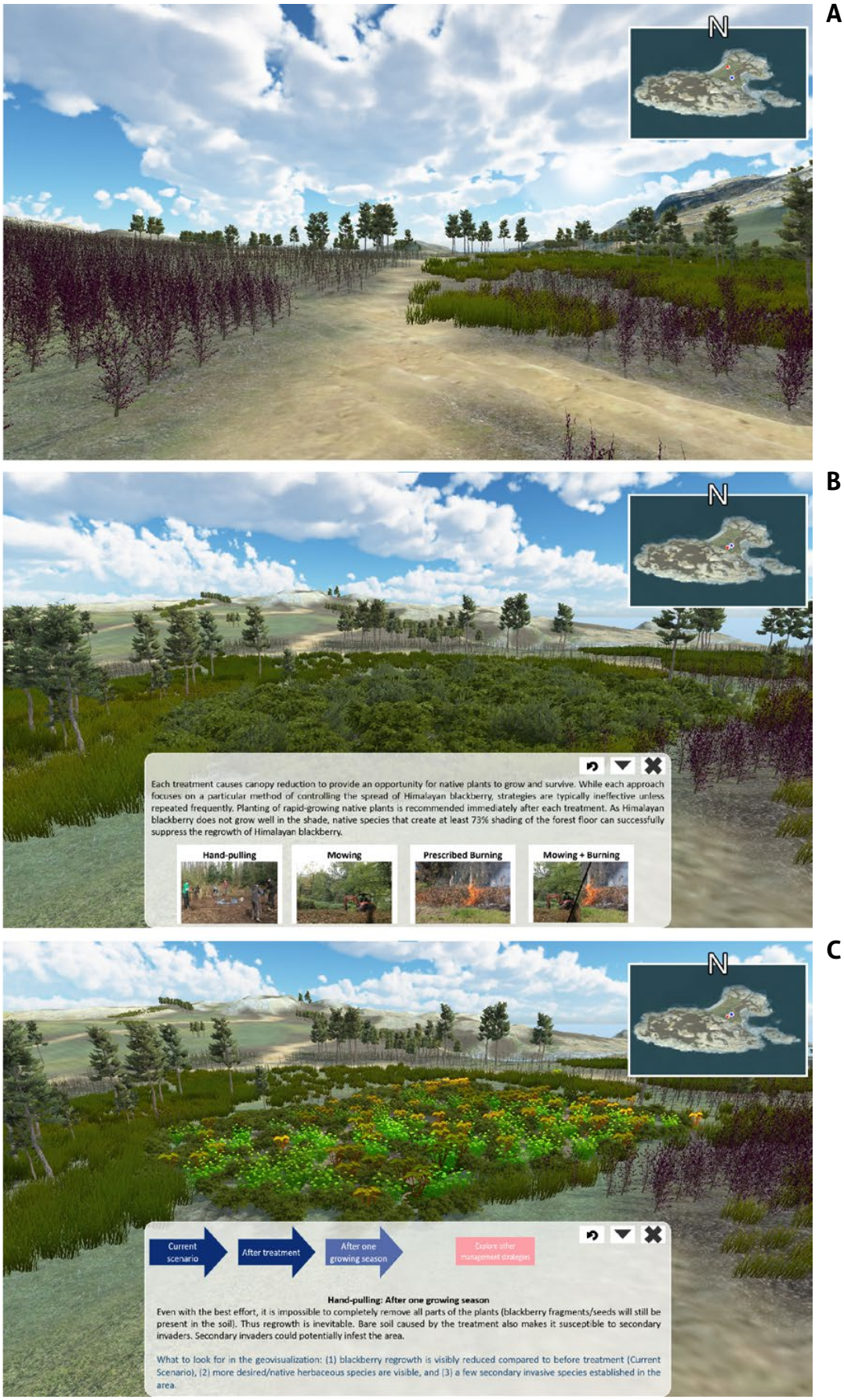

Figure 2. Screenshots of the geovisualisation. First-person perspective (A); Information and the four Himalayan Blackberry management strategies (B); 'After one growing season' stage (C)

Geovisualisation development and use

The geovisualisation experience places the user in the role of a first-person character standing on Mitlenatch Island, allowing them to freely explore the island and the Himalayan Blackberry plots (Figure 2). An information panel appears when the user is near a site with Himalayan Blackberry invasions, providing details and the option to view the four management scenarios. Each management strategy is accompanied by scenarios displaying what the landscape would potentially look like after one growing season. Explanatory text is included in each scenario with the aim of helping users to better understand the management outcomes for Himalayan Blackberry on Mitlenatch Island.

MIVis was developed using a game engine, Unity 3D (version 2020.1.9f1), using techniques established by Newell et al. (2017). This software allows the capability to construct an open-world environment, incorporating features such as terrain, weather, first-person character movement, and interaction. The tool is designed to provide interactive experience, where users can virtually freely explore Mitlenatch Island. Additional software including QGIS (version 13.16.10), GIMP, Adobe Photoshop and SketchUp are used to prepare data and visual elements for integration into Unity 3D, following the methods of Newell et al. (2017). These additional software allow for more detailed design elements, creating a visually realistic virtual environment. While this paper provides a succinct overview of the modelling process, a comprehensive description is available in the Supplementary Materials.

Focus groups

Focus groups involve gathering insights from small groups of participants whose knowledge and/or opinions are of relevance to the subject under examination. Snowball sampling was used for recruitment. This strategic method for recruiting currently unknown and hard-to-reach stakeholders (Parker et al., 2019) is commonly used in the investigation of local planning matters (e.g. Newell et al., 2020; Newell et al., 2022). Recruitment began with a small number of initial contacts with whom the researchers had previously developed relationships, and these contacts were asked to identify other individuals who might be interested in our study. This method allowed us to identify individuals who had connections to Mitlenatch Island, which is particularly important for this study due to the island's inaccessibility. Invitations were sent to over 100 people; approximately 30 invitees expressed interest in the project, and 20 participants attended the focus groups. Participants included members of BC Parks, Laich-kwil-tach Treaty Society and Mitlenatch Island Stewardship Team (MIST).

In September 2022, three two-hour focus groups were conducted: one in-person session and two online sessions. The focus groups began with a brief presentation on the research project and its objectives, followed by a demonstration of MIVis. Participants were given the chance to explore MIVis at their own pace, after which they were provided with feedback forms (Supplementary Material 2A) to share their experience, noting any encountered opportunities and limitations. The research involving human participants underwent ethical review and received approval from the University of Victoria's Human Research Ethics Board. Each participant was briefed and received a letter of consent (Supplementary Material 2B) outlining the research, focus group procedures and their right to withdraw.

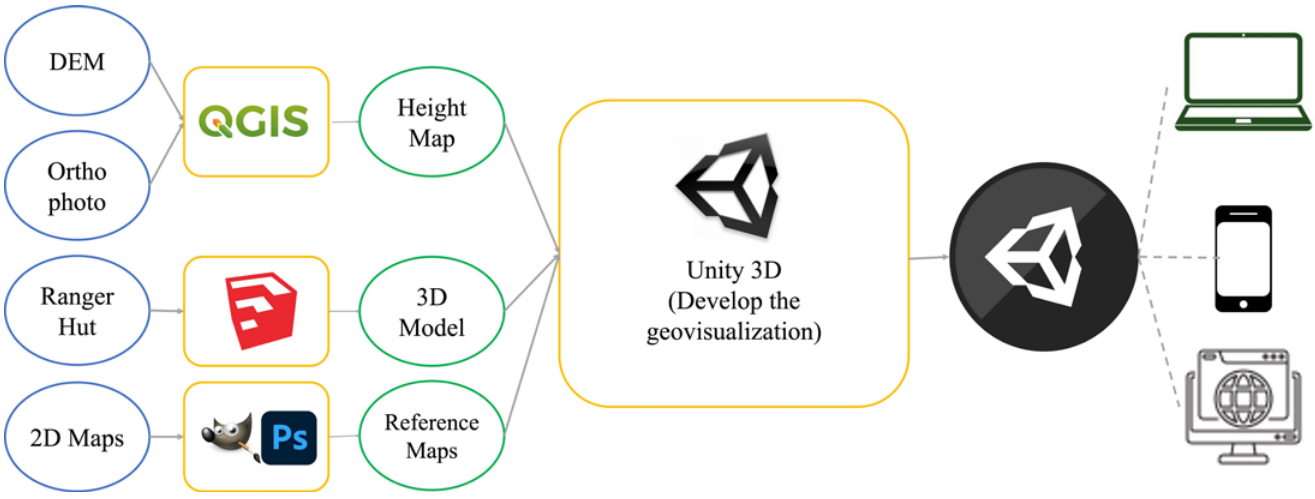

Figure 3. Workflow of developing MIVis

Table 2: Summary of results

Categories	Themes	Codes
Weaknesses and Limitations: *adoption gaps of MIVis*	Lack of representation	Too oversimplified Lack of animals and birds, vegetation is a lot thicker on the island
	Lack of content	Region-specific resources, long-term outcome results
	Varied familiarity with the platform among different audiences	Preferred to view data, charts and graphs Preferred using Google maps
	User skill level	Future/next phase of the project
	Technology Compatibility	Problems with opening the application on my device
Opportunities: *the potential contributions to planning/other uses*	Making informed decisions	Different perspectives, Multiple dimensions, Outcomes
	Reviewing resource management/enabling scenario planning	Planning, Budgeting, Manpower, Maintained
	Empowering the voice of First Nations	First Nations' values and sites, middens, burial sites, canoe runs, fish traps, nesting sites
	Providing a sense of context	Topography, Mainlanders, Accessible vs. restricted areas
	Addressing/ communicating current issues and opportunities	Floods, climate change, (Elk Falls, Strathcona Park)/other invasive species (Scotch Broom)
	Engaging/educating the public	Educational, awareness, outreach
Potential for improvements: *factors for improving the success of MIVis*	Work with practising users/local experts	Hand-cutting, photos, sound clips of the island
	Improve user experience	Movements, buttons, mobile phones
	Planning needs and requirements	Bird's-eye and street-level, views comparison, 2D man, planning information

Data analysis

Data included written feedback, researchers' notes and transcripts of focus group discussions. The audio data from the focus groups were transcribed, and the transcripts were imported into NVivo (version 12) for qualitative analysis. Thematic coding was used to analyse the data using NVivo, following an inductive coding approach that involved both applying and revising the coding framework as the data were analysed (Thomas, 2006). After completing the open coding process, an axial coding process was used to group the coded data based on commonalities in ideas, thoughts and comments (Thomas, 2006). This process identified a series of coherent themes that emerged from the focus group discussions and written feedback, which described the opportunities, issues and areas for improvement in MIVis.

RESULTS

As shown in Table 2, the thematic analysis was organised into three categories: (1) weaknesses and limitations, (2) opportunities, and (3) potential for improvement. These results are discussed in the sections below, with the specific themes identified in italic text.

Weaknesses

This category includes themes that relate to the weaknesses and limitations associated with the use of MIVis. Participants acknowledged the presence of certain limitations inherent in MIVis, with one participant describing it as "having minimal effectiveness". While MIVis captured some of the realistic aspects of the appearance of the island, some expressed that it *lacked representation*. Some participants noted that the visualisation failed to accurately depict the appearances of vegetation, thickness of vegetation, and the plants and bushes. Additionally, participants also noted that

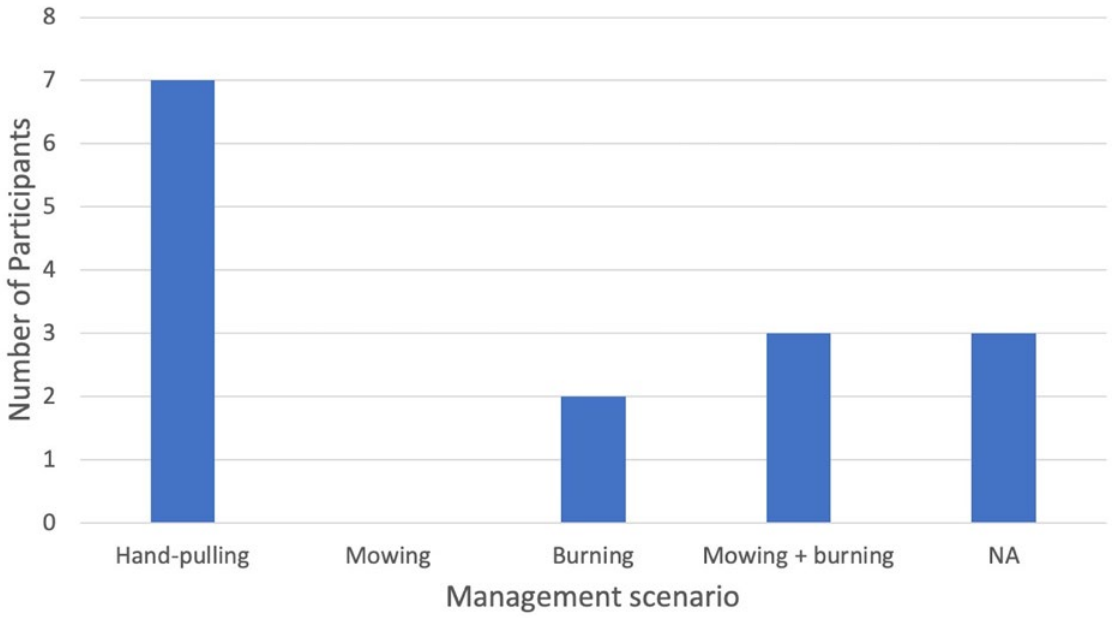

Figure 4. Participants' preferred first choice of management strategy after using MIVis

the absence of animals in MIVis was a limiting factor. For example, the seagull population on the island is significant and cannot be ignored, and thus the lack of seagulls in the tool made the tool look less realistic.

Some participants expressed the *lack of content*, particularly their interest in seeing the outcomes of the hand-cutting method, which is the current management strategy for controlling Himalayan Blackberry on Mitlenatch Island. In the feedback form, most participants stated that their preferred method was hand-pulling when asked about their first choice (Figure 4). However, it was found that the reason behind their choice was not based on MIVis, but rather their previous experience with hand-cutting. Participants believed that hand-pulling was "*the most similar to the hand-cutting*" which made it their preferred management strategy.

The *participants' level of familiarity* with the island was found to be a factor in their perception of the usefulness of MIVis. Those who were more familiar with the island tended to rate the tool as minimally or somewhat effective at best. In contrast, participants who were less familiar with the island were more likely to find MIVis useful. This suggests that prior knowledge and experience can affect one's perception of the value of geovisualisation tools in exploring and understanding geographic information.

Participants also brought up the *technical challenges* during the focus group discussions. Some participants reported they faced hardware and software compatibility issues, and some of their laptops were too old to run the application or did not meet the minimum system specifications for the tool to run smoothly. This limits their ability to fully interact with and benefit from MIVis. Participants also raised concerns about the *technical skills* required to build and maintain MIVis in the future.

Opportunities

While participants recognised the limitations of MIVis, they also described it as effective and having potential. One key benefit of the tool, as identified by participants, was its ability to *support informed decision-making* by visually exploring and evaluating different options and scenarios. One participant indicated that the visualisation tool was effective in '*seeing*' the outcome of management decisions. MIVis also effectively conveyed the message that a singular management treatment of any kind would not be sufficient in eradicating Himalayan Blackberry and that ongoing management efforts were necessary.

Participants also indicated that MIVis could be *beneficial for evaluating resource management* by offering a visual representation of the area. The visual information provides insights on the specific locations where resources are needed to manage the area. The tool has the potential to be useful for budgeting and managing resources, as well as for planning and allocating personnel.

Participants stated that this tool could also be useful *for addressing and communicating current issues and opportunities* by providing a visual representation of data and information about the state of the environment and the potential impacts of different actions or inactions. According to participants' comments, this tool

Camp Bay and volunteer's hut on Mitlenatch Island © Robert Newell

could be valuable for identifying areas of concern and for developing and implementing effective strategies for addressing certain issues. MIVis *provided a sense of context* such as allowing users to view restricted areas, such as bird nesting sites or areas with thick vegetation, without disturbing the ecosystem or the animals living there. It also enables users to view wildlife activities in their natural habitat without disrupting them. Additionally, the tool can be used to educate users about why these places are restricted to help them understand the importance of preserving these areas.

The potential of MIVis to *assist First Nations* in land stewardship was acknowledged by a few participants, as it could provide the opportunity to enhance how resources in their territory are managed. Multiple First Nations participants recognised the capability of using MIVis to depict the past use and management of the island, including historical sites such as middens, burial grounds, canoe routes and fish traps. One example that was mentioned by a participant was that MIVis could portray the historical gathering of seagull eggs on Mitlenatch Island and support an understanding of the influence of this practice on seagull populations.

Finally, participants indicated other potential uses for MIVis in the future, including *public educational outreach efforts* and virtual visits. The tool could also communicate other plans, such as prescribed burning as a management tool. It could also be used to explore climate change scenarios and to manage other areas. The tool could also track the growth or decrease of all species on the island, as well as the management of over-growth plants and eelgrass, pelagic haul-out areas, gulls, and potential erosion. The tool can be used to mark locations of rare plant species and ecological communities, as well as to track plant growth over time and, by adding a seasonal component, visually depict the phenology of different species.

Potential for improvements

Participants indicated that MIVis could be improved by including more relevant scenarios, particularly those involving *collaboration with experienced users*. They identified the current hand-cutting treatment method as an important inclusion, and expressed being open to help develop this scenario in an update of the tool. They also offered to provide materials and resources that could be utilised to enhance the representation of the island in future versions of the geovisualisations. These resources include photographs taken during one of the participants' recent visit in summer 2022, as well as audio recordings of the island's unique sounds. Participants suggested that the *user's interface* such as the manoeuvrability could be improved (i.e. making it easier to move around and navigate). Also, some features were not intuitive, as participants noted that the buttons did not appear to be clickable, which made it difficult to use the tool effectively. Other suggestions included the option to use the tool on different platforms, such as mobile devices, which would make it more accessible and user-friendly. Furthermore, they suggested that a user guide on how to use MIVis would be helpful in allowing users to better understand the tool and its capabilities.

Several areas for improvement in MIVis were suggested to make them more *relevant for managers*. They suggested the inclusion of aerial views and 2D maps to provide a bird's-eye view and better overall understanding of the island. Participants suggested the capability to fix the view at certain locations and to minimise screen movement, as the current movement was causing some participants to experience a dizzy sensation. They also emphasised the importance of the ability to view all scenarios at the same time for easy comparison. Lastly, they suggested the inclusion of visual information on financial and human resources to aid in planning.

DISCUSSION

The results showed that MIVis has great potential for enhancing understanding and connecting to a sense of place, as evidenced in the opportunities category. However, the study also revealed challenges associated with using geovisualisation for decision-making purposes. Participants also raised several suggestions during the focus groups to enhance the effectiveness and appeal of the geovisualisation to users. These suggestions are explored in this section, offering practical ways to improve the strategies and engage stakeholders in a more meaningful way.

Enhance understanding through sense of place

Sense of place is defined as a complex of emotional, physical, and cultural factors that give a place its unique character and meaning for individuals (Tuan, 1977). When developed with high degrees of realism, geovisualisation tools can engage and interact with people's sense of place (Newell & Canessa, 2015). MIVis thus has potential to connect with people's sense of place, engaging users' deeper understandings of the complexity, issues, and management opportunities associated with Himalayan Blackberry on Mitlenatch Island. By interacting with sense of place, users can assess scenarios based on their place-based perceptions and values, as well as their attitudes and behaviours toward the environmental issues affecting a place. MIVis enabled participants to gain a nuanced understanding of managing Himalayan Blackberry by providing visual access to data, context and to hard-to-reach areas, thereby enhancing participants' awareness of locational characteristics and exposing them to the issues and opportunities present in those areas.

Participants agreed that MIVis had the potential to effectively communicate those issues and opportunities to a broader audience, engaging and educating the public. This finding is consistent with other research on geovisualisation tools, which has found that realistic environmental models and simulations can facilitate effective and efficient communication and consensus-building among participants by providing a common language (Al-Kodmany, 2002). The findings are also supported by Hayek (2011), who noted that 3D geovisualisations are best employed in the context of motivating people, raising awareness, and drawing their attention to a specific topic.

While the tool has the potential to be valuable for public engagement and education (i.e. communicating and making sense of what is known), there is a need to work towards improving the tool and making it more effective for collaboration and creating the opportunity for scientific knowledge discovery. This may involve incorporating more opportunities for the two-way flow of knowledge by involving stakeholders in the co-design, co-creation and co-implementation of research and management actions (Shackleton et al., 2019b).

Facilitate decision-making

MIVis may not be effective in facilitating decision-making, as several participants reported that it did not have the potential to support their invasive species work, describing it as being only minimally effective. The lack of realistic representations of many features was a significant factor, as participants felt that it did not accurately resemble the environment of the island. Secondly, participants felt that they needed more data to make informed decisions. Specifically, they expressed the need for long-term impact scenarios and comparisons with the existing method of controlling Himalayan Blackberry invasions. However, due to the lack of literature on hand-cutting, this method was not incorporated in MIVis. Participants also expressed an interest in seeing the outcomes of management strategies over a longer period, as most research on Himalayan Blackberry focuses on the short-term impacts of these strategies.

Increasing levels of detail in a visualisation can indeed contribute to people's ability to connect with and envision the presented landscape. The more realistic the depiction, the easier it becomes for individuals to immerse themselves in the visualised environment and imagine its real-life counterpart. However, the search for a 'sufficient' level of realism is challenging because some elements are not simulated or represented with the same level of accuracy, realism or quality as other elements (Appleton & Lovett, 2003). The complexity also arises from the fact that the real landscape is constantly changing due to seasonal and daily variations in atmospheric conditions, and these diverse and ever-

changing elements cannot be accurately replicated in a simulated environment (Lange, 2001).

Our study also revealed that participants who frequently visited Mitlenatch Island did not think that the current geovisualisation accurately represented the island. This highlights the importance of understanding that perception of 3D geovisualisation is not only influenced by the realism it can present but also by the individual's knowledge, prior experiences and unique characteristics of the audience (Jaalama et al., 2021). Furthermore, research has shown that how a place is seen and experienced can also differ between people and groups (Newell & Canessa, 2017). Therefore, when creating a geovisualisation, it is crucial to incorporate place-based cues and consider the characteristics and preferences of the intended audience. This includes understanding their sense of place, their expectations, and their familiarity with the depicted landscapes.

Despite the criticisms of MIVis, participants recognised its potential. This was demonstrated by the willingness of some participants to share data and feedback to help improve the tool, such as the most recent photos taken from Mitlenatch Island and sound clips, all of which can present a more immersive and realistic experience for users, and aid in creating an accurate representation of the island.

Limitations

Limitations of this study include its sample size. Although the participant sample represented many targeted users on the management of Himalayan Blackberry on Mitlenatch Island, the sample size was relatively small. The engagement was also limited to one First Nations community, and the results cannot be generalised to other communities or the broader population due to the relatively few participants who were involved. In addition, several other challenges were faced during the project's online focus groups process, including hardware and software compatibility issues for some participants. As a result, some participants were unable to open the application on their own devices and relied on walkthroughs of the tool conducted by researchers to understand MIVis, limiting their ability to fully interact with it.

CONCLUSION

Geovisualisations have potential for improving public communications, outreach and participatory governance of environmental issues. By providing a sense of context for out-of-reach sites, the public can be engaged to help them better understand complex issues and make management decisions. However, to fully realise the collaborative potential of geovisualisation, it is crucial to involve stakeholders in the co-design, co-creation and co-implementation of research and management actions. This two-way flow of knowledge can lead to more effective decision-making and implementation of management actions. Moreover, the ability to enhance understanding is another key benefit of MIVis.

Building an effective geovisualisation requires careful consideration of the data, its sources and its potential uncertainties. The process of building a geovisualisation tool does not necessarily need to result in a final product (Newell et al., 2017). Instead, it can involve an ongoing and iterative approach where the base model is continuously improved as more stakeholders interact with it. Conducting geovisualisation research in this manner requires a flexible tool that allows for continual modification, as well as scenario building, so that users can explore different hypothetical situations, their potential outcomes, and the uncertainty that exists in the information and in the model. Although ambitious and time-consuming, this longitudinal approach to geovisualisation research could produce valuable insights into what makes for an effective geovisualisation planning and management tool, as well as how these tools are shaped depending on who is involved in their

SUPPLEMENTARY ONLINE MATERIAL

Supplementary Material 1. Development of the Geovisualisation Tool for Invasive Species Management.
Supplementary Material 2A. Letter of Information for Participant Consent.
Supplementary Material 2B. Focus Group Feedback Form.

