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Developing capacity for a protected planet

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IUCN WCPA WORLD COMMISSION ON PROTECTED AREAS

Convention on Biological Diversity

protected planet

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

IUCN WCPA'S BEST PRACTICE PROTECTED AREA GUIDELINES SERIES

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.

A full set of guidelines is available at: www.iucn.org/pa_guidelines
Complementary resources are available at: www.cbd.int/protected/tools/
Contribute to developing capacity for a Protected Planet at: www.protectedplanet.net/

PARKS is published electronically twice a year by IUCN's World Commission on Protected Areas. For more information see: www.parksjournal.com

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 fulfill 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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PARKS: THE INTERNATIONAL JOURNAL OF PROTECTED AREAS AND CONSERVATION

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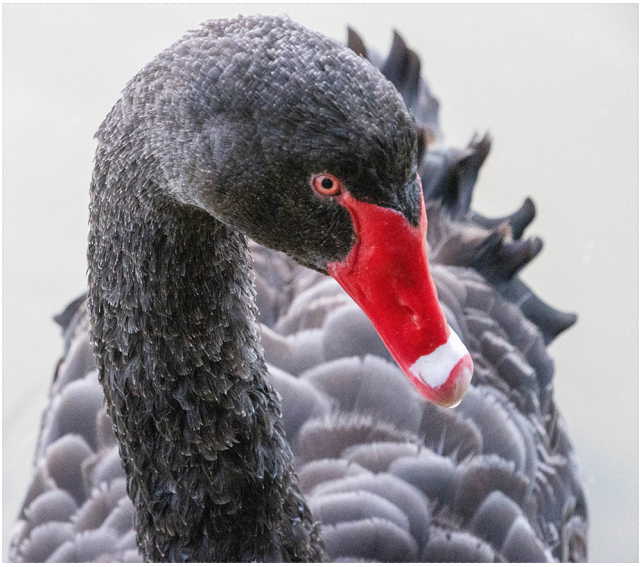

EDITORIAL

Marc Hockings, Managing Editor

Convention on Biological Diversity COP15

As this issue goes to press, the second phase of the 15th Meeting of the Conference of the Parties (COP15) of the Convention on Biological Diversity is getting underway in Montreal, Canada. This is the much delayed second part of COP15 (the first phase was held in Kunming China and virtually online in 2021). COP15 was originally scheduled to be held in 2020 with its major item of business being the development and adoption of a new biodiversity strategy and targets as the successor to the biodiversity strategy and Aichi targets developed in 2010 at the CBD COP in Japan but the global pandemic , COVID-19 intervened.

It is fair to say that the negotiations have been long and arduous. As Inger Anderson, Executive Secretary of the UN Environment Programme observed in an article in *Policy Commons* in September this year "...despite the achievement of four meetings of the Open-ended Working Group, much work is needed before and at COP15 to reach a final agreement." Let us hope that an ambitious and transformational Global Biodiversity Framework can be agreed in Montreal.

In the context of protected and conserved areas, many of the key issues and challenges that we hope the Global Biodiversity Framework, and especially Target 3, will address have been discussed at regional protected area congresses in recent years. The Editorial Essay in this issue by Mitchell et al. reviews the outcomes form congresses in Latin America (2019), Asia (2022) and Africa (2022). Key messages that Mitchell et al. distilled from these Congresses are:

- the need for more and better area-based conservation (the 30 x 30 objective);
- putting people at the centre of conservation - addressing governance and equity;
- recognizing the nexus of climate, biodiversity and health - protected and conserved area as nature-based solutions;
- achieving more sustainable conservation financing; and
- promoting greater youth engagement and urban conservation.

These are all issues that must be addressed in implementing the plans developed at COP15.

PARKS

It is now just over 10 years since the re-birth of *PARKS* in September 2012 as a peer reviewed journal, during which time 26 issues have been published. There continues to be strong flow of papers submitted for consideration. The journal has an impact score of 3.05 and is ranked in the 63 percentile (70th of 192 journals) of journals in Nature and Landscape Conservation in the Scopus bibliographic database.