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Trail through a field on Mitlenatch Island © Robert Newell

RESUMEN

Las especies invasoras constituyen una grave amenaza para las áreas protegidas, ya que alteran los ecosistemas autóctonos y contribuyen a la pérdida de biodiversidad. La gestión de las especies invasoras se enfrenta a un reto conocido como la "brecha entre el saber y el hacer", que se refiere a la desconexión entre la investigación científica y su aplicación en los esfuerzos de conservación. Para hacer frente a este reto es necesaria la colaboración entre las partes interesadas (investigadores, gestores, responsables políticos y público en general), por lo que se precisan herramientas que comuniquen con claridad las especies invasoras y sus estrategias a públicos diversos. Las visualizaciones geográficas realistas y envolventes (geovisualizaciones) pueden contribuir a colmar esta laguna. Este estudio involucra a personas con relaciones de gestión y basadas en el lugar en un parque provincial de la Columbia Británica (Canadá) en el uso de una novedosa herramienta de geovisualización para apoyar los esfuerzos de gestión de especies invasoras. Utilizando métodos de grupos focales, la investigación recoge ideas y perspectivas sobre la utilidad de la herramienta desarrollada. Los resultados indican que las geovisualizaciones tienen el potencial de implicar y educar a las partes interesadas en las opciones de gestión; sin embargo, es importante que las geovisualizaciones mantengan el realismo y tengan en cuenta los diversos orígenes de los usuarios. El documento concluye con sugerencias de los participantes en el estudio sobre cómo mejorar las herramientas de geovisualización para aumentar su eficacia y atractivo para los interesados en los parques y áreas protegidas.

RÉSUMÉ

Les espèces envahissantes constituent une menace majeure pour les zones protégées, car elles perturbent les écosystèmes indigènes et contribuent à la perte de biodiversité. La gestion des espèces envahissantes est confrontée à un défi connu sous le nom de "fossé entre le savoir et l'action", qui fait référence au décalage entre la recherche scientifique et son application dans les efforts de conservation. Pour relever ce défi, il faut une collaboration entre les parties prenantes (notamment les chercheurs, les gestionnaires, les décideurs et le public), d'où la nécessité de disposer d'outils permettant de communiquer clairement sur les espèces invasives et les stratégies à divers publics. Les visualisations géographiques réalistes et immersives (géovisualisations) peuvent contribuer à combler ce fossé. Cette étude implique des personnes ayant des relations avec la gestion et le lieu dans un parc provincial en Colombie-Britannique, au Canada, dans l'utilisation d'un nouvel outil de géovisualisation pour soutenir les efforts de gestion des espèces invasives. En utilisant des méthodes de groupes de discussion, la recherche recueille des idées et des points de vue sur l'utilité de l'outil développé. Les résultats indiquent que les géovisualisations ont le potentiel d'impliquer et d'éduquer les parties prenantes dans les options de gestion ; cependant, il est important que les géovisualisations restent réalistes et prennent en compte les différents contextes des utilisateurs. Le document se termine par des suggestions des participants à l'étude sur la manière d'améliorer les outils de géovisualisation afin d'accroître leur efficacité et leur attrait pour les parties prenantes des parcs et des zones protégées.

DEVELOPING STATEMENTS OF COMPLIANCE FOR UK PROTECTED AREAS AND 'OTHER EFFECTIVE AREA-BASED CONSERVATION MEASURES'

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ABSTRACT

The Protected Areas Working Group of the IUCN National Committee for the UK assessed 23 types of designation of land and sea for biodiversity conservation against IUCN definitions of 'protected area' and 'other effective area-based conservation measures'. This assessment supersedes Statements of Compliance published in 2014, reassigns several categories on the basis of new information and understanding, and provides guidance to UK and devolved governments, and their agencies, on which types of sites should be incorporated within the Global Biodiversity Framework Target 3 total. There is a need for urgent investment in improving the management effectiveness of all sites considered to ensure they can all effectively contribute to the achievement of UK's 30x30 target.

Key words: Management effectiveness, OECM, site network

INTRODUCTION

In 2014, the IUCN National Committee for the United Kingdom (IUCN-NCUK) published an assessment – *Putting Nature on the Map* (PNOTM) – of potential types of protected areas in the United Kingdom (UK) against IUCN definitions and standards (Crofts & Phillips, 2013; Crofts et al., 2014).

This was a ground-breaking assessment of the many different types of areas historically established throughout the UK, at least in part, for the purposes of biodiversity conservation. However, in the nearly a decade since then, much has changed, not least internationally.

In December 2022, the Convention on Biological Diversity's (CBD) 15th Conference of Parties (COP15) adopted the Kunming-Montreal Global Biodiversity Framework (GBF) (Convention on Biological Diversity, 2022). The GBF seeks to respond to the 2019 *Global Assessment Report of Biodiversity and Ecosystem Services* issued by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2019); the fifth edition of the *Global Biodiversity Outlook*; and many other scientific assessments which provide ample evidence that, despite ongoing efforts, biodiversity is deteriorating worldwide at rates unprecedented in human history.

Target 3 of the GBF, known colloquially as 30x30, calls for at least 30 per cent of the world's terrestrial, inland water, and of coastal and marine areas, to be in effective protection and management by 2030. This target will be achieved through the establishment of protected areas and other effective area-based conservation measures (OECMs). Both these types of area-based conservation measures are well defined under the CBD, and both have extensive CBD and IUCN guidance (e.g. CBD, 2018; Dudley, 2008).

The UK and devolved governments have committed to implement Target 3 in the UK both on land and in

Ballachuan Hazelwood, Argyll – a 'temperate rainforest' – is a Scottish Wildlife Trust nature reserve, internationally important for very rich communities of epiphytic lichens, bryophytes and fungi but lacking any statutory protection © D.A. Stroud

the marine environment, for example in the Welsh Government's Biodiversity Deep Dive recommendations (Welsh Government, 2022), the Westminster Government's Nature Recovery Green Paper (DEFRA, 2022) and the Scottish Government's draft Framework for 30x30 in Scotland (Nature Scot, 2023).

Since 2014, the UK has withdrawn from the European Union (EU), with the legal obligations for some protected areas established through the EU Birds and Habitats Directives now replaced with broadly corresponding requirements within new domestic legislation.

The period since PNOTM was published has also seen growing awareness of the importance of effective management of land for biodiversity, as well as formal recognition of the role, alongside formally protected areas, of OECMs, introduced as an element of 'Aichi' Target 11 of the CBD *Strategic Plan for Biodiversity 2011–2020* (CBD, 2010). In November 2018, CBD Parties adopted at COP14 a definition of OECMs as well as guiding principles, common characteristics and criteria for identification (CBD, 2018), and additionally, the issues of governance and effective management have achieved even higher visibility in relation to protected areas and OECMs than was the case in 2014 (e.g. Olmeda et al., 2022). There has also been a critical review of the 2014 assessment (Starnes et al., 2021).

For all these national and international reasons, in 2021, the Protected Areas Working Group (PAWG) of the IUCN-NCUK considered it timely to revisit the assessments made in PNOTM in the light of new knowledge and understanding, and in particular as an aid to governments in the UK in implementing the commitment to establish and effectively manage the protection of 30 per cent of land and 30 per cent of territorial marine areas by 2030 – a deadline that is now just six years away.

The assessment is aiming to establish whether site designation types that have historically been considered as protected areas across the UK should still be considered as such, based on accepted international definitions (CBD and IUCN). Therefore, some site designation types formerly recognised and reported as protected areas may now be more correctly considered as OECMs, either in their totality, or in part. This could be true at the site designation type level, or on a case-by-case basis of individual sites within a site designation type. Case by case assessment is necessary since, with its multiple designations and long history of protected areas, multiple designation types overlap. For example, a parcel of land in the Ouse Washes of eastern England may be in a nature reserve managed by one of three different conservation non-governmental organisations (NGOs), be in a Site of Special Scientific Interest, Ramsar Site, Special Protection Area and Special Area of Conservation. Determining the levels of protection/management provided at any place thus needs detailed assessment of each case.

METHODS

Objective questions were developed from formal protected area and OECM definitions, as well as to assess the effectiveness of management at the level of the site designation type. In the site designation type proforma (IUCN National Committee for the UK Protected Areas Working Group, 2023), the Statements of Compliance assessments are presented in three parts: relating to the definition, of protected areas, then that of OECMs as well as management effectiveness.

Part 1. Protected area[2] definition

Protected areas are defined by IUCN (Dudley, 2008) as:

"A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values."

Main elements of IUCN definition

Does this type of protected area have clearly defined geographical boundaries?

Is this type of site recognised, dedicated and managed to achieve the long-term conservation of nature?

Is the main management objective nature conservation?

Does the designation of the site prevent, or eliminate where necessary, any exploitation or management practice that will be harmful to their objectives of designation?

Is the long-term[1] nature conservation ensured through legal or other effective means?

Based on the evidence available, does this type of site meet the IUCN's definition of a protected area?

Part 2. Other effective area-based conservation measures assessment

If the site designation type did not meet the definition of a protected area under Part 1, in Part 2, it was assessed in relation to CBD's 2018 OECM definition:

"A geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in-situ conservation of biodiversity [as defined by Article 2 of the Convention on Biological Diversity and in line with the provisions of the Convention], with associated ecosystem functions and services and where applicable, cultural, spiritual, socio-economic, and other locally relevant values."

IUCN screening tool tests

Is the designation type a protected area?

Does the site have the essential characteristics required to meet the OECM definition?

- It is geographically defined
- The site is governed and managed and such arrangements are expected to be ongoing and sustained over the long term (i.e. in perpetuity if the PA interpretation of 'long-term' is adopted)
- The site delivers effective in-situ conservation of biodiversity
- The site is free of environmentally-damaging activities and threats to biodiversity

Will the conservation outcome at the site endure over the long term?

What is the in-situ area-based conservation target (e.g. GBF Target 3) being met by this OECM?

Based on the evidence available, does the site meet the IUCN's definition of an OECM?

Part 3. Management effectiveness assessment

All site types were then assessed for evidence of the effectiveness of their management in the delivery of positive biodiversity outcomes/conservation objectives in Part 3.

"Management effectiveness evaluation is defined as the assessment of how well protected areas are being managed – primarily the extent to which they are protecting values and achieving goals and objectives." (Hockings & Dudley, 2008).

Is the management of this type of protected area/OECM documented?

What evidence is there that the measures to achieve the conservation objectives are being implemented?

Is monitoring in place to assess if measures are working?

Are the protected areas/OECMs moving towards or have they reached their conservation objectives?

Based on the evidence available, is this site designation type/ network of sites being managed effectively?

In line with the requirements of the 1998 'Aarhus' Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, we considered it critical that information on the current status of protected areas and OECMs should be in the public domain, including at the very least useful and transparent summary data.

Accordingly, assessments were made following searches for relevant, publicly available data and information on the websites – or published elsewhere in other formats – of those organisations or statutory authorities responsible for the relevant site designation type. Searches were made during the period May to September 2023.

Table 1. Occurrence of different designation types across the UK (listed alphabetically).

Type of designation	England	Northern Ireland	Scotland	Wales
Areas of Outstanding Natural Beauty (AONB)	Yes	Yes		Yes
Butterfly Conservation's (BC) Nature Reserves	Yes	Yes	Yes	Yes
Heritage Coasts	Yes			Yes
John Muir Trust (JMT) properties	Yes		Yes	
Local Nature Reserves (LNR)	Yes	Yes	Yes	Yes
Local Wildlife Sites (LWS)	Yes	Yes	Yes	Yes
Marine Protected Area (MPA) designations	Yes	Yes	Yes	Yes
National Nature Reserves (NNR)	Yes	Yes	Yes	Yes
National Parks (including The Broads)	Yes		Yes	Yes
National Scenic Areas (NSAs)			Yes	
National Trust (NT) and National Trust for Scotland (NTS) properties	Yes	Yes	Yes	Yes
Plantlife Nature Reserves	Yes	Yes	Yes	Yes
Ramsar Sites	Yes	Yes	Yes	Yes
Royal Society for the Protection of Birds (RSPB) Nature Reserves	Yes	Yes	Yes	Yes
The Wildlife Trusts' Nature Reserves	Yes	Yes	Yes	Yes
Sites and Areas of Special Scientific Interest (SSSI and ASSI)	Yes	Yes	Yes	Yes
Special Area of Conservation (SAC; part of the National Site Network)	Yes	Yes	Yes	Yes
Special Protection Areas (SPA; part of the National Site Network)	Yes	Yes	Yes	Yes
Wildfowl & Wetlands Trust's (WWT) sites	Yes	Yes	Yes	Yes
Woodland Trust (WT) sites	Yes	Yes	Yes	Yes
UNESCO Biosphere Reserves	Yes		Yes	Yes
UNESCO Global Geoparks	Yes	Yes	Yes	Yes
UNESCO World Heritage Sites (natural or mixed sites only)	Yes	Yes	Yes	

In many cases, although data, relevant to management for instance, were not available in detail at site scale, websites nonetheless provided clear statements of existing processes for the designation. Such general information was used to inform the assessments. Where we found no information to suggest any relevant activities were occurring or planned, we concluded that these processes were lacking. Where future activities were stated to be planned but yet were not yet occurring, we made our assessment on the *status quo* in late 2023 – given the potential for planned processes not to come to fruition.

Where there were significant differences between policy and practices between the four country governments across the UK and their respective statutory nature conservation bodies, site types were assessed and reported on at a country rather than Great Britain (GB) or UK level. The different geographical occurrence of designation types across the UK is shown in Table 1.

These assessments consider those elements of the Target 3 definition that require sites to be "effectively conserved and managed". It has not been possible, at this stage, to consider whether the individual site types are either "ecologically representative", "well-connected" and/or are "equitably governed". We note for connectivity, that whilst some site types have been selected on a network basis (for example Special Protection Areas), others – such as World Heritage Sites – are selected individually, making connectivity per se of lesser significance in the context of the individual site type.

Table 2. Summary findings for potential types of protected area in 2023 in respect to IUCN definitions and effectiveness of management. All assessments at UK scale.

Type of designation	Statement of compliance no.	Does the site type meet IUCN's definition of a Protected Area (PA)?	If not PA, does site type warrant case-by-case consideration against OECM criteria?	Is this network of sites being managed effectively?
Areas of Outstanding Natural Beauty (AONB)	9	No	Yes	Partly
Butterfly Conservation's (BC) Nature Reserves	17	No	Yes	Partly
Heritage Coasts	11	No	Yes	Unknown
John Muir Trust (JMT) properties	18	No	Yes	Partly
Local Nature Reserves (LNR)	7	No	Yes	Unknown
Local Wildlife Sites (LWS)	23	No	Partly	Partly
Marine Protected Area (MPA) designations[3]	5	Yes	n/a	Partly
National Nature Reserves (NNR)	6	No	Yes	Partly
National Parks (including The Broads)	8	No	Yes	Partly
National Scenic Areas (NSAs)	10	No	No	No
National Trust (NT) and National Trust for Scotland (NTS) properties	16	Partly	Yes	Partly
Plantlife Nature Reserves	19	No	Yes	Partly
Ramsar Sites	4	Yes	n/a	Partly
Royal Society for the Protection of Birds (RSPB) Nature Reserves	15	No	Yes	Partly
The Wildlife Trusts' Nature Reserves	20	No	Yes	Partly
Sites and Areas of Special Scientific Interest (SSSI and ASSI)	1	Yes	n/a	Partly
Special Area of Conservation (SAC; part of the National Site Network)	3	Yes	n/a	Partly
Special Protection Areas (SPA; part of the National Site Network)	2	Yes	n/a	Partly
Wildfowl & Wetlands Trust's (WWT) sites	22	No	Yes	Partly
Woodland Trust (WT) sites	21	No	Yes	Partly
UNESCO Biosphere Reserves	12	No	Yes	Partly
UNESCO Global Geoparks	13	No	Yes	Unknown
UNESCO World Heritage Sites (natural or mixed sites only)	14	No	Yes	Partly

RESULTS

A high-level summary of assessment findings is given in Table 2. The evidence identified that five types of site designation are considered to fully comply with IUCN's definition of a 'protected area': Sites/Areas of Special Scientific Interest; marine protected area designations[4]; Ramsar Sites; Special Protection Areas; and Special Areas of Conservation.

Eighteen other designation types are not considered as 'protected areas' in their own right (although many will contain areas of land or sea that do meet that definition) (Table 2 and Supplementary Table 1).

Sixteen of these types of sites should be assessed on a site-by-site basis with respect to their potential status as OECMs (Supplementary Table 2).

Sycamore Gap, on Hadrian's Wall lies within Northumberland National Park, England © D.A. Stroud

The Paps of Jura (within Jura National Scenic Area, Scotland) seen from Islay, with a RSPB nature reserve, Site of Special Scientific Interest, Ramsar Site and Special Protection Area in the foreground indicating the complexity of designation types in the UK © D.A. Stroud

For no site type, as a whole, was there sufficient evidence of effective management (Supplementary Table 3) although individual sites do demonstrate effective management. In most cases, management was, at best, either partly delivered and/or partly effective, whilst for three site types (Heritage Coasts, Local Nature Reserves and UNESCO Global Geoparks) management effectiveness was entirely unknown.

We found many data gaps, especially with respect to management effectiveness and condition of sites. These are highlighted in the detailed individual designation type assessments reported by us in IUCN National Committee for the UK Protected Areas Working Group (2023).

DISCUSSION

Changes since the previous assessment

Compared to the 2014 assessment, there have been some notable changes in the factors affecting the assessment of different designation types as protected areas as defined by IUCN. The most important have been: the advent of new publicly available data; progress (or lack of) in clarifying qualifying criteria since the last assessment; the option of identifying OECMs rather than protected areas as a method of classifying sites qualifying for the 30x30 target; and a more rigorous assessment against the criteria.

Of those designation types that qualified as protected areas in the last assessment, Areas of Outstanding Natural Beauty (to be promoted generally in the vernacular in GB – although not Northern Ireland – as 'National Landscapes' from November 2023), National Nature Reserves, National Parks, most NGO land, UNESCO Biosphere and World Heritage Sites, no longer qualify as protected areas in their entirety, in the estimation of PAWG. The exceptions are those parts of these areas which are also covered by qualifying designations (e.g. Areas/Sites of Special Scientific Interest). However, elements of the remaining areas could be included in the 30 per cent target as OECMs but would need assessment on a case-by-case basis. The inclusion of all marine protected area designations as qualifying protected areas develops the proposal put forward in the 2014 assessment (Crofts et al., 2014).

Standards for inclusion in UK's delivery of the 30x30 target

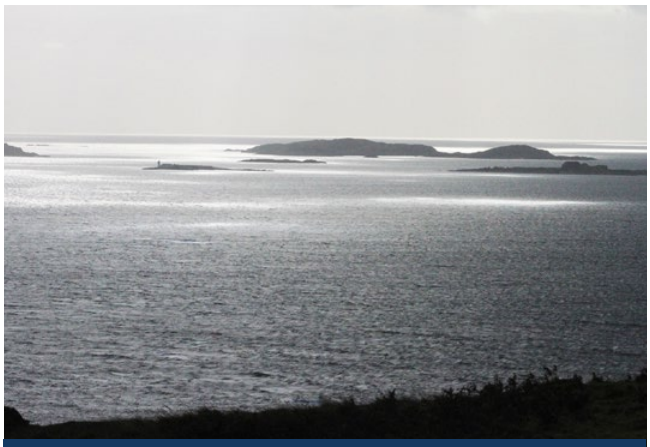
The findings have relevance to the UK's implementation of Target 3 of the Global Biodiversity Framework, in particular the expressed intention by government to establish a network of protected areas and OECMs that, by 2030, will cover 30 per cent of the UK land area and 30 per cent of its marine area (the 30x30 target) – a deadline that is now only six years away. The assessment is offered as a contribution to the UK Government's obligation to identify and ensure the effective management of protected areas and OECMs across 30 per cent of land and seas in the UK.

The assessments, which supersede Statements of Compliance published in 2014 and recorded at the time on the World Database of Protected Areas, provide guidance to government and its agencies on which types of sites should be incorporated within those 30 per cent totals.

To meet the required standards for GBF Target 3, sites must meet the conditions of its definitions. These assessments address the elements of a) protection and b) effective management. We have not addressed the additional definitional elements of c) ecological representation, d) connectedness and e) equitable governance and we recommend that such assessments are undertaken.

PAWG recommends that the UK Government and the devolved administrations invest urgently in improving

Eilean na Muice Dubh/Duich Moss, Islay, Scotland is a Ramsar Site designated for its international importance for Greenland White-fronted Geese *Anser albifrons flavirostris* as well as for its peatland habitats © D.A. Stroud



The Garvellachs SSSI islands in Argyll, Scotland notified for both their geological and botanical importance © D.A. Stroud

the management effectiveness of all sites considered in this assessment to ensure that they can all effectively contribute to the 30x30 target, noting that to meet the required standards, sites must be both protected and demonstrate that they are being effectively and equitably managed. We understand that NGOs rely on charitable resources to manage their sites effectively. We consider that public money should be made available to support their efforts.

We believe that the target can be met with renewed efforts from government and non-government bodies to manage existing sites effectively whilst governments also implement the findings of reviews that show that existing networks of protected areas are not yet complete (e.g. Galbraith & Stroud, 2022; RSPB, 2020; Stroud, 2023; Stroud et al., 2016).

Other sites, such as those in private or state ownership, not considered in this review, which have primary objectives potentially compatible with delivering nature conservation outcomes at least equivalent to those of protected areas, could have the potential to be a component of the 30x30 target for the UK following case-by-case assessment of such sites against OECM criteria. However, in line with the international definition of the GBF Target 3, such sites clearly exclude multiple use areas as well as those where their primary objectives are not compatible with delivery of nature conservation outcomes equivalent to those provided by protected areas.

We note that the effectiveness of managing many protected areas and other designation types considered here is constrained, sometimes significantly, through the impact of both on-site and especially off-site factors outside the control of organisations responsible for the sites. We recommend conservation NGOs be funded to audit their reserves to identify those external influences negatively impacting sites. This will enable the identification of strategic actions and policies that would help to enhance management effectiveness. PAWG will seek to report on these in our next assessment.

Future assessments

PAWG intends to update annually these Statements of Compliance assessments, reflecting anticipated changes in policy and practice in relation to the designation types assessed, and we have invited comments on our assessments and the submission of data and evidence to inform subsequent revisions.

Limitation of resources means that this review has not yet been extended to UK Overseas Territories and Crown Dependencies, but initial work is planned in 2024 with some territories.

This assessment and its 2014 predecessor have considerably advanced the understanding of protected areas and OECMs in the UK. We strongly recommend such a process elsewhere, whether nationally or at other scales, not least to identify future strategic needs such as, for example, focused adaptive management and monitoring.

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SUPPLEMENTARY ONLINE MATERIAL

1. Supplementary Tables 1–3

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ENDNOTES

[1] IUCN define 'long-term' as "Protected areas should be managed in perpetuity and not as a short-term or temporary management strategy" (Dudley 2008).

[2] The assessment is aiming to establish whether site designation types that have historically been considered to be protected areas across the UK should still be considered as such, based on accepted international definitions (CBD and IUCN). Therefore, some site designation types formerly recognised and reported as protected areas may now be more correctly considered as OECMs, either in their totality, or in part. This could be true at the site designation type level, or on a case-by-case basis of individual sites within a site designation type.

[3] Including Marine Conservation Zones in England, Northern Ireland and Wales; Nature Conservation Marine Protected Areas in Scotland; and Highly Protected Marine Areas which can apply in all four countries.

[4] Marine Conservation Zones in England, Northern Ireland and Wales, Nature Conservation Marine Protected Areas in Scotland and Highly Protected Marine Areas in England.

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Many National Trust properties have significant biodiversity values, including through habitat restoration and management, such as the recreation of the medieval orchard set in hay meadows at Lyvden New Bield, Northamptonshire, England © D.A. Stroud

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RESUMEN

El Grupo de Trabajo de Áreas Protegidas del Comité Nacional de la UICN para el Reino Unido evaluó 23 tipos de designación de tierras y mares para la conservación de la biodiversidad en relación con las definiciones de la UICN de "área protegida" y "otras medidas eficaces de conservación basadas en áreas". Esta evaluación reemplaza las Declaraciones de Cumplimiento publicadas en 2014, reasignando varias categorías sobre la base de nueva información y comprensión, y proporciona orientación a los gobiernos del Reino Unido y descentralizados, y sus agencias, sobre qué tipos de sitios deben incorporarse dentro del total de la Meta 3 del Marco Global de Biodiversidad. Es necesario invertir urgentemente en la mejora de la eficacia de la gestión de todos los sitios considerados para garantizar que todos ellos puedan contribuir eficazmente a la consecución de la meta 30x30 del Reino Unido.

RÉSUMÉ

Le groupe de travail sur les zones protégées du Comité national de l'UICN pour le Royaume-Uni a évalué 23 types de désignation de terres et de mers pour la conservation de la biodiversité par rapport aux définitions de l'UICN de " zone protégée " et " d'autres mesures de conservation efficaces basées sur les zones ". Cette évaluation remplace les déclarations de conformité publiées en 2014, en réassignant plusieurs catégories sur la base de nouvelles informations et d'une meilleure compréhension, et fournit des orientations aux gouvernements britanniques et décentralisés, ainsi qu'à leurs agences, sur les types de sites qui devraient être incorporés dans le total de l'objectif 3 du cadre mondial pour la biodiversité. Il est urgent d'investir dans l'amélioration de l'efficacité de la gestion de tous les sites considérés afin qu'ils puissent tous contribuer efficacement à la réalisation de l'objectif 30x30 du Royaume-Uni.

NUDGING TO GLORY: THE WORLD HERITAGE CONVENTION'S INFLUENCE IN CONFLICT-PRONE GLOBAL SOUTH NATURAL SITES

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ABSTRACT

The paper explores the role of the UNESCO World Heritage Convention in safeguarding natural and cultural heritage, with a specific focus on sites facing armed conflict. The Convention acts as a global mechanism for the protection and conservation of sites with Outstanding Universal Value. The study investigates the use of 'soft power' and 'nudging' strategies by the World Heritage Committee to facilitate the restoration of World Heritage Sites facing threats, particularly in the Global South. The analysis is based on the examination of 32 natural sites inscribed on the List of World Heritage in Danger since 1984, nine of which are in the Global South and faced with armed conflict. Case studies illustrate how armed conflicts impact biodiversity and the steps taken to recover these sites. The study emphasises the soft power of the World Heritage Convention, backed by diplomatic ties and financial aid, as instrumental in achieving restoration. Nudging is observed in the strategic alignment of choices to encourage conservation efforts. The findings suggest that the World Heritage Committee's influence extends beyond conservation, contributing to regional development, especially in the Global South. However, challenges persist, and the paper calls for a continuous evolution of the World Heritage Convention's role in addressing conflicts, development, and climate change to ensure effective global heritage conservation.

Key words: Natural World Heritage, armed conflict, nudge, soft power, diplomacy, Global South

INTRODUCTION

The establishment of the World Heritage Convention (the Convention) emerged from extensive dialogues dating back to the 1920s, centring around the concept of 'common heritage' and the need for international collaborative institutions to safeguard it (Cameron & Rossler, 2016). After comprehensive discussions, a collective statement was ultimately formulated, and on 16 November 1972, during UNESCO's General Conference, the Convention was adopted. The Convention came into effect in 1975, coinciding with ratification by the initial 20 countries. The process of selecting and nominating cultural and natural heritage sites for inclusion on the World Heritage List serves as a means of global recognition, financial assistance, and management support from the global community. This involvement includes contributions from UNESCO's official advisory bodies, namely the International Council on Monuments and Sites (ICOMOS) and the International Union for Conservation of Nature (IUCN), in conjunction with the World Heritage Committee (Bertacchini et al., 2016). Over the extensive history of the Convention and its evolving implementation, the decision-making process has advanced, incorporating more countries and adapting to shifts in global politics (Bertacchini et al., 2016; Blake & Payton, 2014). The World Heritage Committee, responsible for implementing the Convention, can influence certain States Parties, encouraging heightened monitoring and additional efforts in managing their World Heritage Sites (WHSs). This influence embodies the principles of 'nudge' or 'soft power' (Flues et al., 2010), with nudging defined as any aspect of the choice architecture that predictably alters people's behaviour without prohibiting options or significantly changing economic incentives (Thaler & Sustein, 2008).

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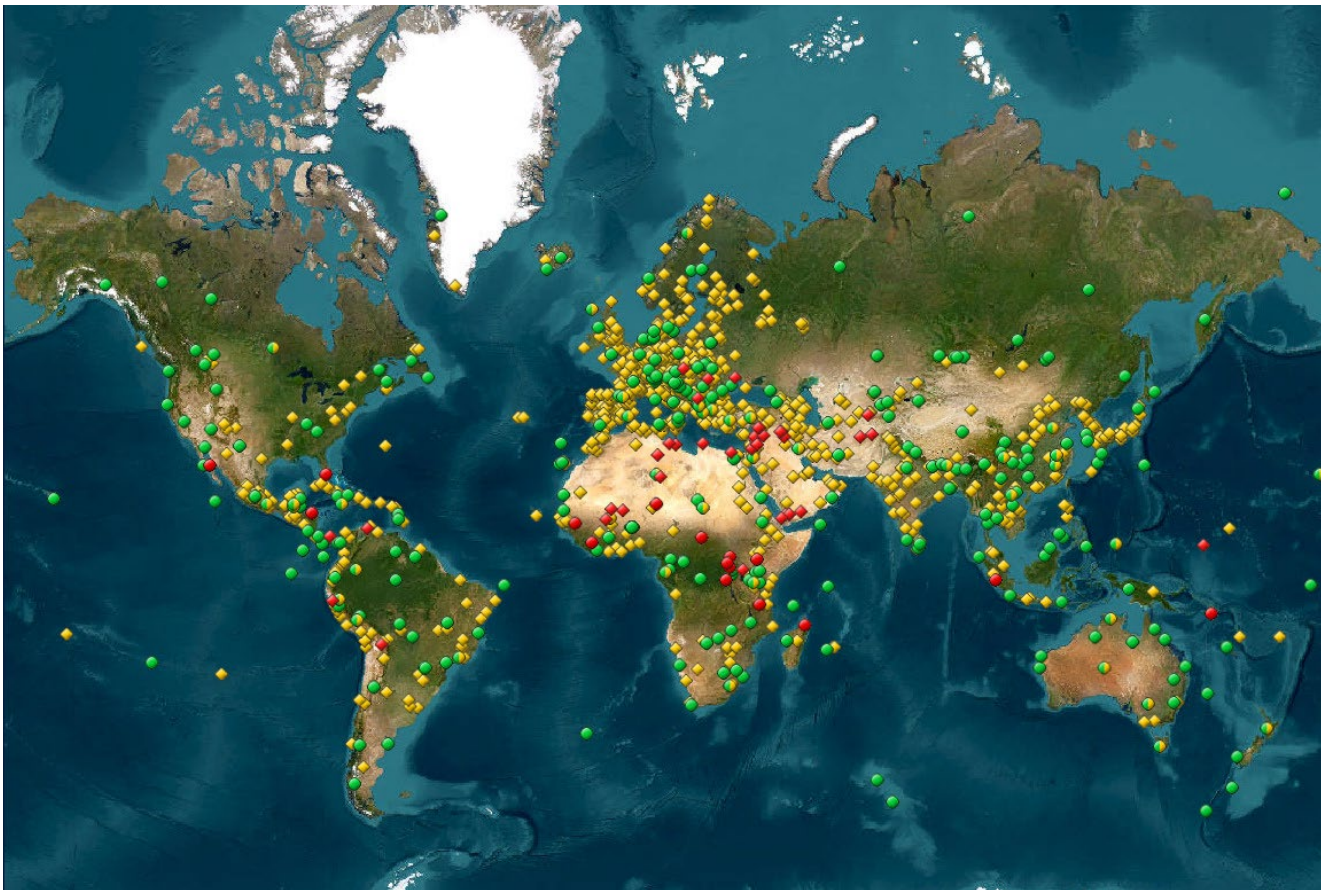


Figure 1. Map of UNESCO Natural World Heritage Sites with sites on the List of World Heritage in Danger shown in red (Source: https://whc.unesco.org/en/interactive-map/ May 2024).

The concept of nudge theory, as introduced by Thaler and Sunstein (2008), theorises that positive reinforcement and subtle recommendations can guide individuals towards improved decision-making without resorting to coercion. This approach shapes decision processes by strategically adjusting the presentation of choices to align them with individuals' best interests. Key principles encompass defaults, social norms, feedback, incentives, timing, simplicity and education. Deployed in public policy, healthcare, finance and environmental conservation, nudge theory emphasises ethical considerations and the importance of respecting individual autonomy in its implementation (Brick et al., 2023; Velez & Moros, 2021). Notably, for an intervention to be considered a mere nudge, it must be simple and inexpensive to ignore, rather than a mandate (Thaler & Sunstein, 2008). This sort of 'soft power', as defined by Nye (2019), refers to the capacity to shape and influence the behaviours or decisions of others to achieve desired outcomes, all without resorting to force or financial incentives. It involves the strategic deployment of cultural, political and diplomatic tools to build relationships, foster cooperation, and sway opinions on a global scale.

World Heritage Site in Danger due to armed conflict

World Heritage properties (see Figure 1), once inscribed, are subject to periodic monitoring and evaluation. When facing damage or loss of its Outstanding Universal Value (OUV), a WHS may be inscribed under the List of World Heritage in Danger (UNESCO, 1972). The site under threat can be proposed to be inscribed on the List of World Heritage in Danger by the State Party itself to seek international attention or can be nominated by the Advisory Bodies, in concurrence with the World Heritage Centre (WHC) (Holleland et al., 2019). Following such an inscription, the State Party is expected to comply with a strategic recovery programme, as advised by the WHC, and undergo a Reactive Monitoring Mission (UNESCO WHC, 2021), abide by a regular reporting mechanism (undertaken by the respective State Party) on the actions for conservation for submission to the WHC, and seek assistance from the World Heritage Fund (WHF) and other international groups to help reinstate the site on the World Heritage List. The WHF is a trust that was set up by the Convention with contributions from the States Parties and other organisations to direct international aid towards properties in need of special protection

initiatives, in addition to the national strategy, to achieve conservation of the site's OUV (UNESCO WHC, 2021). The WHC also mobilises 'extra-budgetary funds' from international donors to the target property in need of conservation intervention, as well as technical support (UNESCO WHC, 2021). The World Heritage Committee (the Committee) is constituted of 21 member states and keeps reconstituting with different members every 4–6 years. The Committee enjoys high political and economic status, which helps in extending necessary support to the WHSs.

It has been observed that the WHC helps in achieving more regional development in the Global South (countries with lower income and substantial natural wealth – Levander & Mignolo, 2011; Odeh, 2010) than in the Global North (Conradin et al., 2015). Moreover, many Global South countries are beset with armed conflict, requiring special conservation strategies. Armed conflict causes long-term changes to biodiversity through direct and indirect impacts, including disruption of administrative activities, displacement of people, destruction of forest infrastructure, disruption of the food supply, poaching, and arms trafficking, respectively (Gaynor et al., 2016); examples abound in Africa and Asia (Fox & Swamy, 2008; Gettleman, 2012; Humphreys & Smith, 2011). In exploring conservation intervention, we sought to understand the Convention's role and the collaborative use of 'soft power' and 'nudging' strategies applied to WHSs in the List of World Heritage in Danger, due to armed conflict in the Global South. The objective was to understand how these approaches contribute to conservation efforts in this region.

METHODS

We obtained data on WHSs on the List of World Heritage in Danger, located in the Global South and threatened with armed conflict, from unesco.org, worldheritage.org and Google Scholar. We tabulated details for all WHSs on the List of World Heritage in Danger to analyse the key reasons for their inclusion on the List of World Heritage in Danger, their socio-economic and geopolitical classification (Global South or Global North), and the support received from the international community for corrective measures to restore their World Heritage status. Following this, we compared the total financial support received by WHSs in the List of World Heritage in Danger in the Global South using a graphical representation. Subsequently, we selectively focused on case studies of sites in the Global South that had faced armed conflict and had successfully restored their World Heritage status after being declared 'in Danger'. We then examined the various nuances and mechanisms within the WHC system that facilitated the removal of threats to OUV of these sites.

RESULTS

The first three natural WHSs to be listed on the List of World Heritage in Danger were Djoudj National Bird Sanctuary (Senegal), Garamba National Park (Democratic Republic of Congo), and Ngorongoro Conservation Area (United Republic of Tanzania) in 1984. Up until 2023, a total of 32 natural WHSs were inscribed on the List of World Heritage in Danger, out of which 27 sites are in countries in the Global South (https://whc.unesco.org/en/list/stat/#s7). From our analysis, we found that using the impetus from the Convention and other actors, 13 properties successfully restored their values and were removed from the World Heritage in Danger List (Table 1). Out of the 13, nine sites faced armed conflict as one of the key reasons for their 'in Danger' status (Figure 2). Of the nine, four WHSs, Comoé National Park (Côte d'Ivoire), Manas Wildlife Sanctuary (India), Rwenzori Mountains National Park (Uganda) and Salonga National Park (Democratic Republic of Congo), tackled armed conflict among other causes and had successfully restored their WHS status. Meskell et al. (2015) observed that during the restoration process of WHSs on the List of World Heritage in Danger, States Parties received support from the Committee members, particularly those with favourable bilateral relations. This implies that diplomatic ties and relationships between countries played a role in garnering assistance for the restoration efforts. Furthermore, the analysis based on the amount of financial support obtained by the nine endangered sites shows that no such sites were restored to the World Heritage List with financial support alone. This could mean that the Committee exercised its soft power, through dialogue and diplomacy, to nudge target sites to reach and sustain their global stature. Powerful organisations like the Rapid Response Facility (RRF), International Rhino Foundation (IRF), United Nations Foundation (UNF), America India Foundation (AIF), Suri Saigal Foundation (SSF), Ford Foundation, and Governments of Italy, Belgium and Norway, etc. collaborated with the Committee to provide their technical and political support in their endeavour to conserve vulnerable sites.

The role of political and economic factors of the WHC instrument in implementing the conservation strategy of each site on the Danger List is noteworthy. The case of each of the four selected sites is described below. For details on the processes applied within each site, please refer to the Supplementary Online Material.

Table 1. Details of WHSs of the Global South inscribed on the Danger List (https://whc.unesco.org/en/danger/)

Name of site and year of inscription	Country, area and OUV criteria	Year of site in Danger List	Key reasons	Financial assistance by UNESCO WHC	Nudge by UNESCO WHC and support from other agencies	UNESCO extra-budgetary funds until 2021
Belize Barrier Reef, 1996	Belize, 96,300 ha, (vii), (ix), (x)	1996 – 2018	Sale and lease of public lands for development within the property leading to the destruction of mangrove and marine ecosystems	0	RRF	US$140,000
Comoé National Park, 1983	Côte d'Ivoire, 1,150,000 ha, (ix), (x)	2003 – 2017	Political and military crisis, poaching of wildlife and fires, overgrazing, absence of effective management mechanism	US$97,000 under 3 projects	UNESCO MAB, RRF	US$50,000
Djoudj National Bird Sanctuary, 1981	Senegal, 16,000 ha, (vii), (x)	1984 – 1988 2000 – 2006	Construction of downstream dams, proliferation of invasive plant species, decrease and/or disappearance of bird colonies	US$229,607 under 6 projects	Govt of Norway	0
Galapagos Islands, 1978	Ecuador, 14,066,514 ha, (vii), (viii), (ix), (x)	2007 – 2010	Governance, human resources, identity, social cohesion, changes in local population and community, illegal activities, impacts of tourism/visitor/recreation, management activities, educational reform not implemented	US$567,850 under 25 projects	Trust Fund	US$3.5 million
Ichkeul National Park, 1980	Tunisia, 12,600 ha, (x)	1996 – 2006	Air pollution, livestock farming, subsistence hunting, scarcity of water	US$140,000 under 4 projects	None	0
Iguaçu National Park, 1986	Brazil, 169,695.88 ha, (vii), (x)	1999 – 2001	Ground transport infrastructure, impacts of tourism, input of excess energy, unsuccessful management system	0	Brazilian World Heritage Biodiversity Program	0
Los Katios National Park, 1994	Colombia, 72,000 ha, (ix), (x)	2009 – 2015	Illegal logging, settlements, fishing and hunting, major infrastructure projects	US$73,000 under 2 projects	None	0
Manas Wildlife Sanctuary, 1985	India, 39,100 ha, (vii), (ix), (x)	1992 – 2011	Civil unrest, poaching	US$165,000 under 2 projects	IRF; UNF; AIF and the SSF; Ford Foundation	
Ngorongoro Conservation Area, 1979	United Republic of Tanzania, 809,440 ha, (iv), (vii), (viii), (ix), (x)	1984 – 1989	Management systems/ management plan	US$158,850 under 10 projects	Switzerland, Netherlands, UNDAP and United Republic of Tanzania; Flanders Funds-in-Trust	0

Table 1 continued . Details of WHSs of the Global South inscribed on the Danger List (https://whc.unesco.org/en/danger/)

Name of site and year of inscription	Country, area and OUV criteria	Year of site in Danger List	Key reasons	Financial assistance by UNESCO WHC	Nudge by UNESCO WHC and support from other agencies	UNESCO extra-budgetary funds until 2021
Rwenzori Mountains National Park, 1994	Uganda, 99,600 ha, (vii), (x)	1999 – 2004	Civil unrest	US$96,749 under 3 projects	None	0
Salonga National Park, 1984	Democratic Republic of the Congo, 3,600,000 ha, (vii), (x)	1999 – 2021	Impact due to conflict, poaching and illegal encroachment	US$149,900 under 9 projects	UNF, Govts of Italy and Belgium; Govt of Norway	US$320,000, US$250,000
Sangay National Park, 1983	Ecuador, 271,925 ha, (vii), (viii), (ix), (x)	1992 – 2005	Construction of the Guamote–Macas road, grazing and illegal hunting	US$58,500 under 2 projects	WWF	0
Simien National Park, 1978	Ethiopia, 13,600 ha, (vii), (x)	1996 – 2017	Major declines of the Walia Ibex and Ethiopian Wolf populations, agricultural encroachment at the borders of the property, road construction through the property	US$323,171 under 10 projects	Global Environment Fund, UNESCO-Spain-Funds-in Trust and UNESCO-Netherlands-Funds-in-Trust	US$100,000

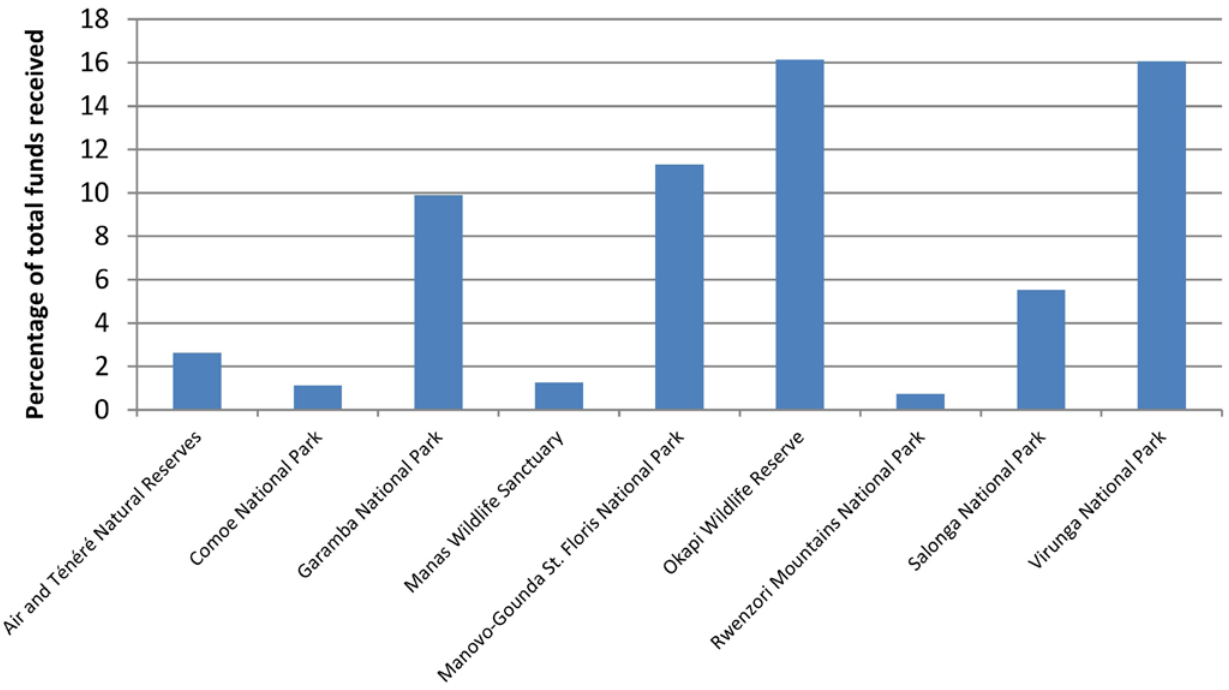
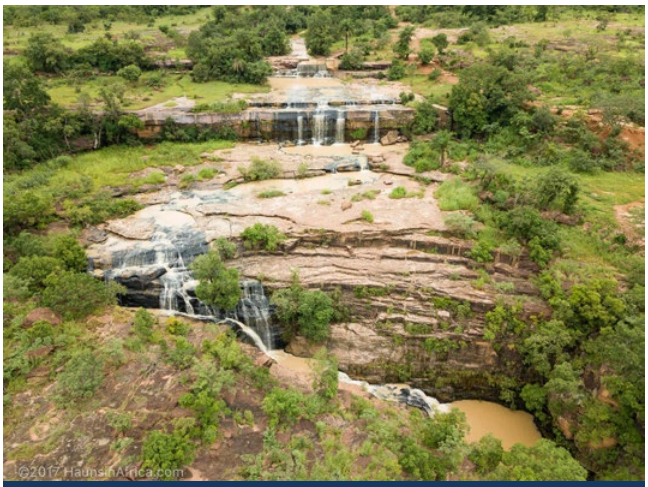


Figure 2. Chart showing the proportion of financial support received by WHSs on the List of World Heritage in Danger, facing armed conflict.



Cascades on the Comoe River © 2017HaunsinAfrica.com


Manas River with Bhutan at the backdrop © 2012 Pallabi Chakraborty

Comoé National Park

Comoé National Park (NP) in Côte d'Ivoire became a UNESCO WHS in 1983 for its diverse flora and fauna, including 620 plant species, 135 mammal species, 35 amphibians and 500 birds. However, it faced severe poaching in the 1980s and 1990s, leading to the suspected extinction of several species (Fisher, 2004). The 2002 rebellion worsened conditions, prompting its placement on the List of World Heritage in Danger (https://whc.unesco.org/en/list/227/; UNESCO, 2021a). Initiatives by the administration, aided by international support (including IUCN's advice on wildlife monitoring, financial support from the WHF and others) (https://whc.unesco.org/en/list/227/documents/; whc.unesco.org/en/sessions/37COM/), led to improved management, closure of nearby gold mines and restoration efforts (https://whc.unesco.org/en/soc/1097; https://whc.unesco.org/en/soc/3503). By 2017, the park regained its OUV and UNESCO World Heritage status after fulfilling corrective measures.

Manas Wildlife Sanctuary

Manas Wildlife Sanctuary, part of the larger Manas National Park and Tiger Reserve in Assam, India, was designated a UNESCO WHS in 1985 for its diverse flora and fauna, including endemic species like the Pygmy Hog and Golden Langur. It suffered during the 1989–2003 Bodo uprising, leading to resource depletion and loss of life. Following its declaration on the List of World Heritage in Danger in 1992 due to neglect and financial losses, restoration efforts began in 2003 with collaborations between local authorities, NGOs and international organisations (UNESCO, 2021b; https://whc.unesco.org/archive/repcom92.htm#manas). Conservation programmes, rhino re-introduction, infrastructure rebuilding and monitoring led to its reinstatement to the World Heritage List in 2011, recognising its regained OUV (https://whc.unesco.org/en/decisions/5426; https://whc.unesco.org/en/soc/1107; Bonal et al., 2009; https://whc.unesco.org/en/decisions/4347).