While climbing steadily in journal rankings since being indexed in Scopus and listed in the Database of Open Access Journals, PARKS has maintained its positioning as a journal open to authors from diverse practitioner as well as academic backgrounds and from all regions of the world. In the past year, the 15 papers published in the journal, included 112 authors from 23 countries, only a quarter of whom work in traditional academic institutions.

EDITORIAL ESSAY: TRENDS IN PROTECTED AND CONSERVED AREAS: REFLECTIONS FROM REGIONAL PARKS CONGRESSES

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ABSTRACT

In 2022, two major regional congresses on protected and conserved areas, the 2nd Asia Parks Congress and the inaugural IUCN Africa Protected Areas Congress, were convened in Sabah, Malaysia and Rwanda, respectively. These well-attended and highly inclusive congresses were significant milestones for setting regional priorities for the next decade, and for preparing for CBD COP15, highlighting conservation successes, challenges and opportunities and fostering commitment and collaboration. They gave an important voice to both Indigenous Peoples and local communities, as well as to youth, to discuss challenging issues in each region. This editorial summarises trends and recommendations from these major gatherings.

Key words: inclusive conservation, equity, governance, Global Biodiversity Framework, Asia, Africa, 30x30

INTRODUCTION

The year 2022 is particularly important for biodiversity conservation with nations coming together at CBD COP15 in December to make commitments for an ambitious Global Biodiversity Framework (GBF). The GBF is being negotiated to put biodiversity on a path to recovery by 2030 for the benefit of planet and people. In the lead up to this important global conference, IUCN – including the World Commission on Protected Areas (WCPA) and IUCN Members – plus host country partners successfully delivered two major regional congresses for protected and conserved areas in Asia and in Africa. More than four years in preparation and delayed by the Covid-19 pandemic, these two congresses were an opportunity for a diverse range of conservation practitioners to come together to discuss opportunities and challenges to strengthen systems of protected and conserved areas across the regions, and to contribute to the achievement of the post-2020 Global Biodiversity Framework.

In late May, the Second Asia Parks Congress (APC) was convened in Kota Kinabalu, Sabah, Malaysia, nine years after the first APC in Japan in 2013. The congress, jointly convened by Sabah Parks and IUCN in one of the most diverse natural and cultural regions of the world, was one of the first large environmental gatherings to be held in Asia since the start of the Covid-19 pandemic. It attracted more than 1,250 participants from 49 countries across Asia and beyond, representing government agencies, NGOs, international organisations, youth, representatives of both Indigenous

Peoples and local communities, academia and the private sector. Under the theme of Parks for Nature and People, the congress highlighted important conservation successes and identified the priorities for the next decade to strengthen effective systems of protected and conserved areas across the region, and to contribute to the achievement of the post-2020 Global Biodiversity Framework. The theme of the 2nd APC celebrated the relationship between nature and society through two forums, Indigenous Peoples and Local Communities, and Youth, making it a truly inclusive conservation gathering.

Just six weeks later, a similarly diverse group of conservationists gathered for the first-ever IUCN Africa Protected Areas Congress (APAC), held from 17–23 July 2022 in Kigali, Rwanda and convened jointly by the Government of Rwanda, IUCN and the African Wildlife Foundation (AWF), with strong support from WCPA. The congress attracted more than 2,400 participants from 53 African and 27 other countries representing governments, African regional bodies, NGOs, national and international experts and organisations, local community members, Indigenous Peoples' representatives, youth, academia, the judiciary, development partners and the private sector. It was a congress organised by Africans for Africa – celebrating and acknowledging the skills and commitment of Africa to conservation, sustainable use of nature and human well-being under the theme For People and Nature.

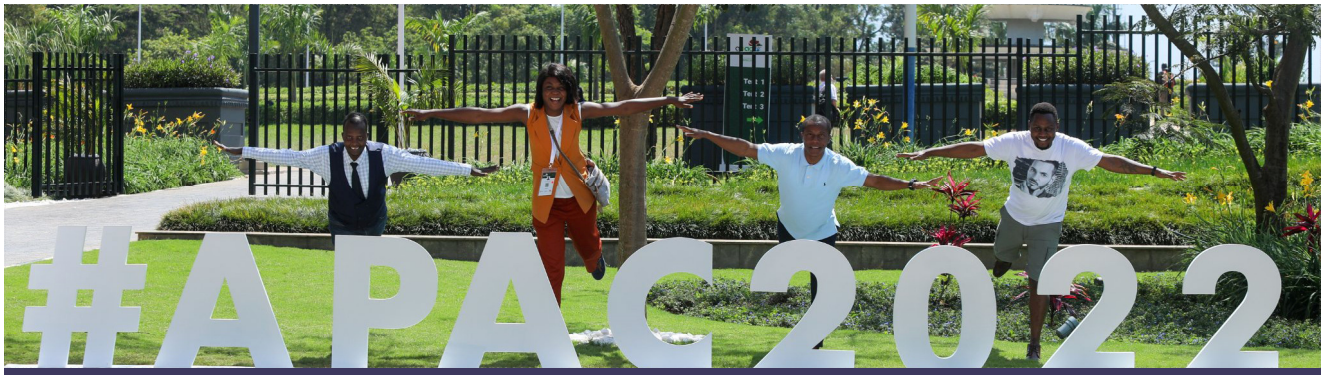
The Asia and Africa congresses were noteworthy for the diversity, enthusiasm and action-oriented approaches of their participants. They were significant milestones in conservation practice, reflecting a stronger focus on improving inclusivity in conservation and the role that protected areas can serve in addressing the multiple environmental challenges facing humankind. Messages from these two events in Africa and Asia reflect and confirm many of the key messages delivered previously by the Congress of Protected Areas of Latin America and the Caribbean (CAPLAC III) held pre-pandemic in 2019 in Peru. All three regional congresses brought together conservation practitioners and other rights-holders and stakeholders to share experience, debate strategies and craft a vision for moving forward. While there were some regional differences in focus and recommendations, there were many common themes and messages, including strong participation from Indigenous Peoples and youth, with dedicated pavilions and forums organised by them. The congress initiatives, priorities and recommendations can be seen as a proxy for global trends since the last IUCN World Parks Congress in 2014. All three congresses concluded with declarations and calls for action. This editorial explores some of those messages and themes, with a particular focus on the two most recent events, APC and APAC.

Calls for more, and better, area-based conservation

Both the Asia and Africa congresses called for greater ambition in setting targets for protected and conserved areas while recognising the critical roles of different rights-holders and stakeholders in the stewardship of nature. The Kota Kinabalu Declaration (Supplementary Online Material) explicitly calls for conservation of at least 30 per cent of lands and of oceans across Asia to ensure that the most important biodiversity areas, with their associated ecosystem services and cultural and spiritual values, are conserved in effective protected and conserved area systems to deliver both conservation and social outcomes. The Kigali Call for Action for People and Nature (Supplementary Online Material) was less explicit in terms of percentage targets but, in both individual events and ministerial speeches, there was strong support for protection of at least 30 per cent of terrestrial, freshwater and marine ecosystems by 2030, as proposed for Target 3 of the GBF, currently under negotiation. These recommendations for more ambitious targets, with more effective, equitably governed and well-connected protected and conserved areas echo declarations from CAPLAC III and, indeed, from the IUCN World Parks Congress 2014 in Sydney. At all three regional congresses there were calls to encourage, support and undertake assessments of the governance and management of protected and conserved areas benchmarked against universal standards such as the IUCN Green List Standard, and the Conservation Assured standard. At all three congresses, special events were held to celebrate the Green-listing of sites, and the commitments of countries to implement the Green List Standard. At Kota Kinabalu, the Sugud Island Marine Conservation Area was the first area in Sabah to achieve this listing.