Rwenzori Mountains National Park

Rwenzori Mountains NP, Uganda, a UNESCO WHS since 1994, boasts glaciers, waterfalls and unique alpine flora and fauna (https://whc.unesco.org/en/list/684/). Threatened by social unrest in 1996–2000, it suffered from rebel activity, causing casualties and disrupting the socio-economic fabric. In response, it was inscribed on the List of World Heritage in Danger in 1999 (Titeca & Vlassenroot, 2012; UNESCO, 2021c). Efforts by the Uganda Police Department Force and Uganda Wildlife Authority led to stability, reopening the park for tourism in 2001 (https://whc.unesco.org/en/soc/2476). Collaborations with local communities and international support improved management and protection (Rossler, 2018). By 2004, successful strategies, including increased tourism revenue and grants, facilitated its removal from the Danger List, ensuring its conservation and reinstatement to the World Heritage List (Wang et al., 2015; https://whc.unesco.org/en/soc/1369).

Salonga National Park

Salonga National Park in the Democratic Republic of Congo, a UNESCO WHS since 1984, preserves Bonobos, Elephants and the Congo Peafowl in the world's second-largest tropical rainforest (UNESCO, 2021d). Civil unrest from the early 1990s led to poaching, deforestation and encroachment, prompting its inscription on the List of World Heritage in Danger in 1999 (Debonnet & Hillman-Smith, 2004; https://whc.unesco.org/en/decisions/5705). Urgent measures included community education, infrastructure improvement and sustainable tourism. Funding from the United Nations Foundation

Aesthetics of Rwenzori Mountains National Park © achieveglobalsafaris.com

Tropical rainforest of Salonga National Park © Karine Aigner-WWF US

supported biodiversity conservation amidst armed conflict (https://whc.unesco.org/en/decisions/5705). Monitoring missions noted progress and international assistance aided restoration efforts (https://whc.unesco.org/en/soc/4048). Co-management with WWF-DRC restricted oil concessions and bolstered conservation. Reinstated on the World Heritage List in 2020, Salonga NP strives for continued support, anti-poaching measures, and ecological connectivity (https://whc.unesco.org/en/decisions/7706).

DISCUSSION

Inscription of a site on the List of World Heritage in Danger entails a strategy of preparing and adopting remedial measures and regular monitoring to restore the site values, and resultant reinstating on the World Heritage List. When a site is listed as in the List of World Heritage in Danger, it signifies that the site faces significant threats, jeopardising its OUV and integrity. This designation acts as a mechanism to attract global attention to the issues confronting the site, necessitating collaborative efforts to address and mitigate these challenges. The process involves identifying threats, conducting Reactive Monitoring Missions to assess on-ground situations, developing corrective measures, and submitting regular progress reports to the WHC. International support, including technical assistance and financial aid, may be provided to sites on the List of World Heritage in Danger. If the State Party successfully addresses threats and demonstrates progress, the WHS may be removed from the List of World Heritage in Danger. However, persistent challenges and ineffective measures may lead to potential delisting, which is undesirable for any State Party. In essence, inclusion on the List of World Heritage in Danger prompts global cooperation to preserve a site's OUV and remove it from the endangered properties list (UNESCO WHC, 2021). An example of this is the delisting of the natural WHS Arabian Oryx Sanctuary (Oman) (under criterion x) in 2007 (Labadi, 2022). There are differing perceptions of sites on the List of World Heritage in Danger, which include drawing international attention to the problems and seeking expert assistance, considering the tag as a dishonour for the State(s) Party(ies), and encouraging

Asiatic Elephants in Assam © Rabindra Sharma

proactive conservation measures (Holleland et al., 2019). In following the recommendations on corrective strategy to bring back World Heritage properties to their former glory, the States Parties choose to act on a 'nudge' from the international community. Nudging has been acknowledged as a successful strategy to bring together aim and action in facilitating behavioural change (Momsen & Stoerk, 2014). When applying a nudging intervention, it is important to consider the characteristics of the particular group as well as the current environmental setting to achieve the best results (Wee et al., 2021). The foundation of a country's soft power is its culture, values and policies. Soft power by itself is rarely sufficient, but when combined with threats of coercion, inducements or incentives, or attractiveness or persuasion, it can be a powerful force amplifier (Carlsson et al., 2019). The ongoing struggle against transnational terrorism poses a challenge that cannot be overcome solely through excessive reliance on raw power. Understanding the roles of credibility, self-criticism and civil society in creating soft power is necessary for smart public diplomacy (Nye, 2019). The study observed that the WHC helped secure these threatened sites using 14 monitoring missions, constant media coverage, diplomatic channels and financial assistance. The WHC has played an important role in assisting site protection measures, as well as institutional capacity building, during disputes and in post-conflict situations (Labadi, 2007). During the year of their restoration on the World Heritage List, the States Parties either had direct representation on the World Heritage Committee or enjoyed support from countries represented on the Committee (https://whc.unesco.org).

Among the many significant challenges that impact our natural heritage, war and aggression between people are more serious and difficult to deal with, among the potential dangers listed by the WHC. The relationship between wars and biodiversity is a complex one, each pathway acting in combination with one or more tactics to influence the environment. War and civil unrest are the most frequent causes of the inscription of sites on the WHSs in the List of World Heritage in Danger (Holleland et al., 2019). According to Douglas and Alie (2014), three main mechanisms link 'high-value' natural resources and social conflicts: (a) resource capture, (b) grievance-based conflict, and (c) the undermining of economic performance and environmental governance. Poachers, insurgent groups and state military personnel kill or rob wildlife resources on a large scale, terrorise, capture and murder park workers, and gain control of forests (Revkin, 2012; UN, 2013; Wyler & Sheikh, 2008). Among the 32 natural sites listed as in the List of World Heritage in Danger since 1984, nine sites, belonging to Global South countries were faced with social unrest (Table 1).

Sites like Garamba NP, Okapi Wildlife Reserve, Virunga NP (DRC), and Manovo-Gounda St. Floris NP (Central Republic of Africa) were, and continue to be, inscribed on the List of World Heritage in Danger as a result of threats posed by armed conflict (Labadi, 2007). Although these

sites were extended similar assistance using the soft power of the WHC, the state of stability and achievement of protection work is still in progress. Garamba was included on the List of World Heritage in Danger from 1984 to 1992, and then was listed again in 1996 and is still on the List. It is interesting to note that Salonga NP and Rwenzori NP suffered from social unrest and were placed on and removed from the List of World Heritage in Danger, despite being located in the same region as the above-mentioned sites. Curiously, the State Party took steps to strengthen collaboration between the management staff, local people and government and army to better manage conflicts over its natural capital at Salonga, however, it could not finalise the proposal for the "desired state of conservation for the property's removal" (DSCOR) from the List of World Heritage in Danger, nor formalise transboundary cooperation between the Congolese Institute for Nature Conservation (ICCN) and the State Service responsible for South Sudan Wildlife (SSWLS) for an augmented protection strategy for the site (https://whc.unesco.org/en/soc/4023/).

Cameron and Rossler (2016) observed that while the World Heritage List grew quickly and irregularly in the first two decades, by the year 2000, the Asia Pacific and Arab and African regions had only 19 and 8 percent representation, respectively. It is also interesting to note that most of the sites inscribed during those early years did not have detailed nomination dossiers or maps (https://whc.unesco.org/archive/repcom80.htm#136) and also lacked site management plans. Although for States Parties being on the Committee makes them very influential (Meskell et al., 2015), the concordance rates between the recommendations of the Advisory Bodies and the WHC's final decisions on nominations and inscriptions of World Heritage properties have decreased. Multi-polarity and fragmentation in the international heritage sphere are caused by conflict, development and climate change (Meskell et al., 2015). Therefore, the WHC's role as an organisational learning hub for global conservation policies calls for greater scope for expansion, for which future efforts need to be suitably aimed (Labadi, 2007).

CONCLUSION

The Convention employs a nudging strategy, characterised by soft power mechanisms, to facilitate the restoration of WHSs facing armed conflict and subsequent placement on the List of World Heritage in Danger. The Convention embodies the principles of nudging, utilising positive reinforcement and subtle recommendations to guide States Parties towards improved decision-making without coercion. This study explores how the Convention's nudging strategy has contributed to the successful restoration of four WHSs – Comoé NP, Manas WLS, Rwenzori Mountains NP and Salonga NP – affected by armed conflict in the Global South.

Through an analysis of case studies and financial support data, it is evident that the Convention, acting as a soft power influencer, engages in diplomatic and collaborative efforts to support the conservation of the OUV of WHSs. The collaborative efforts include partnerships with international organisations, governments and NGOs, showcasing the Convention's ability to build relationships, foster cooperation and influence decisions without resorting to force or political sanctions.

In particular, the four case studies illustrate the multifaceted approach employed by the Convention to address the complex challenges posed by armed conflict. The Convention leverages its influence, economic status and diplomatic channels to nudge States Parties towards implementing corrective measures and conservation efforts. The successful restoration of these sites highlights the importance of the Convention's role in mobilising support, both technical and financial, from various stakeholders to safeguard the OUV of WHSs.

As the study concludes, the Convention's commitment to ethical considerations, respect for autonomy and collaborative approaches position it as a key player in the global conservation arena. Future efforts should focus on expanding the Convention's role as an organisational learning hub, addressing challenges such as multi-polarity, fragmentation and the need for detailed management plans for WHSs. Overall, the Convention's nudging strategy, intertwined with soft power, emerges as a vital tool in the conservation of natural heritage.

SUPPLEMENTARY ONLINE MATERIAL

Detailed case studies

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RESUMEN

Este artículo analiza el papel de la Convención del Patrimonio Mundial de la UNESCO en la salvaguardia del patrimonio natural y cultural, con especial atención a los sitios que se enfrentan a conflictos armados. La Convención actúa como mecanismo mundial para la protección y conservación de sitios con Valor Universal Excepcional. El estudio investiga el uso de estrategias de "poder blando" y "empuje" por parte del Comité del Patrimonio Mundial para facilitar la restauración de sitios del Patrimonio Mundial amenazados, especialmente en el Sur Global. El análisis se basa en el examen de 32 sitios naturales inscritos en la Lista del Patrimonio Mundial en Peligro desde 1984, nueve de los cuales se encuentran en el Sur Global y se enfrentan a conflictos armados. Los estudios de caso ilustran el impacto de los conflictos armados en la biodiversidad y las medidas adoptadas para recuperar estos sitios. El estudio hace hincapié en el poder blando de la Convención del Patrimonio Mundial, respaldado por lazos diplomáticos y ayuda financiera, como instrumento para lograr la restauración. Se observa un "nudging" en la alineación estratégica de las opciones para fomentar los esfuerzos de conservación. Los resultados sugieren que la influencia del Comité del Patrimonio Mundial se extiende más allá de la conservación, contribuyendo al desarrollo regional, especialmente en el Sur Global. Sin embargo, los retos persisten y el documento aboga por una evolución continua del papel de la Convención del Patrimonio Mundial a la hora de abordar los conflictos, el desarrollo y el cambio climático para garantizar una conservación eficaz del patrimonio mundial.

RÉSUMÉ

Ce document explore le rôle de la Convention du patrimoine mondial de l'UNESCO dans la sauvegarde du patrimoine naturel et culturel, en mettant l'accent sur les sites confrontés à des conflits armés. La Convention agit comme un mécanisme mondial pour la protection et la conservation des sites ayant une valeur universelle exceptionnelle. L'étude examine l'utilisation de stratégies de "soft power" et de "nudging" par le Comité du patrimoine mondial pour faciliter la restauration des sites du patrimoine mondial confrontés à des menaces, en particulier dans les pays du Sud. L'analyse est basée sur l'examen de 32 sites naturels inscrits sur la Liste du patrimoine mondial en péril depuis 1984, dont neuf se trouvent dans le Sud et sont confrontés à des conflits armés. Des études de cas illustrent l'impact des conflits armés sur la biodiversité et les mesures prises pour restaurer ces sites. L'étude met l'accent sur le pouvoir d'attraction de la Convention du patrimoine mondial, soutenu par des liens diplomatiques et une aide financière, qui a joué un rôle déterminant dans la restauration des sites. L'alignement stratégique des choix en vue d'encourager les efforts de conservation est un facteur d'incitation. Les résultats suggèrent que l'influence du Comité du patrimoine mondial s'étend au-delà de la conservation, contribuant au développement régional, en particulier dans les pays du Sud. Cependant, des défis persistent et le document appelle à une évolution continue du rôle de la Convention du patrimoine mondial dans le traitement des conflits, du développement et du changement climatique afin de garantir une conservation efficace du patrimoine mondial.

A CRISIS OF MORAL ECOLOGY: MAGAR AGRO-PASTORALISM IN DHORPATAN HUNTING RESERVE, NEPAL

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ABSTRACT

Prior political ecology studies have explored the vulnerability of pastoralism and conflicts between protected areas and pastoralist livelihoods. Some conservation regimes regard Indigenous pastoralists' institutions, knowledge, self-governance and self-determination as incompatible with contemporary conservation on the grounds that the associated practices are unsustainable. Based on critical ethnography, this paper examines the moral ecology of Indigenous Magar agro-pastoralism in the Dhorpatan Hunting Reserve of mid-western Nepal. Traditional Magar management is in crisis due to reserve policies and practices. From a political ecology perspective, I show that the traditional moral ecology of agro-pastoralism sustains complex relationships with the rangelands. Traditional institutions uphold a moral ecology that is deeply rooted in spiritual practices and fosters a sense of responsibility for the preservation of biodiversity and nature. Current conservation policies inadequately recognise these Indigenous moral principles and weaken harmonious socio-ecological relations. In order to manage protected areas sustainably in high-altitude regions, it is crucial to manage agro-pastoralism within the framework of traditional moral ecology through Indigenous peoples' self-governance and self-determination.

Key words: Self-determination, traditional institutions, pastoralism, livelihoods, spirituality

INTRODUCTION

Globally, transhumance pastoralism in agro-pastoral zones in high altitude lands has become vulnerable due to the pressure of climate change and the growth of protected areas (PAs) (Yılmaz et al., 2019). Conflicts between pastoralists and PA authorities in relation to lands and resources are widespread (Toutain et al., 2004). In part as a response to social justice and human rights concerns, policies and practices have shifted from a protectionist model of conservation (1950–1980) to a participatory approach (1980–2000), with the institution of multipurpose buffer zones and a wider landscape approach (in the 2000s), improving recognition of the socio-economic needs of Indigenous peoples and local communities (Aryal et al., 2020). However, the shift from area-oriented PA conservation to community-based conservation for the purpose of reducing conflict and community development has not always been successfully implemented (Du et al., 2015). In some regions, community-based approaches have actually reinforced 'fortress' conservation, thereby weakening the link between conservation and Indigenous peoples' (IPs) traditional practices (Haller & Galvin, 2011). The IUCN and the parties to the Convention on Biological Diversity have long been advocating for Indigenous Peoples and Community Conserved Territories and Areas (ICCAs) for the global conservation of biodiversity, thereby recognising pre-existing Indigenous knowledge, self-governance, institutions and self-determination (Dudley, 2008). Despite such efforts, in some regions PA policies and practices continue to threaten customary livelihoods of IPs and their cosmovision, knowledge and resource management practices (Domínguez & Luoma, 2020; Toledo, 2013). Further research is needed to better understand conflicts between customary livelihoods and PA policies, with a key issue being a disjunction between traditional moral ecologies of human–nature

relationships and contemporary conservation (Griffin et al., 2019; Jacoby, 2001; Norget, 2012).

Thompson's (1971) moral economy, which holds that social and moral values are deeply ingrained in communal economic relations, is the foundation of the moral ecology concept. First introduced by Jacoby (2001), moral ecology studies seek nuanced understandings of local communities' relationships with ecosystems, which are typically founded on a homegrown environmental ethic. Moral ecology, as defined by Martínez-Reyes (2021), concerns the moral rules that result from the profound, historical and spiritual relationships between humans and non-human nature. These ethically-based rules direct and shape the behaviours of community members in their interactions with their surroundings, so fostering connection and mutual sustainability (Martínez-Reyes, 2021). Such ethics ingrained in long-standing practices of creating intricate interactions with biodiversity and ecosystems have been disregarded or criminalised by some conservation regimes (Jacoby, 2001). According to Griffin et al. (2019), the idea of moral ecology refers to a vernacular, informal and unwritten way of managing 'the commons' as a space sustainably maintained by 'the commoners' for generations. Norget (2012) regards Indigenous peoples' ethics and sacred practices as embodied moral ecologies that are deeply connected to nature, and showed how such regimes may conflict with contemporary conservation policies. In Nepal, Thing (2019) analysed how the moral ecology of the Sonaha Indigenous minority, which encompasses complex meanings and fosters the subsistence use of riverine resources, has been marginalised by conservation discourses. Such studies show that conservation policies and practices have challenged the customary moral ecologies that include Indigenous norms, values, beliefs and ethical relationships with nature.

Twenty PAs cover almost one-quarter (23.39 per cent or 34,419.75 km2) of Nepal, encompassing ancestral lands of diverse IPs from lowland Terai to high Himalayan regions (Stevens, 2013). In 1992, the fourth amendment of Nepal's *National Parks and Wildlife Conservation Act 1973* instituted 13 buffer zones, allowing livelihood activities of IPs and local communities in proximity to relevant PAs (Bhattarai et al., 2017). Buffer zones have brought significant changes in conservation and livelihoods of local people, albeit not always with positive outcomes (Bhusal, 2014). Although participatory modalities have made many promises, in some jurisdictions legal and institutional spaces are too limited to allow IPs and local people to have meaningful opportunities to influence plans and programmes (Poudel et al., 2010).

Studies of PAs and agro-pastoralism in Himalayan Nepal reveal mixed results. State-led conservation has increased the vulnerability of pastoralism, a mainstay of Indigenous peoples' livelihoods, and contributed to a decline of customary laws and practices, communal ownership, Indigenous knowledge, and institutions governing subsistence pastoral systems (Gentle & Thwaites, 2016; Tiwari et al., 2020). State policies do not adequately recognise and respect the ICCAs integral to rights-based conservation and the operationalisation of international standards such as the *United Nations Declaration on the Rights of Indigenous Peoples* and the International Labour Organization's *Indigenous and Tribal Peoples Convention*. High Himalayan protected areas marginalise Indigenous practices, despite biodiversity conservation and sustainable resource management by IPs who continue to maintain their customary ICCAs (Stevens, 2013). State legislation for the management of forests and rangelands also marginalises IPs' economic, socio-cultural and ecological practices (Gentle & Thwaites, 2016).

This paper examines a crisis for the moral ecology of agro-pastoralism among the Magar Indigenous group in Nepal residing in villages adjoining the Dhorpatan Hunting Reserve, a high mountain protected area in East Rukum. I argue that current conservation policies and practices fail to recognise and respect the long-standing Magar moral ecology for managing rangelands through agro-pastoralism, thereby compromising ethical socio-ecological relations. I analyse this issue from the perspective of political ecology, which has not been previously applied to this context. Political ecology is an appropriate frame to analyse the dynamics of power in livelihood conflicts (Adams, 2015). Among the five dominant narratives of political ecology as outlined by Robbins (2012), I particularly use 'conservation and control' as a key analytic tool to explain how the conservation regime controls resources and adversely affects local livelihoods and socio-political systems of managing resources. I analyse how current conservation plans and practices have displaced competing local discourses of resource management.

STUDY AREA

The Dhorpatan Hunting Reserve (DHR), which was established in 1983 and gazetted in 1987, is the only hunting reserve in Nepal. The goal was to encourage tourism, protect endangered wildlife and sub-alpine and high temperate vegetation, and manage Nepali and foreign sport hunting of Blue Sheep (*Pseudois nayaur*)

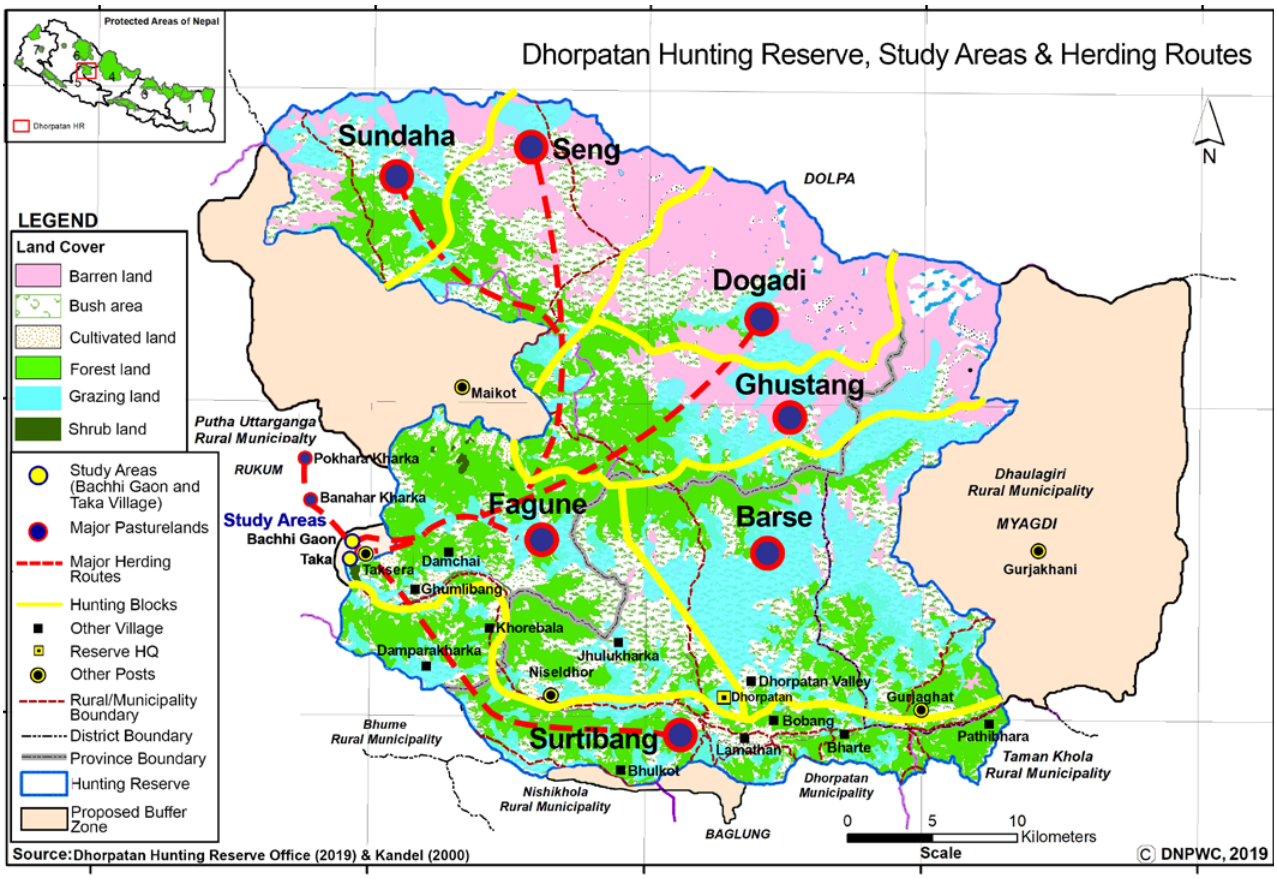

Figure 1. Dhorpatan Hunting Reserve, study areas and herding routes.

Animals grazing in the Dhorpatan Hunting Reserve highlands © Indra Mani Rai

Herds of animals in a low valley of the Dhorpatan Hunting Reserve © Indra Mani Rai

Pasturelands within Dhorpatan Hunting Reserve © Indra Mani Rai

and Himalayan Tahr (*Hemitragus jemlahicus*). The DHR covers an area of 1,325 km², occupying 60 per cent of Rukum, 26 per cent of Baglung and 14 per cent of Myagdi district in the Dhaulagiri mountain range of mid-western Nepal, with altitudes varying from 3,000 m to 7,000 m above sea level (DHRO, 2019). The core area of the reserve covers parts of Dhaulagiri Rural Municipality of Myagdi, Dhorpatan Municipality and Taman Khola and Nishikhola Rural Municipality of Baglung, and Bhume and Putha Uttarganga Rural Municipality of East Rukum districts (Figure 1). It lies in the ancestral lands of the Magar, the third largest among Nepal's 142 castes and Indigenous groups whose population of 2,013,498 comprises 6.9 per cent of the country's total (NSO, 2021).