Putting people at the centre of conservation

Governance and equity were major themes at both APC and APAC, emphasising the need for more inclusive and equitable approaches to conservation and recognising the diversity of rights-holders and governance arrangements for protected and conserved areas (a theme first highlighted at the Fifth IUCN World Parks Congress in Durban in 2003, where an entire stream was devoted to the topic of governance). While at CAPLAC III, themes related to Indigenous Peoples and local communities were threaded throughout the streams, and the entire congress, both APAC and APC, notably set out dedicated streams of work on these



Welcome with open arms to the Africa Protected Areas Congress, Kigali, Rwanda © Sean Southey

topics. A focus on People was one of the three main themes of APAC emphasising the recognition of diverse values and the stewardship roles and rights of Indigenous Peoples, local communities and women, while APC dedicated an entire stream to the topic of shared governance.

The APAC proceedings were enriched by a two-day pre-congress Indigenous Peoples and local communities event convening more than 200 participants, many of whom had also participated in the ICCA General Assembly in Kigali immediately prior to the Congress. In addition to providing input to the overall congress declarations, Indigenous Peoples and local communities also issued their own powerful statements calling for recognition and redress of past injustices, better respect for the rights, identities, traditional knowledge, governance systems and customary laws of all rights-holders and stakeholders and more direct involvement in future conservation efforts. The formal declarations from both congresses reflected these important inputs and responded to the calls for respect and inclusion (see the Api Api Declaration).

At both congresses there were strong recommendations for an ambitious post-2020 GBF that enhances and empowers the diversity of governance in protected and conserved areas and the need to take a rights-based approach to identify, recognise and support other effective area-based conservation measures (OECMs), privately protected areas and ICCAs/Territories of Life. Many events focused on community governance and management and the crucial role that OECMs will play in achieving the proposed new targets under the GBF. There is still some confusion about what qualifies as an OECM, though WCPA has issued clear guidance (IUCN WCPA, 2019; Jonas & MacKinnon, 2021). Since the definition and criteria for OECMs were only approved at COP 14 in 2018, there was much discussion on the challenges, opportunities and need for capacity building to help countries to identify, recognise and support these areas while respecting the rights and concerns of Indigenous Peoples and local communities and other private actors and stakeholders. Like protected areas, OECMs can have a wide range of governance and management models but could offer a particular opportunity to recognise and support the stewardship of important biodiversity by both Indigenous Peoples and local communities, and other actors. It is essential, however, to ensure that the establishment of new protected areas and the reporting of OECMs on community lands and waters are only undertaken with the involvement of Indigenous Peoples and local communities, with recognition of their governance and customary management systems, and with their free, prior and informed consent.

There was a particular emphasis in Africa to promote the truly sustainable use of natural resources and investment in building an appropriate wildlife economy through rights-based approaches and strategies to reduce human–wildlife conflict while halting human rights abuses associated with park management and enforcement. This would require stronger support and resourcing of rangers to carry out their work professionally, responsibly and accountably in a way that respects human rights. Governments and other organisations were urged to adopt the new International Ranger Federation Code of Conduct[1] presented at APAC. An inspiring evening event celebrated recipients of the IUCN WCPA International Ranger Awards, several of them community and Indigenous rangers.

Nexus of climate, biodiversity and health: protected and conserved areas as nature-based solutions

Climate Change and Protected Areas was a key theme at both congresses. Both Asia and Africa are especially vulnerable to the impacts of climate change; the frequency and intensity of natural disasters, including floods and landslides; and environmental degradation

and habitat loss leading to the emergence of pandemic diseases, plus threats to food security.

In high-level events and particular sessions, there were strong calls for a more integrated approach to addressing the climate and biodiversity crises. In particular this was underscored by several of the African ministers attending APAC with emphasis on the importance of protected and conserved areas as nature-based solutions to regional challenges, human health and well-being. It is noteworthy, for example, that the 6 million km² of Africa's protected and conserved areas provide food and water security, erosion and flood control, disease control, climate regulation, carbon sequestration and a host of other critical ecosystem services which underpin human welfare and well-being, yet these values are rarely recognised in national accounting. At APC, the Japanese government sponsored the stream examining the links between nature-based solutions, protected areas and OECMs, providing many examples from within and beyond the region and discussing tricky issues relating to identification and management of OECMs in particular.