The *Pasture Land Nationalization Act 1974* vests ownership of pasturelands with the Government of Nepal. This Act permits animal grazing subject to the annual payment of a maximum of three rupees for each large animal (yak, cow, buffalo, horse, mule), and one rupee for each small animal (sheep, goat). Under the *National Parks and Wildlife Conservation Act 1973* and the *Wildlife Reserve Rules 1977,* local people seeking to graze their animals inside the Dhorpatan Hunting Reserve require written consent from the reserve warden. The *Dhorpatan Hunting Reserve Management Plan 2019* prohibits Magar from hunting, collecting herbal plants, extracting timber for making houses and livestock sheds, and using fire to promote the establishment of alpine pasture for livestock (DHRO, 2019). And while the plan makes some allowance for customary grazing practices, the regulatory regime curtails the autonomy and self-determination of traditional Magar management. The plan also proposes a buffer zone (Figure 1), yet to be implemented, that would regulate activities in villages adjoining the reserve.

The Bachhi Gaon and Taka villages study sites (with an area of 75 km², 400 households and a population of 2,143) are located within Ward 10 of Putha Uttarganga Rural Municipality (with an area of 560 km² and a population of 18,954 in 14 wards). The villages closely adjoin the DHR. The villages are located in East Rukum, which covers 60 per cent of the reserve and includes four of the reserve's seven hunting blocks. The settlements are believed to be the Magars' oldest, having been homelands for many generations in which their long-standing agro-pastoralism, cultural and religious practices are maintained.

For over a decade, Magars have been speaking out against Indigenous human rights violations. In 2012, Magar activists created the Dhorpatan Hunting Reserve Affected Peoples' Struggle Committee (DHRAPSC). DHRAPSC has actively participated in protests, strikes, petitions, public education, and lobbying of relevant authorities. International human rights standards, in particular the *United Nations Declaration on the Rights of Indigenous Peoples* and the International Labour Organization *Indigenous and Tribal Peoples Convention*, to which the Government of Nepal is a party, have served as guidance for the concerns they raise. The UN human rights discourse has shaped Magar strategies, advocacy activities and conduct. The proposed buffer zone, which is home to over 24,000 people, has been the focus of their most recent activities. The Magar community were not consulted about the proposal, nor included in any of the processes involved in formulating reserve plans, policies and programmes. The DHRAPSC chairperson has pointed out that only a small number of local elites, political operatives and government representatives at the local level were aware of and took part in such processes. For this reason, Magar activists have been speaking out against the declaration of a buffer zone, but to date this has had little apparent influence on government agencies.

METHODS

Critical ethnography

This paper is based on data compiled for a larger critical ethnographic research project I conducted from mid-2021 to mid-2022. The aim of the project was to document and understand injustices (Madison, 2020) suffered by Magar agro-pastoralists in Bachhi Gaon and Taka villages. I purposively selected village members and conducted a series of open interviews with them (Cohen et al., 2018). Respondents included a community elder or shaman (male), four youths including two women, and two Magar activists (males) from each village. I also conducted focus group discussions with six male herders from each village. Men were my preferred dominant participants because they had more herding experience than women, who primarily engage with household chores and small-scale farming in the pasturelands. The interviews and focus groups enabled me to understand the deep-rooted moral ecology of agro-pastoralism, and their experiences of the interface with DHR. In addition, I conducted interviews with two reserve managers to understand their perspectives. All conversations took place in the Nepali language. After transcribing the data from Nepali into English, I cross-checked translations to ensure that the meanings of the original texts were preserved.

To further explore the moral ecology of the Magar, I engaged in informal observation (Cohen et al., 2018) of pasturelands, herding practices and cultural practices

associated with Magar sacred sites and plant species of spiritual significance. During the research process, I paid particular attention to obtaining participants' free, prior and informed consent; protecting their privacy and confidentiality; and respecting their right of self-determination. I used recordings, field notes, digital photos and reflective journals to record data from interviews and observation. Other information sources included documents held in the DHR office and advocacy documents collected by Magar activists.

In order to understand the crisis of the moral ecology of the Magar people, I described and analysed these data from the perspective of political ecology. The analysis comprised a qualitative classification of the transcribed data into key themes (Cohen et al., 2018), which served as a means to identify and structure the key findings reported in the next section.

RESULTS AND DISCUSSION

Magar spirituality and moral ecology

Magars' worship of rangelands is termed *Bal Puja* or *Bhumya Puja*. A key event is a traditional village assembly, *Kachahari,* which is held annually on 15 June. Their worship includes the construction of a shrine out of a flat stone upon which is placed wheat-flour bread inscribed with markings depicting local plants and animals. They also sacrifice a *Bal*, a sheep that has been separated from a flock. The Magar revere the rangelands in order to receive blessings from their departed ancestors. Their worship also seeks improved livestock and crop yields, protection of crops and cattle from wild animals, avoidance of floods and landslides, peace and harmony within the community and the prosperity of kin. A shaman offers *Nakai*, placing a tiny portion of fermented millet on a small flat stone in remembrance of the spirits of deceased community members. East Himalayan Fir (*Abies spectabilis*) are also planted for this purpose, as they believe deceased community members' spirits are eternally housed in such trees.

The *Bhumya Puja* also promotes sacred values of the lands and natural resources. In an interview, a shaman in Taka village indicated that such worship focuses on the lands and spirits (*gel*) of ancestors as well as the spirits of animals (wild boar, leopard, bear, monkey and snake) and plants such as East Himalayan Fir, Katus (*Castanopsis indica*), Bhorlo (*Bauhinia vahlii*) and Titepati (*Artemisia vulgaris*). Ritual worship of these plants is considered necessary to appease ancestral spirits. Rituals and shrines devoted to sacred beings demonstrate the reverence Magar have for the spirits of human and non-human beings. Spiritual ties with plant and animal species constitute a moral ecology through which community members are taught to coexist peacefully with flora and fauna. This moral ecology is deeply connected with sacred lands, animals, birds and plants of the alpine region. Magar sacred beliefs and worldview express a fundamental ethical interpretation of the environment in which they live (Norget, 2012). Spiritual practices and rituals are undertaken to reciprocate and maintain balance among humans, spirits of ancestors, flora and fauna, lands, and the environment as a whole.

The moral ecology of the Magar is closely linked to their spiritual practices, which are crucial to the preservation of nature and biodiversity. Offerings, prayers and acts of reverence for nature are all part of the ritual of *Bhumya Puja*. They have a profound respect, a deep regard and veneration for all living and non-living beings in the rangelands. This spiritual connection to nature fosters a strong sense of responsibility to safeguard and conserve biodiversity. For example, I observed that the *Sabapo*, a Magar sacred site inside the DHR, had been fenced by a stone wall to prevent animals from grazing significant plant species. Rather than degrading resources, they promote the regrowth of the flora and wildlife to meet future material and spiritual needs. Magar have a deep sense of accountability for the well-being of all species and ecosystems. Such moral precepts, rooted in spiritual practices which are passed down through the generations entail a strong commitment to protect biodiversity and the environment. Such a moral ecology serves to promote an effective community-based conservation regime (Torri & Herrmann, 2011).

Magar relationships with ancestral territory

The moral ecology of the Magar is attributed to their relationships and interactions with the lands they consider to be their ancestral territory. The Magars in East Rukum have a belief that they came from the base of Putha mountain in Dopla district, the western part of the Dhaulagiri mountain range. They were nomadic and moved along the route of the Rustam river to Taka village. They understand that a clan group, Budha-Magar, settled for the first time in the neighbouring village, naming it Bachhi Gaon. They have a popular saying passed down from generation to generation: "The forest is our store, the cave is home, the grave is our permanent house". A participant in the focus group at Bachhi Gaon shared, "Our ancestral land is from the habitat of Lophophorus to fish". "Habitats of Lophophorus are the lands of Gharti-Magar (a clan) and habitats of fish are the lands of Budha Magar

(a clan)", added another participant. Thus, they claim their ancestral lands and territories, from high mountains to low valleys, with a sense of ownership and interdependence.

The Magar experience a strong sense of belongingness to the rangelands that they have sustainably managed for centuries. All areas of alpine, sub-alpine and lower pastureland have been named in the Magar language (Kandel, 2000). A herder shared with me several names in the Kham/Magar language for specific rangeland areas, including Fagune, Seng, Surtibang and Ghustang (see Figure 1). The toponyms for pasturelands epitomise the first settlements of Magar ancestors in these places and give contemporary residents a strong sense of collective ownership. For example, during the interviews and focus group discussions with Magar youths, herders and adults, I repeatedly heard such proud pronouncements as "Hamro Kharka (our pasturelands)", "Hamro Pita Purkha (our forefathers)", "Hamro Goths (our herds)" and "Hamro Gaon (our hamlet)". Thus, they have strong experiential and emotional attachments to the rangelands and traditional agro-pastoralism. The herders shared that the rangelands were transferred to their clan groups, and parcels of the lands were owned and controlled by the particular clan groups. These clan groups use the lands collectively without encroaching on each other's areas.

From this series of interviews, I understood that the Magars in Bachhi Gaon and Taka villages have traditional agro-pastoralism as the mainstay of their livelihoods, in the course of which they engage in mobile animal husbandry across different agro-ecological zones. Households of each clan group have herds of sheep, goats, cows and/or buffalos that are moved to high elevations between mid-March and October to take advantage of the spring and summer flush of growth of alpine grasses, then back down to the valleys in late October. The herders in the focus group discussions noted:

> *"The seasonal movement is important for cattle to protect them from climatic differences and to give a chance for grasses, shrubs and herbs to grow for the livestock. The herds are moved from place to place to make the rangelands fertile to grow many different species of grasses. The wild animals are also dependent on the varieties of grasses in the herding locations."*

Customary agro-pastoralism, founded on Magar moral ecology, encourages the coexistence of domestic and wild animal and plant species, which helps to preserve biodiversity. The ethical meanings and beliefs embedded in the rangelands were and are expressed through sustainable resource management. The strong sense of interdependence with the rangelands shapes Magar interactions with nature. The Magar have a sense of ownership of the rangelands, which represent the socio-ecological geography constitutive of a long-standing Indigenous moral ecology. The rangelands are conceptualised as a biocultural heritage from which they derive their complex moral ecology of management.

Magar traditional institutions for managing agro-pastoralism

The Magars manage their rangelands according to their traditional moral ecology through a particular socio-political system, *Kachahari*. *Kachahari* is a traditional institution of Pun and Gharti Magar communities, which is still practised in the Bachhi Gaon and Taka villages. As the community leader informed me, the *Kachahari* is a religious, cultural and economic institution of the Magars. Every year on 15 June, the community comes together in *Sabapo*, a sacred location near Bachhi Gaon. Formerly, the oldest male community member, known as the *Mukhiya*, takes leadership of the *Kachahari*. Now every year a *Mukhiya* is chosen through a consensus process. This *Mukhiya* can be reappointed the following year if he is judged to have performed his duties well.

Managing agro-pastoralism in the rangelands is one of the main responsibilities of the *Kachahari*. The villagers collectively set restrictions on the usage of rangelands for livestock grazing and determine the best times and places for herd travel. They designate the areas of pasturelands where large and small animals should be grazed separately, as well as the guidelines for gathering fodder. They appoint a *Katuwal*, who notifies every member of the community of the times and specific parcels of rangelands that are permitted or prohibited for cattle grazing. Thus the Mukhiya ensures participation of each of the families in the village. Further, the *Katuwal* disseminates other information decided upon under the *Kachahari*. In return, the *Katuwal* receives a certain quantity of food grains from every household, which in 2021–2022 was 2 *Pathis*, (1 *Pathi* = approximately 3 kg), but the amount can vary depending on the decision of the *Kachahari*.

Also, the *Kachahari* designates the *Gwala Mukhiya*, or leader of the herders, who is responsible for monitoring other *Gwalas* (generally male herders), enforcing their compliance with the protocols for grazing livestock. Under *Kachahari*, anyone who exploits restricted rangelands or breaks other guidelines for managing pastoralism faces a fine of up to Rs. 500 (at the time of study). Additionally, the *Gwala Mukhiya* is responsible for rescuing herders and animals that go missing in

the rangelands. In the event of an accident or other disaster, the *Gwala Mukhiya* selects and mobilises community people to carry out the rescue. Based on their performance, the positions of *Katuwal* and *Gwala Mukhiya* are terminated or continued under the *Kachahari*.

Thus, the *Kachahari* is the means by which the Magars preserve, govern and manage the rangelands and agro-pastoralism through the application of a long-standing vernacular set of rules, communal norms and values, and procedures. The customary moral ecology that has been passed down from generation to generation serves as the foundation for the traditional administration of agro-pastoralism. *Kachahari* is a "local management structure which provides rules of use that maintain subsistence and renewal of community resources" (Robbins, 2012, p. 51). It advances the Magar moral ecology of resource management, which stabilises and regulates ecosystem flows and access to resources. In addition to upholding their moral ecology for resource management, under the *Kachahari*, Magar engage in spiritual practices that are directed towards the preservation of nature and biodiversity.

A crisis for Magar moral ecology

However, the rangelands, which consist of grazing lands, forests, barren lands, agricultural lands, bush areas and shrublands, are legally managed by the Department of National Parks and Wildlife Conservation (DNPWC, 2020). Thus the Magars co-exist with Department of National Parks and Wildlife Conservation managers and the associated formal regime of legislation, policies and plans. The *Dhorpatan Hunting Reserve Management Plan 2019*, the most recent plan, fails to recognise the conservation effectiveness of Magar agro-pastoralism by restricting the grazing of animals inside the reserve. While the *Himalayan National Park Rules 1979* allow herders to pasture animals and access resources, this is contingent on them obtaining written consent from the reserve warden. In the late 1990s, such permission required the herders to move cattle to the *Buki* (highland pasture where alpine grasses predominate) from mid-May to the end of August, even though the traditional cattle grazing season runs from mid-March to mid-October (Kandel, 2000). This restricted access to the *Buki* dismantled the traditional herding structure.

Following this disruption, overgrazing has caused the introduction of invasive species, the destruction of wildlife habitats, soil compaction and exposure, the transfer of diseases, displacement of Blue Sheep, and harm to natural regeneration (DHRO, 2019). However, the response in the plan has not been to restore the Magar regime, but rather to further compromise Magar agro-pastoralism by prohibiting activities such as collecting firewood, fodder, timber and wild foods, and preventing small-scale farming that are essential for maintaining traditional practices. Women interviewees from each village noted:

> *"We are not allowed to collect firewood, wild vegetables (mushrooms and nettles, etc.), herbal plants, fodder, and even the dry leaves and logs buried under snow and flooded by the river. At one time, I applied to collect logs for firewood, but the reserve officer refused."*

In a series of focus group discussions in both villages, the herders collectively agreed:

> *"The practices of livestock keeping and the number of sheep and cows in the herds are decreasing and only a few households run a few herds with few livestock. The Magars, nowadays, are uncertain about the future of keeping livestock because of the restrictions of DHR on accessing resources. Many of them are selling their livestock or keeping lower numbers."*

In the interviews, several herders noted that their activities were strictly monitored by security forces and rangers. As an Assistant Warden of DHR warned:

> *"There is maximum encroachment of lands at Taka, Dhorpatan and Gurjaghat areas from where we remove the huts/cow sheds and crops mobilizing armies if the local people neglect the notice we have previously given."*

In the late 1990s, there were 716 households in the Taksera Village Development Committee (VDC) area, with 31,217 associated livestock (the highest number in the East Rukum VDCs) (Kandel, 2000). However, in the four East Rukum VDCs (Ranmamaikot, Hukam, Taksera and Kakri) there were only 30,130 livestock by the late 2010s (DHRO, 2019). This indicates a sharp decline in agro-pastoral practices in Bachhi Gaon and Taka villages. As is the case in many high-mountain protected areas, this decline has been driven by factors such as migration out of the region, tourism development and conservation policies (Tiwari et al., 2020), and in Dhorpatan the pressure brought to bear by the reserve managers has also been significant.

Conservation plans and practices have effectively controlled the management of agro-pastoralism, thereby weakening those customary moral ecologies upheld by traditional governance systems. Coercive conservation regimes have denied agro-pastoralism communities the right to exercise their autonomy and self-determination

in regards to resource management (Robbins, 2012). This has not only tended to undermine traditional resource constraints but also diminished the ethical accountability of the Magar for sustainable agro-pastoral management, thereby creating a crisis for their long-standing moral ecology. Advocacy documents of Magar activists show that the right to self-determination of IPs as a global framing of Indigenous rights motivates them to resist the injustice of the current conservation regime. However, such a view of global order is inadequately translated into reality since the framework of international law is weak and at the local level governments may pay little head to the provisions of international agreements.

CONCLUSION

This paper examines the customary moral ecology of managing agro-pastoralism among the Magar Indigenous peoples in East Rukum, Nepal. It argues that Magar moral ecology and associated practices are in crisis due to the failure of conservation policies and plans to recognise their value and significance. State-led conservation contributes to the crisis of a deeply ingrained, intricate Indigenous moral ecology for managing agro-pastoralism. The Magars' strong sense of ownership, belonging and dependency in relation to the rangelands underpins complex relationships which are expressed through long-standing sustainable practices. Magar moral ecology not only maintains symbiotic relationships between humans and non-humans, but also fosters coexistence of domestic and wild animals and plant species. In addition, the traditional institutions uphold an agro-pastoralism regime that is deeply rooted in spiritual practices and fosters a sense of responsibility for the preservation of biodiversity and the natural world. Recognition of the need for Indigenous peoples' self-governance and self-determination in managing rangelands and agro-pastoralism based on a customary moral ecology is of central importance for long-term sustainable and rights-based management of the DHR. A change of approach on the part of the Department of National Parks and Wildlife Conservation is needed to bring this about.

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RESUMEN

En anteriores estudios de ecología política se ha analizado la vulnerabilidad del pastoralismo y los conflictos entre las áreas protegidas y los medios de subsistencia de los pastores. Algunos regímenes de conservación consideran que las instituciones, los conocimientos, el autogobierno y la autodeterminación de los pastores indígenas son incompatibles con la conservación contemporánea, alegando que las prácticas asociadas son insostenibles. Este artículo, basado en la etnografía crítica, examina la ecología moral del agropastoreo indígena magar en la Reserva de Caza de Dhorpatan, en el medio oeste de Nepal. La gestión tradicional magar está en crisis debido a las políticas y prácticas de la reserva. Desde una perspectiva de ecología política, demuestro que la ecología moral tradicional del agropastoreo mantiene relaciones complejas con los pastizales. Las instituciones tradicionales sostienen una ecología moral profundamente arraigada en las prácticas espirituales y fomentan un sentido de responsabilidad por la conservación de la biodiversidad y la naturaleza. Las políticas de conservación actuales no reconocen adecuadamente estos principios morales indígenas y debilitan las relaciones socioecológicas armoniosas. Para gestionar las zonas protegidas de forma sostenible en las regiones de gran altitud, es crucial gestionar el agropastoralismo en el marco de la ecología moral tradicional a través del autogobierno y la autodeterminación de los pueblos indígenas.

RÉSUMÉ

Des études antérieures d'écologie politique ont exploré la vulnérabilité du pastoralisme et les conflits entre les zones protégées et les moyens de subsistance des pasteurs. Certains régimes de conservation considèrent les institutions, les connaissances, l'autogouvernance et l'autodétermination des pasteurs indigènes comme incompatibles avec la conservation contemporaine, au motif que les pratiques associées ne sont pas durables. Sur la base d'une ethnographie critique, cet article examine l'écologie morale de l'agropastoralisme Magar indigène dans la réserve de chasse de Dhorpatan, dans le centre-ouest du Népal. La gestion traditionnelle des Magar est en crise en raison des politiques et des pratiques de la réserve. Dans une perspective d'écologie politique, je montre que l'écologie morale traditionnelle de l'agro-pastoralisme entretient des relations complexes avec les terres de parcours. Les institutions traditionnelles soutiennent une écologie morale qui est profondément enracinée dans les pratiques spirituelles et qui favorise un sentiment de responsabilité pour la préservation de la biodiversité et de la nature. Les politiques de conservation actuelles ne reconnaissent pas suffisamment ces principes moraux autochtones et affaiblissent les relations socio-écologiques harmonieuses. Afin de gérer durablement les zones protégées dans les régions de haute altitude, il est essentiel de gérer l'agro-pastoralisme dans le cadre de l'écologie morale traditionnelle par le biais de l'autogouvernance et de l'autodétermination des peuples autochtones.

COORDINATED ACTION ACROSS ADMINISTRATION LEVELS AND ASSESSMENTS ARE KEY TOOL TO REVEAL BARRIERS TO THE EFFECTIVE MANAGEMENT OF PROTECTED AREAS

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ABSTRACT

We assessed protected area management effectiveness and identified attributes that limit the effectiveness of 21 protected areas in the State of Santa Catarina, southern Brazil. Of these, we assessed 10 areas under state-level administration for which a standardised assessment had not previously been conducted. For the 11 protected areas under federal administration, we obtained assessment data from the government. The protected areas were contrasted regarding the administration level and a list of attributes that could result in differences in management effectiveness between areas. We examined the relationship between protected areas' attributes and mean effectiveness using linear models. The same attributes were also related to management elements, namely context, planning, inputs, processes and outputs, using redundancy analysis. Management effectiveness and scores of management elements were found to be lower for areas either with unresolved land tenure, lacking management plans or updated ones, those under many pressures and threats, or those under state-level administration. Overall, we suggest that federal protected areas do better in at least these attributes or a combination of attributes not well-captured by single indicators than state-level protected areas. Reassessments should be regularly carried out across administration levels in order to effectively flag a barrier, clear it, and identify the next one to be tackled.

Key words: Atlantic Forest, land tenure resolution, management elements, State of Santa Catarina.

INTRODUCTION

Creating and maintaining protected areas (PAs) is an essential strategy in conservation (Rodrigues & Cazalis, 2020; Watson et al., 2014) and as a climate adaptation strategy (Carrasco et al., 2021), even though many barriers limit the fulfilment of PA conservation aims. PAs tend to improve biodiversity conservation (Le Saout et al., 2013) by both reducing threats to biodiversity (Andam et al., 2008) and maintaining ecosystem services (Watson et al., 2014). Global efforts towards biodiversity conservation have raised the coverage of PAs to ~16.6 per cent in terrestrial areas (UNEP-WCMC et al., 2023). However, habitat loss and biodiversity continue to decline in most PAs (Laurance et al., 2012). Such losses indicate that PAs have been unable to meet all the goals they had been created for, a fact in part related to management ineffectiveness (Coad et al., 2015).

To promote successful management, the International Union for Conservation of Nature (IUCN) has directed efforts towards the systematisation and assessment of PA management effectiveness. Such efforts produced a framework based on the principle of adaptive management (Biggs et al., 2011) and the assessment of six elements: context, planning, inputs, processes, outputs and outcomes (Hockings et al., 2006). Following this framework, different methods have been developed to assess PA management effectiveness. Of these methods, the Rapid Assessment and Prioritisation of Protected Area Management has been often used (RAPPAM; see Ervin, 2003). Thus far, management assessments cover only a small fraction of the global PA network (Coad et al., 2015) and indicate just a moderate effectiveness of ~50 per cent, which tends to be even lower in developing countries (Leverington et al., 2010). In Brazil, management effectiveness assessments

have been carried out mostly for PAs administered by the federal government; however, a substantial part of the Brazilian PA network is run under state-level administration.

Understanding attributes of PA management that influence results and defining actions that contribute to the most positive outcomes underlies effectiveness assessments and adaptive management, so that scarce resources are directed towards conservation gains. In addition, PA management effectiveness depends on attributes like the size and qualification of staff and available funds, with less than one-quarter of 2,167 PAs across the globe having adequate funding and staff (Coad et al., 2019). Such attributes often depend on administration levels – whether federal or state – and the appeal of the PA to the public, therefore we checked their influence on PA effectiveness. Specifically, we expected that PAs would score higher in effectiveness assessments when under federal administration (WWF-Brasil & ICMBio, 2012) and in more stringent protection categories (WWF-Brasil & ICMBio, 2012); with established management councils (Andrade & Rhodes, 2012), including co-management by relevant partners (Cundill et al., 2013); with large staffs and funds (James et al., 1999); with a management plan (Middleton & Thomas, 2003); and with substantial public appeal indicated by attracting many visitors (Steven et al., 2013). We also expected well-conserved ecosystems (Kauano et al., 2017) to show more effective management results due to fewer pressures and threats to biodiversity (Tranquilli et al., 2014). Finally, land tenure resolution was also expected to lessen many pressures and threats and thus lead to successful management outcomes (Nolte et al., 2010).