There was widespread agreement that the twin crises of climate change and biodiversity loss must be addressed simultaneously and that greater efforts should be made to promote the role of protected and conserved areas (including OECMs), Indigenous Peoples' territories and community conserved areas as contributing nature-based solutions helping people to cope with climate change (Dudley et al., 2010). Countries were encouraged to consider protected and conserved areas as a first option for climate adaptation and mitigation,

Indigenous Peoples Event, APC © Brent A. Mitchell

incorporating effective area-based conservation measures into Nationally Determined Contributions under the UNFCCC. Recognising that climate change will lead to geographic shifts in the distributions of species and habitats and impact human livelihoods and migration, there were also recommendations to avoid and mitigate the impacts of new infrastructure and to restore fragmented and degraded ecosystems to maintain ecological connectivity through networks of protected and conserved areas, including OECMs and transboundary areas.

Not surprisingly the Covid-19 pandemic has focused attention on the relationship between effective conservation and human health and well-being (Hockings et al., 2020 [see also Phillips, A. & Mitchell, B.A. (2021) PARKS 27 special issue.] Delegates emphasised the need to position protected and conserved areas as significant elements within One Health frameworks, ameliorating land degradation and contributing to sectoral and institutional cooperation and coordination for health promotion – including detection and treatment of disease and better understanding of pathways to human and environmental health and well-being.

More sustainable financing

All efforts to create effective networks of protected and conserved areas under different governance and management regimes will require mechanisms to ensure more sustainable conservation financing. It is generally recognised that many protected areas are seriously underfunded to deliver effective conservation. The situation has been exacerbated during the Covid-19 pandemic when revenues from tourism were reduced markedly or lost altogether. Funding challenges were particularly acute in community-conserved areas. As progress is made in recognising OECMs, additional funding will be needed to help support them. Both APC and APAC had dedicated sessions, including high level panels, on new and innovative financing mechanisms, including the importance of utilising climate finance to leverage additional biodiversity benefits and support human livelihoods.

WCPA Chair Madhu Rao, Asia Parks Congress © Brent A. Mitchell

The congresses called for mobilising and scaling up public and private investment in nature-positive actions; phasing out harmful subsidies and mainstreaming nature into development, production sectors and policy. There was particular emphasis on ensuring that climate and other conservation-financing instruments, including compensation mechanisms for communities affected by human–wildlife conflict, should be fair, equitable and efficient and deliver direct benefits to Indigenous Peoples and local communities. In addition to broader discussions on the merits of specific trust funds and other new and innovative financing mechanisms, a new conservation fund was launched at APAC. Sponsored by AWF and several prominent African leaders, a new Pan-African Conservation Trust (APACT) would complement existing financing mechanisms to mobilise significant public, private and philanthropic funding into protected and conserved areas across all 54 countries.

Promoting greater youth engagement and urban conservation

Recognising the energy and enthusiasm that youth can bring to conservation and the fact that young professionals will be future leaders in protected and conserved areas, the organisers of both APC and APAC made a special effort to support youth participation through specific forums and events. Under the banner of #NatureforAll, WCPA and the IUCN Commission on Education and Communication collaborated with other organisers to support a very successful Youth Forum at APC and a two-day pre-congress event at APAC. These were designed to share conservation stories and encourage increased stewardship and action for protected and conserved areas. Youth delegates called for more opportunities to promote capacity-development opportunities for young people to enhance their knowledge, and to promote the development and mentorship of young leaders. Korea National Park Service committed to establish the Asia Youth Network for Protected and Conserved Areas as a platform for youth involvement, to enable sharing of experiences in conservation, and to enable youth to voice their concerns regarding conservation. The network was formally launched last September with support from Korea National Park Service, the IUCN Asia Regional Office and WCPA, and nearly 250 youth participated in the 2nd Asia Congress.

While many of the key themes and topics at the regional congresses were similar, there were some specific differences. Urban Conservation was one of the six working group themes in Asia with a strong emphasis on conserving and restoring nature in cities, to strengthen their ecological, social and climate resilience, and to help prevent, manage and recover from human-induced and natural disasters. Events under this topic emphasised engaging stakeholders from all sectors of society, especially young people, in nature-related activities within and beyond cities through regular outreach, innovative experiences and the use of science and technology.