Thus, we estimated the relative importance of attributes related to management effectiveness outcomes that can aid PAs to achieve their biodiversity conservation goals. While our main aims were exploratory, we tested for effectiveness according to administration level (federal vs. state-level) because such governance differences can impact financial and human resources. To test these hypotheses, we considered a network of protected areas located in the State of Santa Catarina in southern Brazil.

METHODS

Protected area network

We assessed a PA network located in the Atlantic Forest domain, a region rated fourth for worldwide conservation priority (Myers et al., 2000). Despite the threats that contribute to this rating, the State of Santa Catarina has a high conservation potential, with

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~30 per cent of native vegetation cover remaining, even though vegetation cover varies across the state (Vibrans et al., 2012). The state has 99 PAs in several protection categories and management levels: federal (16 PAs), state (10), municipality (18) and private (56) (updated from MMA, 2017). In this study, we excluded private and municipality-managed PAs due to the high heterogeneity in the data available for these categories, difficulty in finding managers' contact details, and their smaller areas compared to federal and state PAs. Given these differences across the PA network, management effectiveness is expected to differ, providing grounds for checking which attributes lead to better outcomes.

Assessment of management effectiveness

We assessed management effectiveness using RAPPAM (Ervin, 2003) because it allows a standardised comparison between different contexts (Leverington et al., 2010) and emphasises effectiveness alongside pressures and threats. Pressures are forces, activities or events that have negatively affected PAs in the five years before the assessment. In turn, threats result from persisting pressures with detrimental impacts in the past are likely to continue over the following five years. Effectiveness assesses whether the management is leading the PA towards its aims, and considers the elements of context, planning, input, process and outputs. While it is important to check for relationships between management effectiveness and the mentioned elements with outcomes, the latter are harder to obtain and were not assessed here. RAPPAM uses several questions to characterise pressures and effectiveness. For each question about pressures and threats, the

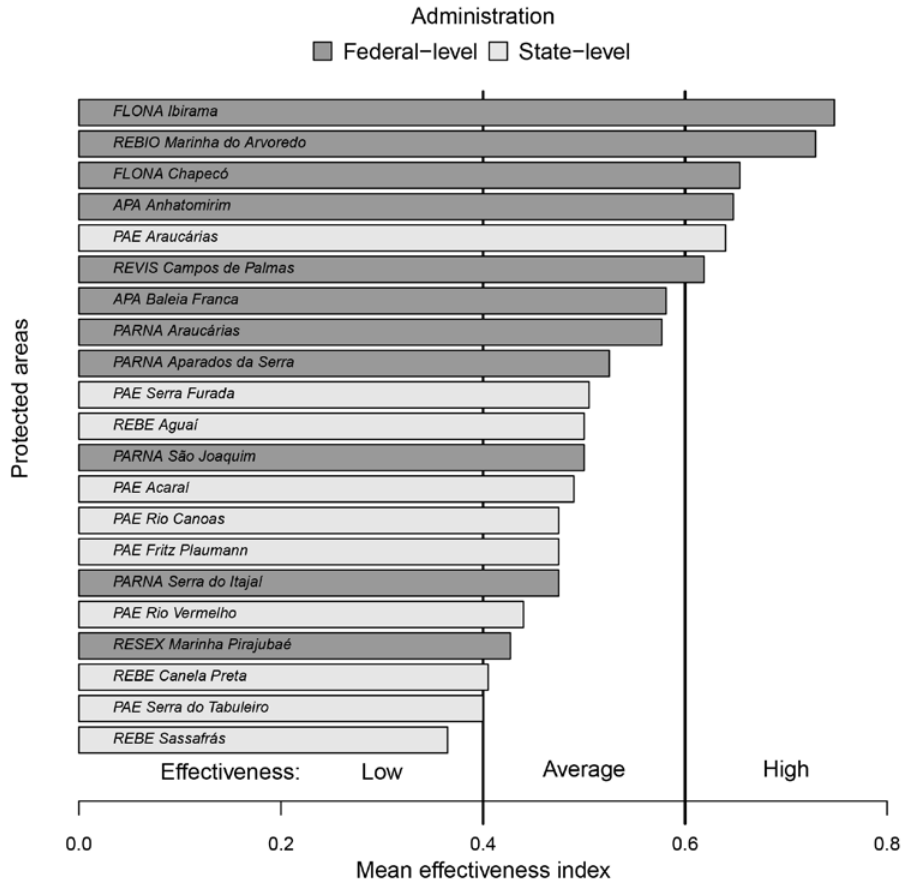

Figure 1. Management effectiveness of federal-level (dark grey) and state-level (light grey) protected areas. FLONA, National Forest; REBIO or REBE, Biological Reserve; APA, Environmental Protection Area; PARNA, National Park; PAE, State Park; RESEX, Extractive Reserve

manager provides an answer in a Likert five-point scale. For the questions related to effectiveness, the method uses a four-point scale. Combining scores assigned to effectiveness questions results in a management effectiveness index, which can be classified as low (<0.4), average (≥0.4 and <0.6) or high (≥0.6). For more detailed information on the RAPPAM method, see Ervin (2003).

For federal-level PAs, we used the most up-to-date RAPPAM assessment that was collected in 2015 (WWF-Brasil & ICMBio, 2017) and covered 11 of the 16 federal PAs in the State of Santa Catarina (5 PAs were not evaluated using RAPPAM). For the 10 state-level PAs, which never underwent such assessment, we applied the whole RAPPAM to PA managers and, in addition, the effectiveness questionnaire to a representative of the State Environmental Agency and two representatives of the management council of each PA. For state-level PAs with either no council or when councillors could not be contacted, we interviewed representatives of entities that were likely to take part in the council once it was established. The criteria for selecting representatives were their consent to participate in our study, basic knowledge of ecology or related fields, and sufficient knowledge about the PA. For each state PA, we calculated the effectiveness index as the median of the four questionnaires. Because the study involved talking to managers and councillors of state-level PAs, it was first authorised by the Ethics Committee of Universidade Federal de Santa Catarina (53996516.7.0000.0121).

Indicator attributes of protected area with management outcome

We assessed the key attributes that indicate effectiveness results in two ways. First, we built general linear models with attributes being included as fixed effects (e.g. PA administration level, protection category, funds and staff size, and so on; see full list in Table 1) and PA effectiveness index as the univariate response. To reduce multicollinearity, we fit preliminary models and removed variables with large variance inflation factors (VIF ≥ 4). Next, we chose which attributes were most strongly related to management effectiveness using a step-by-step removal process. This process was guided by values of corrected Akaike information criterion for small samples (AICc), and we stopped the selection when we reached the lowest AICc-values. Second, we used a multivariate approach to inspect for changes to the six elements underlying the effectiveness index. In this approach, the same 13 PA attributes were related to the six elements of effectiveness as the multivariate response using a Redundancy Analysis (RDA). To check for multicollinearity, we fitted a preliminary RDA and

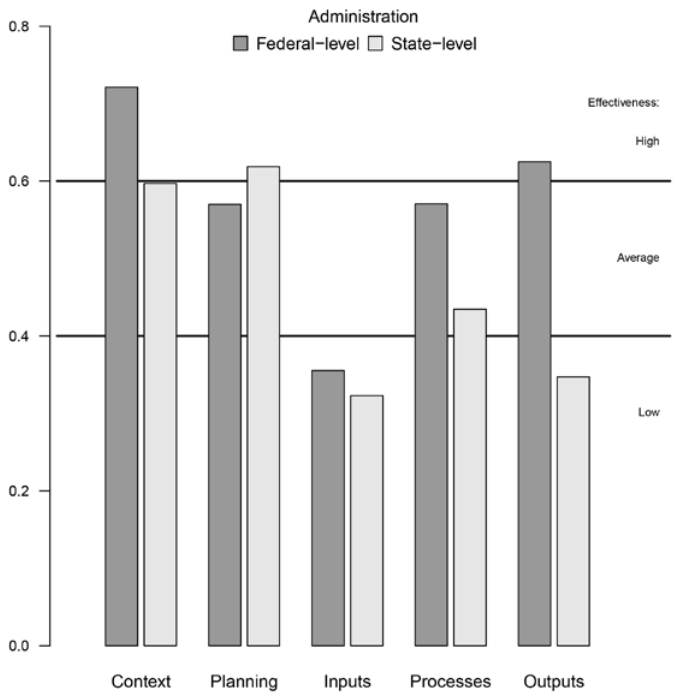

Figure 2. Protected areas management effectiveness per management element

removed indicators with VIF ≥ 10. Then, we reduced the full model in a step-by-step process using the highest adjusted-R^2 as the stopping criterion. We checked the overall predictor-response relationship of RDA and of each of the remaining predictors using permutation tests (9,999 iterations). Finally, we also conducted these analyses for the subset of state-level PAs to better explore the newly collected dataset. We computed all analyses in R (R Core Team, 2016) using the 'vegan', 'MASS' and 'car' packages.

RESULTS

Overview of management effectiveness and its elements

Two-thirds (14/21) of the PAs had average management effectiveness, whereas it was high in 6/21 PAs and low in one (Figure 1). The mean effectiveness index was 0.53 (min = 0.37; max = 0.75), which corroborates a medium overall management effectiveness. Based on mean indices, federal-level PAs showed a management effectiveness index that was 25 per cent higher than that of state-level PAs. Under federal administration, effectiveness was evenly distributed as either average (6/11) or high (5/11) ($\bar{x}$ = 0.59; min = 0.43; max = 0.75). At the state-level, 8/10 PAs had average effectiveness, while one had high and another had low effectiveness ($\bar{x}$ = 0.47; min = 0.37; max = 0.64).

Context was the element that mostly indicated high management effectiveness values ($\bar{x}$ = 0.66), while input was associated with lower values ($\bar{x}$ = 0.35) (Figure 2). A similar pattern was found for PAs from either federal-level (context: $\bar{x}$ = 0.72; input: $\bar{x}$ = 0.38) or state-level administration (context: $\bar{x}$ = 0.61; input: $\bar{x}$ = 0.33). Mean scores of all elements were higher for federal than state-level PAs, except for planning, which was lowest for federal-level PAs.

We identified 22 pressures and threats across PAs (min = 4, max = 18 per PA) that can require management actions. Criticality levels ranged from 82 to 906. On average, there were ~11 pressures and threats per PA (criticality: $\bar{x}$ = 353). The overall top pressures and threats (with greater degrees of criticality) were hunting, invasive alien species, and construction or operation of infrastructure. For federal PAs, the top pressures and threats were external interference, invasive exotic species, and hunting, while for state PAs, they were hunting, construction or operation of infrastructure, and invasive alien species.

How do protected areas vary, and which attributes indicate successful management?

Most PAs were in the broadleaf evergreen rainforest but spanned over seven different ecosystem types (Table 1). Funds per km^2 differed by up to 2,022 times among PAs, but there was no significant difference between mean funding across administration levels. Only 2/21 PAs had > 1 employee/km^2 and 13/21 PAs had < 0.1 employee/km^2. Land tenure was resolved in 8/21 of the PAs, and most PAs had management plans. Of federal-level PAs, all had < 1 employee/km^2, but the trend towards smaller staff size than for state-level PAs was not significant. Regarding the protection category, 5/11 federal-level PAs had strict protection and 6/11 were managed for sustainable use. Land tenure was resolved in 6/11 federal-level PAs, and 3/11 lacked management plans. Under state-level administration, land tenure was resolved in 3/10 PAs, and 3/10 had no management plan. All state-level PAs were managed as strictly protected areas.

PA attributes added up to just over 50 per cent of overall management effectiveness (adj.-R^2 = 0.52; F = 4.65; $p < 0.01$). The most relevant indicators at this stage were the administration level, ongoing co-management arrangements, funds (negative relationship), management plan availability, tenure resolution, and criticality of pressures and threats (negative relationship). Because the model with the lowest AICc contained non-significant indicators, we further removed those with p-values > 0.05 up to the limit of ΔAICc < 4 from the above-mentioned model. After that,

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administration level ($p = 0.01$) and management plan availability ($p = 0.04$) were deemed the most relevant indicators, correlating most strongly with management effectiveness index values (adj. $R^2 = 0.52$; $F = 4.65$; $p < 0.01$). Adding back indicators in this model resulted in tenure resolution becoming significant ($p = 0.025$), but with $\Delta AICc > 4$. Thus, even though land tenure is always of concern, its relevance tends to be masked or related to the relevance of administration level and management plan availability.

Regarding the relationship between PA attributes and effectiveness, the protection category was removed from the redundancy analysis (RDA) because of multicollinearity. After step-by-step reduction, the final RDA explained ~50 per cent of the variation in the elements of management (Figure 3). Tenure resolution ($F = 12.48$, $p < 0.001$), administration level ($F = 7.01$, $p < 0.01$), degree of criticality of pressures and threats ($F = 5.72$, $p < 0.01$) and management plan availability ($F = 3.57$, $p < 0.05$) were the most important indicators of differences in the numeric values for the elements of management effectiveness, and tenure resolution was the attribute most strongly related to management success. PAs with tenure resolution also had the highest values for processes and outputs. In turn, being under federal administration was the second most important attribute in terms of its association with management effectiveness. Federal-level PAs also tended to have the highest values for both context and outputs. Criticality of pressures and threats was the third most important attribute and had mostly an inverse relationship with effectiveness. Criticality was highest in PAs with larger values of context and lacking management plans and lowest in PAs with larger input values.

For the state-level data and after both checking for multicollinearity and model simplification, the number of employees per km² was the attribute most strongly related to differences in the effectiveness index, being followed by management plan availability (Figure 3; adjusted $R^2 = 0.74$; $F = 14.07$; $p < 0.01$). When assessing changes to the elements of effectiveness, the most relevant attributes were again the number of employees per km² (RDA, $p < 0.01$). In addition, tenure resolution and criticality of pressures and threats were also relevant, but to a smaller extent. The RDA, including only the number of employees per km² as a predictor, explained 42 per cent of the variation in effectiveness elements, whereas, with the three attributes, the explanation reached 63 per cent. The RDA with the three attributes was kept in order to explore the results further. This RDA showed larger staff sizes, indicating higher management effectiveness values in state-level PAs and linked to larger output values. PAs with tenure resolution had higher values for the elements of effectiveness. In turn, there was a negative association of management elements with the criticality of pressures and threats, with especially lower values for processes and planning under higher threats.

Table 1. Protected areas attributes and effectiveness results. ERF, Evergreen rain forest; MRF, Mixed rain forest; SEF, Semi-evergreen seasonal forest; MAR, Marine; MAN, mangrove; GRA, Grassland; H, High; A, average; L, Low; EI, Effectiveness Index

Protected Area	Administration level	Group	Category	Council	Human resources/ km²	Co-management
Acaraí	State	Integral	Park	yes	0.060	no
Aguaí	State	Integral	Reserve	no	0.013	no
Anhatomirim	Federal	Sustainable	Environmental protection area	yes	0.158	no
Aparados da Serra	Federal	Integral	Park	yes	0.053	no
Araucárias	Federal	Integral	Park	yes	0.008	no
Araucárias	State	Integral	Park	yes	2.614	yes
Baleia Franca	Federal	Sustainable	Environmental protection area	yes	0.005	no
Campos de Palmas	Federal	Integral	Wildlife refuge	yes	0.012	no
Canela Preta	State	Integral	Reserve	no	0.053	no
Chapecó	Federal	Sustainable	Forest	yes	0.249	no
Fritz Plaumann	State	Integral	Park	yes	1.116	yes
Ibirama	Federal	Sustainable	Forest	yes	0.578	no
Marinha do Arvoredo	Federal	Integral	Reserve	yes	0.035	no
Marinha Pirajubaé	Federal	Sustainable	Extractive reserve	yes	0.584	no
Rio Canoas	State	Integral	Park	yes	0.083	no
Rio Vermelho	State	Integral	Park	yes	0.849	yes
São Joaquim	Federal	Integral	Park	yes	0.004	no
Sassafrás	State	Integral	Reserve	no	0.019	no
Serra do Itajaí	Federal	Integral	Park	yes	0.007	no
Serra do Tabuleiro	State	Integral	Park	no	0.014	yes
Serra Furada	State	Integral	Park	yes	0.301	no

ERF, Evergreen rain forest; MRF, Mixed rain forest; SEF, Semi-evergreen seasonal forest; MAR, Marine; MAN, mangrove; GRA, Grassland; H, High; A, average; L, Low; EI, Effectiveness Index

Visitation	Financial Resources/ km²	Management plan	Ecosystem	Tenure resolved	Size (km²)	Pressure	EI	Effectiveness
0	4777.41	yes	ERF	no	66.67	111	0.49	A
0	10502.17	yes	ERF	no	76.72	347	0.50	A
12249	1350.50	yes	ERF	yes	44.37	434	0.65	H
111778	11240.56	yes	MRF	no	131.48	473	0.53	A
55	51246.22	yes	MRF	no	128.10	328	0.58	A
2414	206774.47	yes	MRF	yes	6.12	116	0.64	H
0	163.43	no	MAR	yes	1548.67	670	0.58	A
0	5690.14	yes	GRA	no	165.94	360	0.62	H
0	17352.56	no	ERF	no	18.99	400	0.41	A
1782	330491.85	yes	MRF	yes	16.04	244	0.65	H
4197	87379.37	yes	SEF	yes	7.17	75	0.48	A
0	48060.30	yes	ERF	yes	5.19	178	0.75	H
0	373.63	yes	MAR	yes	171.05	228	0.73	H
0	42432.26	no	MAN	yes	17.12	207	0.43	A
0	182603.78	yes	MRF	yes	12.00	362	0.48	A
0	94094.35	no	ERF	no	15.32	430	0.44	A
108148	8731.85	no	MRF	no	455.24	336	0.50	A
0	6091.22	yes	ERF	no	52.29	216	0.37	L
0	1577.56	yes	ERF	no	573.75	729	0.48	A
5350	427.69	no	ERF	no	843.00	906	0.40	A
0	44775.19	yes	ERF	no	13.30	259	0.51	A

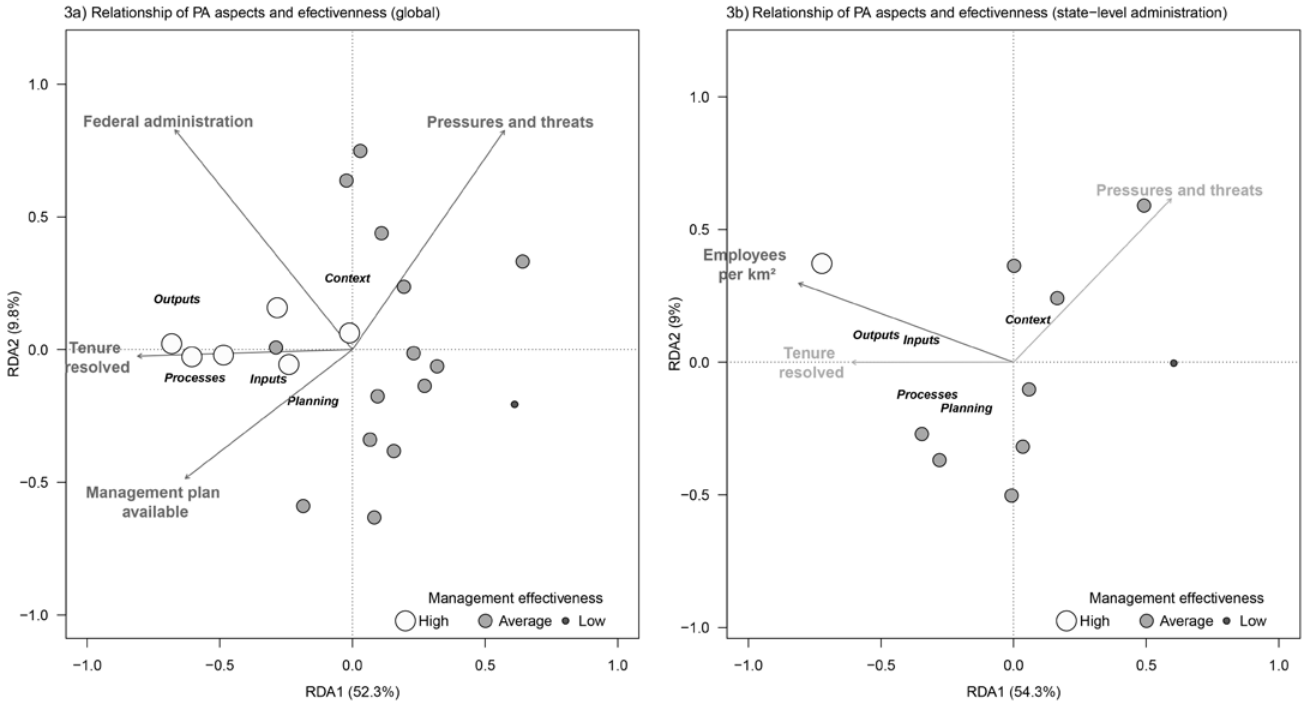

Figure 3. Relationship of protected areas' attributes and effectiveness for (3a) all areas, and (3b) state-level administration.

DISCUSSION

We found the protected area network to be of average management effectiveness. Effectiveness scores differed especially between PAs under different administrations, thus corroborating our expectation of an important role for governance in management effectiveness. In turn, staff and fund sizes were weakly related to better management effectiveness scores. Instead, land tenure issues seem to be the top barrier to more successful management in the studied PA network. The existence of management plans, and pressures and threats were additional attributes associated with differences in management effectiveness.

The average effectiveness score found here is comparable to the result of assessments across the globe (Leverington et al., 2010) and of all federal-level PAs in Brazil (WWF-Brasil & ICMBio, 2017). PA context was the element of management effectiveness with the highest values, suggesting good strategies are in use in prioritisation schemes and planning (Oliveira et al., 2017). High values in elements of both processes and outputs also correlated with high effectiveness. These findings can result from the practical aspect of both elements because processes include executing management actions, while outputs gauge action results (Hockings et al., 2006). The element with the lowest values was inputs, showing that staff and fund sizes – at least when considered independently – were weak indicators of management effectiveness scores, except for state-level PAs, where staff size correlated with higher management effectiveness scores. Put together, such results suggest that when overall inputs are low, management effectiveness tends to be limited. In addition, a shortage of resources is a problem that is worsening worldwide, and that relies on strong governance to be mitigated (Coad et al., 2019). PAs under federal administration were more effective than state-level PAs. Such results can be due to recurrent effectiveness assessments (WWF-Brasil & ICMBio, 2017), structure of the management body, and programmes developed at the federal-level, including access to funding. Federal-level PAs have already gone through three assessment rounds, and effectiveness indices improved along them, pointing to benefits along the process. It seems that at least some improvements result from information sharing and managers targeting the most serious issues after assessments (as suggested by Geldman et al., 2015), which is a pattern observed worldwide with ~70 per cent of PAs increasing in effectiveness scores in reassessments (Geldmann et al., 2015). In Brazil, the federal management body used to be more structured (Gerhardinger et al., 2011), with programmes developed at this level often maintained with international resources, a type of funding that makes reassessments more viable (Geldmann et al., 2015). Although international funding is scarce for state-level PAs, those of the State of Santa Catarina showed results above the average when compared to other Brazilian states (e.g. Lima et al., 2005), suggesting barriers to conservation goals to be distinct or more

detrimental in other PA networks. Further investigation on how such differences could be reduced is needed, given that appropriate governance is a key requirement for biodiversity maintenance (Leverington et al., 2010; Watson et al., 2014). We suggest that coordinated action across administration levels would lead to better conservation outcomes, particularly as many conservation goals can only be achieved by the whole PA network (Rodrigues & Cazalis, 2020). In this context, the use of tools such as RAPPAM that allow for the comparison of PAs in terms of individual performance across administration levels is a strength of the method. However, the limitations in using this method are the low flexibility, especially with different contexts of PAs, under different governance regimes; the limitations in capturing outcome-level data (Coad et al., 2015); and the subjectivity inherent in filling out the RAPPAM questionnaire. This last element can be minimised by using alternative ways to consider information about outputs, such as collective assessments.

The relationship found between pressures and threats with context is worrisome. While PA management should address and reduce pressures and threats to biodiversity to be effective (Rodrigues & Cazalis, 2020), just listing pressures and threats can be too simplistic, given ongoing and intensifying anthropogenic pressures worldwide. Dealing with the impacts of threats depends especially on staff (Tranquilli et al., 2014) to monitor, mitigate or bar their effects, as well as funds to mitigate them. Although hunting and deforestation are top threats to PAs globally (Kauano et al., 2017; Laurance et al., 2012), deforestation was of little concern, at least as an ongoing threat at the time of assessment. Conversely, hunting, invasive species, and impacts of infrastructure – such as roads – , were critical. There is also likely a synergic effect of both threats. For example, roads lead to direct impacts such as roadkills (Garriga et al., 2012), but can also lead to deforestation (Barber et al., 2014), access by hunters, and dispersal of invasive alien species. Here, we found staff size to be important, at least within PAs under state-level administration, which suggests that inputs tend to be limited to dealing with a large list of threats and pressures and cannot be overlooked.

Land tenure and development of management plans are of special concern for this PA network. Resolving land tenure has already been identified as a priority (Nolte et al., 2010), although it was suggested as a problem for a minority of PAs elsewhere (e.g. Leverington et al., 2010). Tenure issues can trigger conflicts (Robinson et al., 2017) because of the large budget needed to accomplish it in most cases, administrative difficulties, and the fragility of land tenure structure (Robinson et al., 2017). Moreover, threats and pressures are unsuccessfully mitigated where land tenure is poorly defined (Hausner et al., 2015). Management plans, in turn, are very likely both important and meaningful for management (Middleton & Thomas, 2003). Management plans lead to the implementation of actions and define guidelines for the optimisation of resources, and, when revised in a timely manner, allow for the adoption of a framework of adaptive management. Although the need for plans is obvious and plan development is considered urgent under current legislation, many PAs in the network still lack such plans, while others have them but they are not being regularly updated , thus contributing to poor management effectiveness. In addition, despite most federal PAs having management plans, which contrasts with just a few under state-level administration, the latter had somewhat higher values in the process element of management effectiveness. This suggests not every plan is making the difference it is expected to or that other barriers further limit management effectiveness when management plans are available.

The situation we describe here has been worsening following pressure to simplify the assessment (Fonseca & Rodrigues, 2017), evidence of corruption (Williams & Dupuy, 2017), and strong and coordinated political interference in the decision-making process (McCullough, 2017). Moreover, checking for an effect of PA management on threat and pressure abatement, for instance, depends on contrasting PAs to counterfactual scenarios in which adequate protection had not been established (Geldmann et al., 2019; Rodrigues & Cazalis, 2020). In such a type of counterfactual assessment, pressures within PAs seem to be increasing at a slower pace (Geldmann et al., 2019). Management effectiveness assessments must thus be linked to details about anthropogenic pressures and how they impact biodiversity; otherwise, such assessments tend to be of little significance by being unrelated to true improvements in ecological and social outcomes (Coad et al., 2015). In this study, however, the way in which information has been obtained for the PA network limits a more profound evaluation of the impacts of threats and pressures on biodiversity within and across the PA network.

CONCLUSIONS

The protected area network we assessed currently has an average management effectiveness. This suggests the management of the PAs within the network is able to deal with only part of the issues involved in achieving the goal of biodiversity conservation. We identified four main attributes as indicators of the differences in

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effectiveness: administration level, existing and up-to-date management plans, potential impacts caused by threats, and tenure resolution. These attributes are related to measures that can be addressed by management actions and by a greater alignment with the legislation related to PAs, which demonstrates the low application of this legislation. We suggest systematising these attributes in a management model that treats them as top priorities and that coordinated action across administration levels would lead to better conservation outcomes, particularly as many conservation goals can only be achieved by the whole PA network. We caution that tools such as RAPPAM are likely to fail if used as the sole gauge of PA management effectiveness and without on-ground measures of conservation outcomes, although the method was found to be a useful tool to compare PAs across administration levels. Moreover, any benefits of assessments can be easily lost following changes in governance. Despite such limitations, we suggest that there is a great opportunity to improve the management effectiveness of PAs by means of regular assessments and information exchange across administrative levels as a guideline to adaptive management strategies, as suggested by Geldman et al. (2015). Only in this way will it become clear when a barrier to effective management has been cleared and which one is to be tackled next, and thereby accomplish solid positive conservation outcomes.

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RESUMEN

Evaluamos la eficacia de la gestión de áreas protegidas e identificamos los atributos que limitan la eficacia de 21 áreas protegidas del estado de Santa Catarina, en el sur de Brasil. De éstas, evaluamos 10 áreas bajo administración estatal para las que no se había realizado previamente una evaluación estandarizada. Para las 11 áreas protegidas bajo administración federal, obtuvimos datos de evaluación del gobierno. Las áreas protegidas se contrastaron con respecto al nivel de administración y a una lista de atributos que podrían dar lugar a diferencias en la eficacia de la gestión entre áreas. Examinamos la relación entre los atributos de las áreas protegidas y la eficacia media utilizando modelos lineales. También se relacionaron los mismos atributos con los elementos de gestión, a saber, contexto, planificación, insumos, procesos y resultados, mediante análisis de redundancia. Se observó que la eficacia de la gestión y las puntuaciones de los elementos de gestión eran inferiores en las áreas cuya tenencia de la tierra no estaba resuelta, que carecían de planes de gestión o de planes actualizados, que estaban sometidas a muchas presiones y amenazas o que estaban bajo administración estatal. En general, sugerimos que las áreas protegidas federales obtienen mejores resultados en al menos estos atributos o en una combinación de atributos no bien captados por indicadores individuales que las áreas protegidas de ámbito estatal. Deberían llevarse a cabo reevaluaciones periódicas en todos los niveles de administración con el fin de detectar eficazmente un obstáculo, eliminarlo e identificar el siguiente que debe abordarse.

RÉSUMÉ

Nous avons évalué l'efficacité de la gestion des zones protégées et identifié les caractéristiques qui limitent l'efficacité de 21 zones protégées dans l'État de Santa Catarina, au sud du Brésil. Parmi celles-ci, nous avons évalué 10 zones administrées au niveau de l'État pour lesquelles aucune évaluation standardisée n'avait été réalisée auparavant. Pour les 11 zones protégées sous administration fédérale, nous avons obtenu des données d'évaluation de la part du gouvernement. Les zones protégées ont été comparées en fonction du niveau d'administration et d'une liste d'attributs susceptibles d'entraîner des différences d'efficacité de gestion entre les zones. Nous avons examiné la relation entre les attributs des zones protégées et l'efficacité moyenne à l'aide de modèles linéaires. Les mêmes attributs ont également été mis en relation avec les éléments de gestion, à savoir le contexte, la planification, les intrants, les processus et les résultats, à l'aide d'une analyse de redondance. L'efficacité de la gestion et les scores des éléments de gestion se sont avérés plus faibles pour les zones dont le régime foncier n'est pas résolu, qui n'ont pas de plans de gestion ou qui n'ont pas été mis à jour, qui sont soumises à de nombreuses pressions et menaces, ou qui sont administrées au niveau de l'État. Dans l'ensemble, nous suggérons que les zones protégées fédérales obtiennent de meilleurs résultats que les zones protégées au niveau de l'État pour au moins ces attributs ou une combinaison d'attributs qui ne sont pas bien pris en compte par des indicateurs uniques. Des réévaluations devraient être effectuées régulièrement à tous les niveaux d'administration afin de signaler efficacement un obstacle, de le supprimer et d'identifier le prochain obstacle à franchir.

THE WORLD HERITAGE CONVENTION, PROTECTED AREAS AND RIVERS: CHALLENGES FOR REPRESENTATION AND IMPLICATIONS FOR INTERNATIONAL WATER COOPERATION

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ABSTRACT

Given the dire state of health of rivers worldwide and their significant heritage values, there is a need to consider their current representation in protected areas inscribed under the World Heritage Convention and identify challenges and opportunities for increasing their coverage. This study identifies a total of 153 natural, mixed natural/cultural and cultural landscape World Heritage sites that recognise rivers as a source of Outstanding Universal Value. There are challenges associated with the recognition of river sites as World Heritage, but further nominations could be encouraged through amendments to the World Heritage Convention Operational Guidelines to allow greater discretion to be exercised in relation to integrity requirements at inscription and to explicitly acknowledge freshwater use as a basis for recognising mixed natural/cultural and cultural landscape sites. There is also an opportunity to encourage further nomination of river sites by recognising the important implications of World Heritage inscription for international water cooperation. Together, these recommendations provide a path forward for enhancing the place of rivers in World Heritage protected areas.

Key words: natural heritage, cultural landscapes, freshwater conservation, law, UN Watercourses Convention, transboundary watercourses

INTRODUCTION

Rivers are amongst the most threatened ecosystems on Earth (Dudgeon et al., 2006). Their extraordinary biodiversity is in rapid and accelerating decline (Harrison et al., 2018), having been severely impacted by a range of intersecting and compounding threats, including water resources development, pollution, and excessive withdrawal of water for irrigation (Vörösmarty et al., 2010). As such, there is a need to identify the current representation of rivers within international protected area (PA) frameworks and consider barriers and opportunities to increase their coverage. In addition to the international PA treaties most commonly associated with freshwater protection, the 1971 Ramsar Convention and the 1992 Convention on Biological Diversity (CBD), the 1972 World Heritage Convention (WHC) also makes significant contributions to the protection of freshwater ecosystems. The WHC requires the protection of natural and cultural heritage which is of Outstanding Universal Value (OUV). Inscription as natural, mixed natural/cultural and cultural landscape World Heritage (WH) generally imposes stringent ecological protection obligations (WHC, arts. 4–5) and can provide significant positive conservation benefits for protected sites (Thorsell, 2003).

This study examines the natural, mixed natural/cultural and cultural landscape WH sites inscribed in the World Heritage List to determine current representation of rivers where they are recognised as source of OUV. Rivers have strong historical connections to WH, but these connections often concern river-related threats to WH, rather than the heritage values of rivers themselves. For example, the construction of the Aswan Dam on the Nile in the 1960s sparked an international movement, led by UNESCO, to protect ancient monuments at Abu Simbel from inundation, leading to the adoption of the WHC in 1972 (Meyer, 1976). While threats posed by dams to WH are well recognised (Albert et al., 2022;

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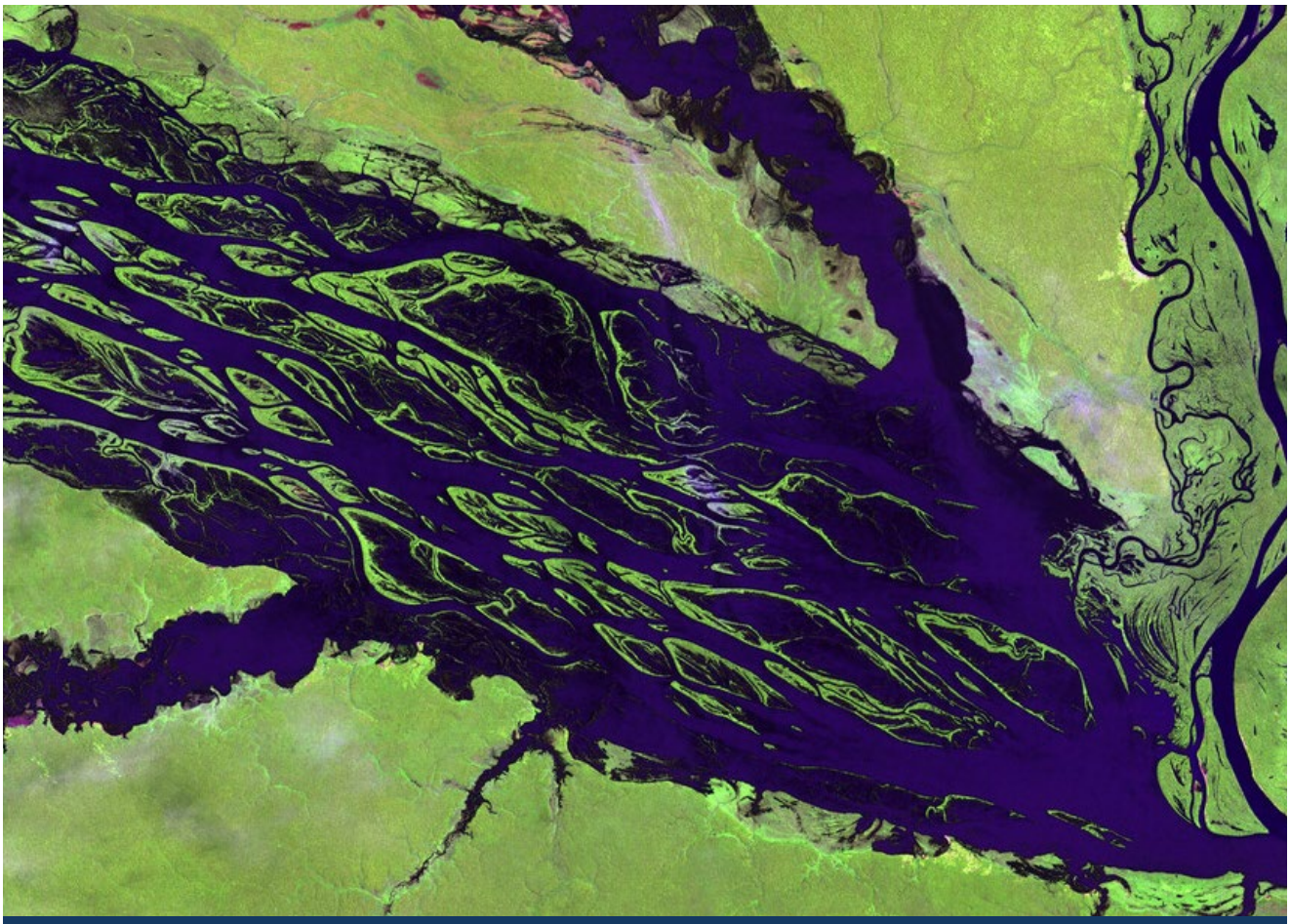

Central Amazon Conservation Complex. © U.S. Geological Survey, Department of the Interior/USGS.

IUCN, 2015), less attention has been paid to rivers as WH themselves. This paper addresses this issue. Challenges associated with protection and management of river WH sites are considered, recommendations are made to amend the WHC Operational Guidelines (UNESCO, 2023a) to encourage the nomination of more river WH sites, and the implications of river WH sites for international water cooperation are analysed. Together, this analysis suggests pathways for recognition of more river sites as WH.

Rivers and protected areas

The representation of freshwater ecosystems in PAs has garnered increasing attention over the past 50 years. The 1971 Ramsar Convention requires State parties to designate appropriate delimited wetlands (including river sites) in their territory and promote their conservation (arts. 2–3). The 1992 CBD requires State parties to establish PAs to conserve biodiversity (art. 8). The CBD Conference of the Parties has also adopted targets to extend coverage of PAs over rivers and other freshwater ecosystems. The 2010 Aichi Targets called for at least 17 percent of the world's "terrestrial and inland water … areas" to be conserved through PAs (or other effective area-based conservation measures) by 2020 (CBD COP 10, 2010, Target 11). In 2022, the Kunming-Montreal Global Biodiversity Framework (KM-GBF) increased this to a global target for 30 per cent of "terrestrial, [and] inland water … areas" to be conserved by 2030 (CBD COP 15, 2022, Target 3). This target puts "more emphasis on the need to protect inland waters in their own right" (Flitcroft et al., 2023, p. 1), and calls for a "radical increase" in the inclusion of freshwater ecosystems in PAs (The Nature Conservancy et al., 2022, p. 1). A historical lack of progress in establishing more freshwater PAs has contributed to a dramatic decline in freshwater ecosystem biodiversity worldwide (Flitcroft et al., 2023).

The adoption of the terminology 'terrestrial and inland water areas' in the Aichi Targets and KM-GBF has resulted in prominent assessments reporting land and inland water PA coverage together as an aggregate. For example, the Protected Planet Report (UNEP-WCMC & IUCN, 2021) provides data only in respect of 'terrestrial' and 'marine' PA coverage, with the terms 'terrestrial' and 'land and inland waters' sometimes used interchangeably. Likewise, the World Database on Protected Areas reports 'terrestrial and inland waters' PA coverage (IUCN & UNEP-WCMC, 2023). There has also

been a pronounced focus on terrestrial and marine areas in assessments of PA efficacy (Abell et al., 2017; Watson et al., 2014).

Despite inherent difficulties in assessing inland water PA coverage (Bastin et al., 2019; Chape et al., 2008), some studies have reported PA coverage of inland waters, including rivers, independently. Opperman et al. (2021) report that 1.9 million km of rivers, or 16 per cent of global river length, lies within PAs. Abell et al. (2017) report that 13.5 per cent of world's rivers are subject to "integrated protection", which includes PA coverage. These studies, however, do not identify the legal instruments under which the PAs are established. Some studies have assessed river coverage by Ramsar PAs, including Chape et al. (2008) who report 127 Ramsar river sites. It is notable in this context that 68 WH properties overlap with Ramsar sites (UNESCO, 2023d). However, there is currently no assessment of the representation of rivers within WHC PAs.

The World Heritage Convention and protected areas

The WHC is a multilateral treaty which has enjoyed an exceptionally high level of adoption, with 195 parties to date (UNESCO, 2023b). The WHC requires the protection of the world's natural and cultural heritage of OUV. Sites of OUV feature "cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity" (UNESCO, 2023a, ss. 49, 52). The WHC obliges State parties to identify, protect and preserve WH (WHC, arts. 4–6, 12). World Heritage sites can be inscribed on the WH List as natural or cultural WH, or both (WHC, arts. 1–2, 11). Sites which represent the "combined works of nature and of man" can also be recognised as cultural landscapes (UNESCO, 2023a, s. 47). Sites are inscribed according to a determination of OUV, assessed by reference to ten criteria (UNESCO, 2023a, s. 77(i)–(x)). In addition to meeting at least one criterion, sites must satisfy integrity requirements (UNESCO, 2023a, ss. 78, 87–95), and additional authenticity requirements if proposed as a cultural WH site (ICOMOS, 1994; UNESCO, 2023a, ss. 78–86). Each site must have an adequate protection and management system to ensure maintenance of OUV (UNESCO, 2023a, ss. 78, 96–118bis).

World Heritage protection of freshwater ecosystems has important implications for biodiversity protection. While there are limited studies on freshwater biodiversity coverage across WH sites, it is estimated that they harbour roughly 40 per cent of the world's freshwater fish species and roughly 23 per cent of globally threatened freshwater fish species (see Carvalho Resende et al., 2023). Protection of freshwater biodiversity in WH sites has led to a focus on constraining the damaging effects of dams. Erkan (2022) reports it is believed that dams threaten or affect at least 20 per cent of all natural WH sites, where they have changed river flows and reduced wetland coverage (IUCN, 2015). The WH Committee has emphasised that building dams with large reservoirs within the borders of WH sites is incompatible with the WHC's protection requirements, and it has also urged parties to rigorously assess upstream and downstream impacts to protect the OUV of potentially affected sites (World Heritage Committee, 2016). These concerns have also led to industry initiatives. In 2021, the International Hydropower Association announced a commitment on behalf of its members to refrain from any future dam development within WH sites and to implement a duty of care in relation to new water resource developments within PAs (International Hydropower Association, 2021).

It is important to note that not all kinds of WH relate to ecological protection in the same way. Many, but not all, WH sites are classified as PAs. The IUCN defines a protected area as:

> *"A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley, 2008, p. 8).*

"Virtually all" natural WH sites are PAs (Dudley, 2008, p. 70), including mixed natural/cultural sites, but only a small number of cultural WH sites qualify (Dudley, 2008; Stolton et al., 2013; The Nature Conservancy et al., 2022). However, a high proportion of cultural landscapes conceptually and spatially overlap with PAs (Dudley, 2008; Finke, 2013). On this basis, cultural landscapes are included within the scope of this study. WH sites that are PAs will generally have already met the definition of a PA before their nomination. Inscription as WH provides international PA protection in addition to pre-existing domestic protections. Cultural WH sites which are not classified as cultural landscapes have been excluded from this study, although it is important to note that there are links between cultural WH and ecological conservation (Boer, 2020).

METHODS

A review of all natural, mixed natural/cultural and cultural landscape WH sites was undertaken to identify sites which include rivers (or parts thereof) as a source

Okavango Delta, Botswana © Wynand Uys

of OUV. For each site, the Statement of OUV, which is the "key reference for the future effective protection and management of the property" (UNESCO, 2023a, ss. 51, 154–155), was text-searched for the words "river", "stream", "creek", "río", "basin", "wetland", "waterfall", "watershed", "watercourse", "delta", and "aquatic". For properties which do not currently have a Statement of OUV (for example, Danube Delta), the same search terms were applied to (1) the site description available on the WH online database (UNESCO, 2023c), and (2) the relevant inscription decision. For each property that returned a positive result, the relevant site map on the WH online database (UNESCO, 2023c) (where available) was consulted to confirm that a river was included within the site boundary. Then, a determination was made whether the river contributed to OUV by assessing whether (1) the positive search terms related to a river and not a different body of water, such as a lake[1]; and (2) there was a thematic connection between the river and the applicable OUV criteria and criteria narratives. Sites were excluded if a river was merely referenced to provide geographical context, such as defining a site boundary[2].

For the purposes of this analysis, 'river' is defined according to the most prevalent international legal definition, being the 'watercourse'. Under the UN Watercourses Convention, a watercourse is "a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus" (UN Watercourses Convention, art. 2(a)). Other freshwater bodies which are not watercourses, such as lakes and wholly subterranean rivers, were excluded.

RESULTS

There are currently 227 natural sites, 39 mixed natural/cultural sites and 127 cultural landscape sites on the WH List. In this study (see supplementary materials for more information), application of the above method identified that rivers are recognised as a source of OUV in 153 WH sites: 106 natural sites, 17 mixed natural/cultural sites, and 33 cultural landscape sites (three of which are also mixed natural/cultural sites). Ninety river sites meet OUV criterion (x), as they contain "the most important and significant natural habitats for in-situ conservation of biological diversity" (UNESCO, 2023a, s. 77(x)). Seventy-three river sites meet OUV criterion (ix), which recognises "significant on-going ecological and biological processes in the evolution and development of … fresh water … ecosystems and communities of plants

and animals" (UNESCO, 2023a, s. 77(ix)). Seventy-two river sites meet OUV criterion (vii), as they "contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance" (UNESCO, 2023a, s. 77(vii)).

There is a large degree of variation across WH sites in respect of protected river area. No WH site is reported to protect an entire large river system at the catchment level. However, some WH sites do cover significant sections of large rivers. This includes the Kakadu National Park, which "incorporates significant elements of four major river systems" and is unique in "protecting almost the entire catchment of a large tropical river" (World Heritage Committee, 2013, pp. 58–59). In a new development, the Vjosa River in Albania has been proposed as a UNESCO Man and Biosphere reserve, the boundaries of which will protect the entire river basin (Wibaux, 20 April 2023). However, it is unclear whether the river will be proposed as a WH site. In contrast, some natural WH sites protect only small sections of large rivers. In the Three Parallel Rivers of Yunnan site, one of only three WH sites to include the word 'river' in its title, "large sections" of the Jinsha, Lancang and Nu Jiang rivers lie just outside the property boundary (World Heritage Committee, 2003, p. 100).

Cultural landscape WH sites identified in this study also make important contributions to the protection of rivers. The Wachau Cultural Landscape covers parts of the mainstream of the Danube, the world's most international river. The Loire Valley between Sully-sur-Loire and Chalonnes, the largest WH site in France, protects large sections of the Loire River, often termed one of the last wild rivers in Europe (Hassan, 2003; Tremblay, 2002).

DISCUSSION

Challenges for representation

These results show that rivers are represented in many WH sites. However, it is important to note that there are challenges associated with inscribing river sites as WH and their subsequent protection and management. Firstly, maintaining the integrity of river sites requires highly comprehensive protection measures. Secondly, integrity requirements may prevent many rivers from consideration as WH, as rivers worldwide are in particularly poor state of health. Finally, OUV criteria for mixed natural/cultural and cultural landscape sites fail to make specific provision for human interactions with freshwater.

Rivers are highly sensitive to anthropogenic impacts, including over long-distances (Meybeck & Helmer, 1989; Vörösmarty et al., 2010). This creates challenges for river PA management, as rivers are particularly susceptible to impacts from outside of PA boundaries (Mancini et al., 2005; Nel et al., 2009). To ensure effective river conservation, PAs ought to be established at the catchment scale (Pittock et al., 2015), or form part of a tailored multi-zoned system of conservation measures (Abell et al., 2007). Failure to establish sufficiently stringent protections can lead to the PA having no or very low impact on water quality (dos Santos Mollmann et al., 2022) and biodiveristy outcomes (Acreman et al., 2019). For WH properties, this can require implementing protections for related ecosystems beyond the PA boundary, even if these related ecosystems would not qualify as WH (Boer, 2023; UNESCO, 2023a, s. 92). Therefore, even a WH site which protects a small section of river will require extensive protections beyond site boundaries, which may act as a disincentive to proposing river sites. This challenge may explain why many river WH sites are located far away from major industrial areas (for example, the Central Amazon Conservation Complex) or in the upstream reaches of rivers (for example, the Great Himalayan National Park Conservation Area), where the impacts of anthropogenic stressors are generally less apparent.

Integrity requirements also present potential barriers to the proposal of river WH sites. Integrity is defined as "a measure of wholeness and intactness of the natural and/or cultural heritage and its attributes" (UNESCO, 2023a, s. 88). To qualify as natural WH, a site's "bio-physical processes and landform features should be relatively intact", and, for cultural landscapes, the significant features of the site "should be in good condition" (UNESCO, 2023a, ss. 89–90). However, the WHC Operational Guidelines acknowledge that "no area is totally pristine and that all natural areas are in a dynamic state, and to some extent involve contact with people" (UNESCO, 2023a, s. 90). While this statement suggests some flexibility in the application of integrity requirements, it is unlikely to allow sufficient space for consideration of many of the world's rivers, given their largely degraded state (Vörösmarty et al., 2010). Concerns regarding meeting integrity requirements have been raised by State parties in relation to proposed river WH sites, including Myanmar's Ayeyawady River Corridor site (Ministry of Environmental Conservation and Forestry of the Republic of the Union of Myanmar, 2014) and Kenya's Tana Delta and Forests Complex (Kenya Wildlife Service, 2010). The inclusion of an explicit statement in the WHC Operational Guidelines which provides a greater degree of flexibility to the WH Committee in applying the integrity test to sites which have the potential to meet the integrity threshold in

Wachau Cultural Landscape, Austria © Mario Schenk

the future but are not currently 'relatively intact' or in 'good condition', would allow for greater recognition of river sites. Care would need to be taken to ensure that appropriate undertakings for improving the integrity of the site were received, and that such discretion was only available for the inscription of sites, not the protection and management of WH generally.

OUV criteria also present a potential challenge to the recognition of river sites as WH on the basis of human use of freshwater. Criterion (v), which may be recognised for mixed natural/cultural and cultural landscape WH, states that a site should "be an outstanding example of a traditional human settlement, land-use, or sea-use …" (UNESCO, 2023a, s. 77(v)). Notably omitted from this list is freshwater use. This omission is surprising, as the oldest recognised cultural landscape in the world, Mount Wuyi (Wuyishan) in China, is a river site (Mitchell et al., 2009). It is also surprising given that IUCN's evaluation of cultural landscapes should address sustainable water use where relevant (UNESCO, 2023a, Annex 6, s C8(iii)). An amendment to criterion (v) to explicitly include freshwater use could more clearly indicate the eligibility of river sites as mixed natural/cultural and cultural landscape WH.

Implications for transboundary water cooperation

River WH sites have important implications for transboundary water cooperation. In circumstances where a WH site includes part of a transboundary river (for example, the Danube Delta, Sundarbans and Sundarbans National Park sites and others), the protection of the site becomes more complex. While the WHC has had some resounding successes in constraining damaging domestic impacts on rivers (for example, in the Tasmanian Wilderness site)[3],WHC sites on international rivers have particular vulnerabilities: not only do they require domestic protections to control domestic impacts, but they are also vulnerable to transboundary impacts originating from the territory of other States. The WHC imposes a number of obligations for the international protection of WH. Under article 6, State parties recognise that in the protection of WH "it is the duty of the international community as a whole to co-operate", while respecting each party's territorial sovereignty (WHC, art. 6.1). All parties also undertake to "give their help" in the protection of WH sites if requested to do so by the State within which the site is located (WHC, art. 6.2). In addition, State parties

undertake "not to take any deliberate measures which might damage directly or indirectly World Heritage situated in the territory of other State parties" (WHC, art. 6.3). This may conversely require States to take positive steps to prevent damaging effects originating in their territory from harming WH in the territory of other States (Forrest, 2010). The WHC Operational Guidelines also state that parties shall complete heritage and environmental impact assessments for developments which have potential direct, indirect, or cumulative impacts on the OUV of WH sites, including those in the territory of other States (UNESCO, 2023a, s. 118bis; World Heritage Committee, 2016). The WH Committee has requested several State parties to cooperate to ensure that no action will be taken that threatens the OUV or integrity of WH sites across national borders, including in respect of sites in the Democratic Republic of the Congo (World Heritage Committee, 2005) and the Lake Turkana site in Kenya. These obligations have broader implications for transboundary water cooperation.

The shared use of transboundary rivers is governed by the law of international watercourses, the substantive obligations of which are reflected in the UN Watercourses Convention. Although the UN Watercourses Convention has relatively few ratifications, many of its provisions are an authoritative statement of customary law (McCaffrey, 2008; Rieu-Clarke, 2013), including the principle of equitable and reasonable utilisation (Danube Dam Case) and the obligation to not cause significant transboundary harm (Pulp Mills Case; San Juan River Case). These obligations apply to all States, regardless of whether they have ratified the UN Watercourses Convention, with the arguable exception of States which have persistently objected to them (Fisheries Case; Sands et al., 2012; Cassese, 2005), of which there are a small number (United Nations General Assembly, 1997). However, all persistent objectors to the UN Watercourses Convention have ratified the WHC (United Nations, 2023).

Together with the UN Watercourses Convention, the WHC has promise in its potential to protect transboundary rivers, particularly from the effects of dams. In ordinary circumstances, the shared use of a river which has a WHC site is governed by both the UN Watercourses Convention and the WHC. However, the operation of two Conventions is not the same. Under the UN Watercourses Convention, water resources development will be permissible if it is consistent with equitable utilisation of the watercourse and its adequate protection and does not cause significant harm to another State (UN Watercourses Convention, arts. 5–7, 20). The WHC imposes more direct obligations in respect of dams, prohibiting deliberate measures which might directly or indirectly damage WH across borders (WHC, art. 6.3). While this obligation may seek to constrain water resources development more explicitly, the WHC, unlike the UN Watercourses Convention, does not establish any platform for the resolution of disputes, nor does it establish any enforcement mechanisms (Green Martínez, 2013; Hamman & Hølleland, 2023). A breach of WHC obligations leads to "no legal penalty, sanction or remedy provided under the Convention" (Boer & Wiffen, 2006, p. 70). While the customary law of international responsibility could potentially provide an avenue to enforce WHC obligations (Forrest, 2010), no State has ever been found responsible for a breach of article 6 (Green Martínez, 2013).

The most influential tools available to achieve compliance with the WHC are available to the WH Committee (Forrest, 2010). In response to an actual or potential breach of the WHC, the WH Committee can take a number of steps to influence State party behaviour, including placing a site on the World Heritage in Danger List (WHC, art. 11.4), which could involve "naming and shaming" State parties (Hølleland et al., 2019). However, the results of this approach are variable and have not always resulted in increased compliance (Morrison et al., 2020). If a site is damaged to the extent that its heritage attributes are lost, the WH Committee can remove it from the WH List (UNESCO, 2023a, Ch. IV.C). The WH Committee may also decide to withhold funding and support from State parties, where appropriate. Through these measures, the WH Committee is able to impose significant pressure on parties to comply with the WHC (Forrest, 2010) and can create a degree of 'compliance pull' to draw parties into conformance with WHC obligations (Franck, 1990; Goodwin, 2009).

Where a WH site protects part of a transboundary river, each of the above measures may have an impact upon the conduct and outcomes of transboundary water negotiations. The UN Watercourses Convention obligations under articles 5–7, the WHC prohibition on deliberate measures under article 6.3 and exercise of the WH Committee tools outlined above have the combined potential to, in some cases, constrain water resource development where it would damage a WH site across national borders. In this respect, the WHC shows promise in its potential to achieve enhanced protection of transboundary rivers.

CONCLUSION

Rivers are critically threated, and PAs established under the WHC provide an avenue for their enhanced protection. Of the 227 natural, 39 mixed natural/cultural, and 127 cultural landscape WH sites currently on the WH List, this study identifies a total of 153 sites that acknowledge rivers as a source of Outstanding Universal Value. While this shows that rivers are reflected in many WH PAs, there are challenges associated with this increasing river coverage. PA design and management is complicated for freshwater ecosystems, often requiring very large sites or multiple tailored management zones. Integrity requirements in the WHC Operational Guidelines also present a barrier for recognising rivers as WH, as a large proportion of rivers around the world are in a dire state of health. Allowing a greater degree of flexibility in applying integrity criteria at inscription would allow room for increased recognition of rivers as WH. Addressing the current omission of human connections to freshwater in OUV criteria would also encourage more river site nominations. It is also important to recognise that river WH sites can have significant implications for the shared use of transboundary rivers. Each of these recommendations provide steps towards encouraging WHC State parties to nominate and protect more river sites as WH.

ENDNOTES

[1] On this basis, the findings exclude a number of lake WH sites which do not include rivers as a source of OUV, but rely upon rivers for maintenance of the site's OUV. These include *Lake Turkana National Parks* and *Lake Baikal*.

[2] An example is the *Dja Faunal Reserve*.

[3] In the Australian High Court case *Commonwealth v Tasmania* the Australian Federal Government successfully constrained the Tasmanian Government from approving the construction of a dam on the Franklin River in the Tasmanian Wilderness WH site.

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SUPPLEMENTARY ONLINE MATERIAL

List of identified World Heritage sites that recognise rivers as a source of Outstanding Universal Value.

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RESUMEN

Dado el grave estado de salud de los ríos en todo el mundo y sus importantes valores patrimoniales, es necesario considerar su representación actual en las áreas protegidas inscritas en la Convención del Patrimonio Mundial de 1972 e identificar los retos y oportunidades para aumentar su cobertura. Este estudio identifica un total de 153 sitios del Patrimonio Mundial naturales, mixtos naturales/culturales y de paisajes culturales que reconocen los ríos como fuente de Valor Universal Excepcional. El reconocimiento de los sitios fluviales como Patrimonio Mundial plantea algunos retos, pero podrían fomentarse nuevas candidaturas mediante la modificación de las Directrices Prácticas de la Convención del Patrimonio Mundial para permitir una mayor discrecionalidad en relación con los requisitos de integridad en el momento de la inscripción y reconocer explícitamente el uso del agua dulce como base para el reconocimiento de los sitios de paisajes mixtos naturales/culturales y culturales. También existe la oportunidad de fomentar la nominación de más sitios fluviales reconociendo las importantes implicaciones de la inscripción en el Patrimonio Mundial para la cooperación internacional en materia de agua. En conjunto, estas recomendaciones ofrecen un camino a seguir para mejorar el lugar de los ríos en las áreas protegidas del Patrimonio Mundial.

RÉSUMÉ

Compte tenu de l'état de santé désastreux des rivières dans le monde et de leurs valeurs patrimoniales significatives, il est nécessaire d'examiner leur représentation actuelle dans les zones protégées inscrites au titre de la Convention du patrimoine mondial de 1972 et d'identifier les défis et les possibilités d'accroître leur couverture. Cette étude identifie un total de 153 sites du patrimoine mondial naturels, mixtes naturels/culturels et de paysages culturels qui reconnaissent les rivières comme une source de valeur universelle exceptionnelle. La reconnaissance des sites fluviaux en tant que patrimoine mondial pose des problèmes, mais de nouvelles propositions d'inscription pourraient être encouragées en modifiant les orientations de la Convention du patrimoine mondial afin de permettre une plus grande marge de manœuvre en ce qui concerne les exigences d'intégrité lors de l'inscription et de reconnaître explicitement l'utilisation de l'eau douce comme base de reconnaissance des sites mixtes naturels/culturels et des sites de paysages culturels. Il est également possible d'encourager d'autres propositions d'inscription de sites fluviaux en reconnaissant les implications importantes de l'inscription au patrimoine mondial pour la coopération internationale dans le domaine de l'eau. L'ensemble de ces recommandations constitue une voie à suivre pour renforcer la place des cours d'eau dans les zones protégées du patrimoine mondial.

SHORT COMMUNICATION:
CLARIFYING 'LONG-TERM' FOR PROTECTED AREAS AND OTHER EFFECTIVE AREA-BASED CONSERVATION MEASURES (OECMS): WHY ONLY 25 YEARS OF 'INTENT' DOES NOT QUALIFY

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ABSTRACT

The concept of 'long-term' is a key part of the definitions of both protected areas and other effective area-based conservation measures (OECMs). Draft principles for OECMs in Australia developed by the Australian Government propose a minimum period for OECMs of 25 years, where a landholder is not able to commit to in-perpetuity conservation. The proposal suggests this is consistent with IUCN *Guidelines for Privately Protected Areas*. As authors of the *Guidelines for Privately Protected Areas* we contend however that Australia's proposed OECM guideline suggesting 25 years of "intention" to deliver biodiversity outcomes is 'long-term' is not supported by IUCN guidelines. Furthermore for protected areas, Australia has a long-established definition of 'long-term' – specifically a minimum timeframe of 99 years is required if permanent protection is not possible – embedded in both national policy and legal agreements. As national governments rapidly seek to define OECMs in response to the raised ambitions of the Kunming-Montreal Global Biodiversity Framework, there will be increasing interest in what counts towards Target 3. Ultimately, more land managed for conservation is good and all forms of area-based conservation should be encouraged. However, not all forms of area-based conservation qualify for inclusion in Target 3. Long-term intent and outcomes are fundamental, as outlined in the definitions of protected areas and OECMs.

Key words: long-term, area-based conservation, protected areas, set-term agreements, Kunming-Montreal Global Biodiversity Framework, Target 3, 30x30

The concept of 'long-term' is a key part of the definitions of both protected areas (Dudley, 2008) and other effective area-based conservation measures (OECMs) (CBD, 2018; IUCN-WCPA Task Force on OECMs, 2019). All protected areas reported to UNEP-WCMC need to meet the definition of a protected area and associated principles agreed by IUCN. The definition is: "*A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values*" (Dudley, 2008). The IUCN guidance defines every phrase within this definition. The definition of 'long-term' is: "Protected areas should be managed in perpetuity and not as a short-term or temporary management strategy." This means areas that are only temporary measures, such as short-term grant-funded agricultural set-asides, rotations in commercial forest management or temporary fishing protection zones are not protected areas as recognised by IUCN.

However, in some jurisdictions, it can seem a challenge for owners and managers of non-state-owned areas such as Privately Protected Areas (PPAs) to ensure and demonstrate protection for the long term, in effect in perpetuity. IUCN thus developed guidance to help PPA owners and managers interpret the broader IUCN protected area guidance to demonstrate conservation in the long term (Mitchell et al., 2018; Stolton et al., 2014).

Land for Wildlife is a high-profile area-based private land conservation program in Australia. However, agreements can be ended at any time, so would not, on their own, be considered long-term and thus not an OECM. © James Fitzsimons

The IUCN's *Guidelines for Privately Protected Areas* (Mitchell et al., 2018) make it clear that PPAs need to meet IUCN's definition of a protected area, including for long-term conservation. In some countries, PPA declaration brings legal obligations for long-term protection or has legal provisions to achieve long-term protection, putting PPAs on equal footing to state-run protected areas. Where this is not the case, IUCN made suggestions in the PPA Guidelines as to how sites could ***demonstrate*** their long-term intent for conservation in perpetuity. The *Guidelines for Privately Protected Areas* state:

> "In '*The Futures of Privately Protected Areas*' (Stolton et al., 2014) 'long-term intent' was proposed as an alternative to 'long-term conservation', to encompass a broader set of situations. The report proposed that PPAs should demonstrate an intent to conservation 'in perpetuity', or at least 'long-term'. Defining long-term for any protected area is fraught with difficulties and some government-managed protected areas may not be secure in the long term (Mascia et al., 2014). With PPAs it is understood that it can take time to put in place arrangements (covenants, tenure agreement, etc.) which ensure permanent protection. IUCN's guidance is that PPAs should demonstrate conservation in perpetuity or at least the intent for conservation in the long term, the latter being defined in this case as for a minimum of 25 years (Stolton et al., 2014)."

The guidelines go on to elaborate this in more detail, noting that:

- 'long-term' should be ***proven*** for at least 25 years, but the ***intent*** should be for perpetuity, thus PPA status should transcend changes of ownership, through easement, covenant, wills, etc.
- where formal agreements relating to PPAs are short-term they should be tied to commitments for long-term protection (e.g. renewable agreements or long-term stated objectives) and the ending of agreements should never prohibit continuation of PPA status.

Long-term intent should also be linked to conservation actions which demonstrate commitment to conservation, such as:

- Some form of long-term monitoring to ensure adherence to conservation intent.
- Active or passive management practices being applied to safeguard the integrity of natural resources present

Ramin Cowling Bushland Reserve, Melbourne, Australia. Reserves established by local governments to maintain and protect native vegetation have not typically been included the the protected area estate. Further assessment may identify them as protected areas or OECMs, as there is a clear intent to maintain and manage for this purpose in the long term. © James Fitzsimons

in the PPA, that are validated by local or regional units of a national association of PPAs with guidelines and a national inventory (Stolton et al., 2014).

The Australian Government has released a *Draft National Other Effective Area-based Conservation Measures Framework* which includes draft principles to guide OECM development in Australia (Commonwealth of Australia, 2024). These principles are largely in line with global guidance for OECMs (IUCN-WCPA Task Force on OECMs, 2019). However, on the topic of *Longevity* the Australian principles (Commonwealth of Australia, 2024) stated "Where a landholder is not able to commit to in-perpetuity conservation, a minimum period for Conserved Areas is 25 years. This is consistent with the minimum requirement for Privately Protected Areas (PPAs) to be considered protected in the long-term, set out in the *IUCN Guidelines for Privately Protected Areas* (Mitchell, B.A. et al., 2018)".

As authors of the IUCN *Guidelines for Privately Protected Areas* (Mitchell et al., 2018), which was cited to justify this definition of 'long-term', we are concerned that our practical discussion on how to demonstrate the future effectiveness of conservation has been misinterpreted to demonstrate a minimum period of conservation.

To reiterate, this guidance does not mean that protected areas can be established for only 25 years, but that long-term intent can be demonstrated in several ways. If, for existing policy or legal reasons, the management objectives of a site need to be regularly reviewed, we proposed 25 years as a minimum period between review, provided that relevant stakeholders show clear intent to continue conservation management in the long term (Mitchell et al., 2018). It should be noted that the IUCN's OECM guidance also discusses the term 'long-term' noting that "IUCN's guidance is that the factors that govern and manage an OECM should be expected to be ongoing and for the long-term" (IUCN-WCPA Task Force on OECMs, 2019).

As such, we contend that the Australian Government's proposed OECM guidelines suggesting 25 years of 'intention' to deliver biodiversity outcomes is 'long-term' is not supported by IUCN guidelines on area-based conservation (Dudley, 2008; IUCN-WCPA Task Force on OECMs, 2019; Mitchell et al., 2018; Stolton et al., 2014).

This is a problem for two reasons. First, 'intention' does little for biodiversity if the landholder chooses to sell their property a few years after being recognised as an

OECM and the new owner has no such conservation interest (Fitzsimons et al., 2024). Australia has well-developed conservation covenant programmes (Fitzsimons, 2015; Fitzsimons & Carr, 2014) that all state governments already use to counter against this very scenario. The covenants are attached to the land title and bind future landholders forever. For this reason, these are considered PPAs.

Second, a 25-year timeframe is at odds with long-established Australian policy for defining 'long-term' for protected areas. A minimum timeframe of 99 years is required if permanent protection is not possible as stated in the *Strategy for Australia's National Reserve System 2009–2030* (NRMMC, 2009) and written into legal agreements for funding for land purchases to state government agencies or NGO land trusts (Fitzsimons, 2006). Australia's long-standing policy position for "99 years or more" was also stated in the IUCN's *Guidelines for Privately Protected Areas* (i.e. Fitzsimons, 2018, p. 62).

Australia's proposal also seems inconsistent with the recently passed *Nature Repair Act 2023*. This law added provision for a 100-year agreement (in addition to its original 25-year agreement) (Parliament of the Commonwealth of Australia, 2023) during the drafting and consultation period. This change was based on feedback that 25-year agreements did not equate to 'long-term'.

Adoption of a 25-year 'intention' as equating to 'long-term' would represent significant backsliding for conservation policy in Australia. Australia has a proud history of innovative protected area policy and approaches (Fitzsimons et al., 2023). The development of OECM policy in Australia needs to complement and advance this, not erode the standards by weakening long-agreed definitions of 'long-term'.

Ultimately, more land managed for conservation is good and all forms of area-based conservation should be encouraged. However, not all forms of area-based conservation qualify for inclusion in global biodiversity targets. Long-term intent and outcomes are fundamental, as outlined in the definitions of protected areas and OECMs.

As national governments rapidly seek to define OECMs in response to the raised ambitions of the Kunming-Montreal Global Biodiversity Framework (GBF), there will be increasing interest in what counts towards Target 3. Significant deviation from global guidance and existing national policy that lessens the chances of achieving long-term conservation sets a concerning precedent and is not consistent with the intent of the GBF. We trust the above expansion of the explanation of long-term timeframes as they relate to PPAs (and thus potentially other forms of area-based conservation) is helpful for national and subnational governments to aid in their decision-making.

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RESUMEN

El concepto de "largo plazo" es una parte fundamental de las definiciones tanto de áreas protegidas como de otras medidas eficaces de conservación basadas en áreas (OECM). El borrador de principios para las OECM en Australia elaborado por el Gobierno australiano propone un periodo mínimo de 25 años para las OECM cuando el propietario no pueda comprometerse a conservarlas a perpetuidad. La propuesta se ajusta a las Directrices de la UICN sobre áreas protegidas privadas. Sin embargo, como autores de las Directrices para las áreas protegidas privadas, sostenemos que las directrices de la UICN no respaldan la directriz propuesta por Australia para los OECM, según la cual 25 años de "intención" de obtener resultados en materia de biodiversidad es "a largo plazo". En el caso de las áreas protegidas, Australia cuenta con una definición de "largo plazo" establecida desde hace mucho tiempo -concretamente, se requiere un plazo mínimo de 99 años si no es posible la protección permanente-, tanto en la política nacional como en los acuerdos legales. A medida que los gobiernos nacionales intenten definir rápidamente las OECM en respuesta a las mayores ambiciones del Marco Global de Biodiversidad de Kunming-Montreal, aumentará el interés por lo que cuenta para el Objetivo 3. En última instancia, es bueno que haya más tierras gestionadas para la conservación y deben fomentarse todas las formas de conservación basada en zonas geográficas específicas. Sin embargo, no todas las formas de conservación basada en áreas pueden incluirse en la Meta 3. La intención y los resultados a largo plazo son fundamentales. La intención y los resultados a largo plazo son fundamentales, como se indica en las definiciones de áreas protegidas y OECM.

RÉSUMÉ

Le concept de "long terme" est un élément clé des définitions des zones protégées et des autres mesures de conservation efficaces basées sur les zones (OECM). Le projet de principes pour les OECM en Australie, élaboré par le gouvernement australien, propose une période minimale de 25 ans pour les OECM, lorsqu'un propriétaire foncier n'est pas en mesure de s'engager à une conservation à perpétuité. La proposition suggère que cela est cohérent avec les lignes directrices de l'UICN pour les zones protégées privées. En tant qu'auteurs des lignes directrices pour les zones protégées privées, nous soutenons cependant que la ligne directrice OECM proposée par l'Australie, qui suggère que 25 ans d'"intention" de fournir des résultats en matière de biodiversité est «à long terme", n'est pas soutenue par les lignes directrices de l'UICN. Pour les zones protégées, l'Australie dispose d'une définition de "long terme" établie de longue date - en particulier un délai minimum de 99 ans est requis si une protection permanente n'est pas possible - intégrée à la fois dans la politique nationale et dans les accords juridiques. Comme les gouvernements nationaux cherchent rapidement à définir les OECM en réponse aux ambitions accrues du cadre mondial pour la biodiversité de Kunming-Montréal, il y aura un intérêt croissant pour ce qui compte pour la réalisation de la cible 3. En fin de compte, l'augmentation du nombre de terres gérées à des fins de conservation est une bonne chose et toutes les formes de conservation par zone doivent être encouragées. Cependant, toutes les formes de conservation par zone ne peuvent pas être incluses dans l'objectif 3. L'intention et les résultats à long terme sont fondamentaux, comme le soulignent les définitions des zones protégées et des OECM.