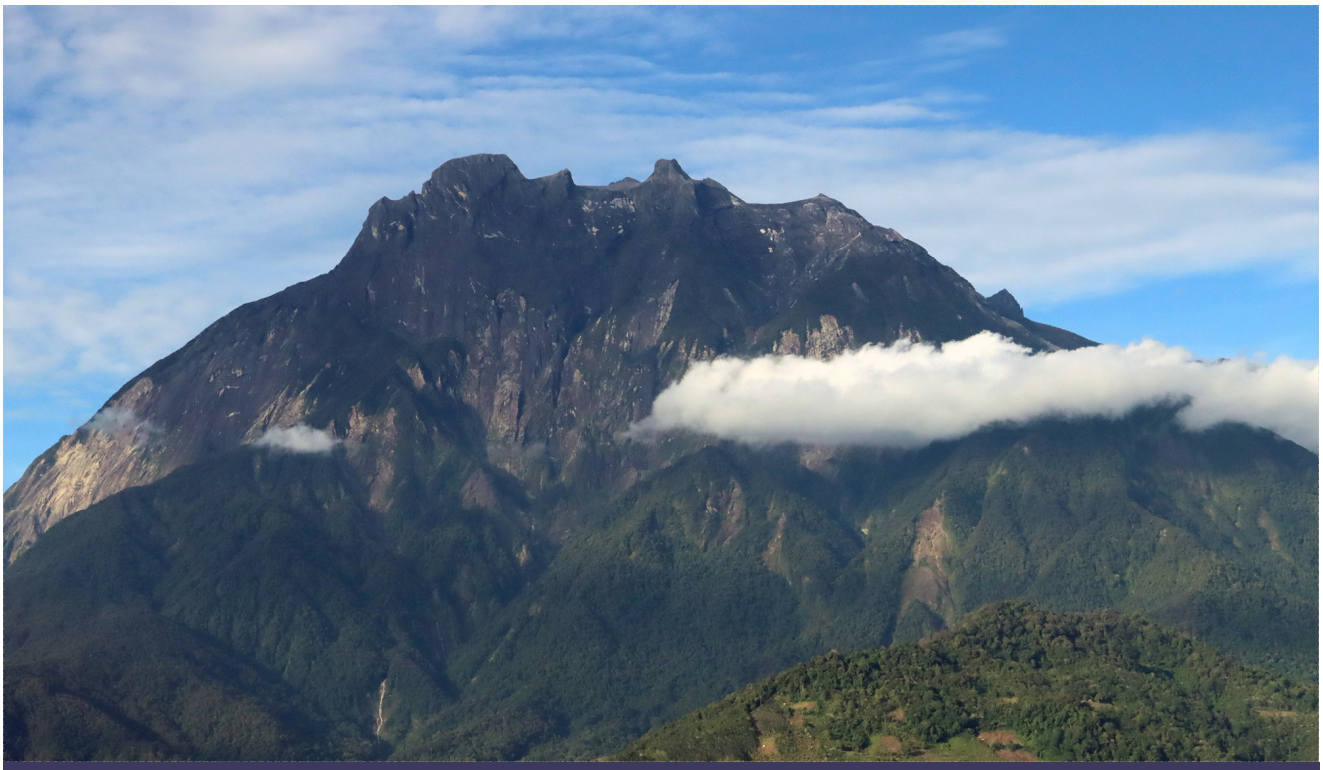
Follow-up

Like the previous CAPLAC III congress, the APC and APAC concluded with declarations and calls to action to maintain momentum and strengthen conservation efforts in the regions. Delegates committed to convey key messages from the congresses to Biodiversity COP 15 for the post-2020 Global Biodiversity Framework, and to UNFCCC COP 27 as well as to the 7th ASEAN Heritage Parks Conference, the 5th International Marine Protected Area Congress, and to the next IUCN World Parks Congress, tentatively planned for 2027 or 2028.

There were several commitments and recommendations to strengthen regional networks in support of protected and conserved areas. APAC's Call to Action, for example, called for enhanced pan-African collaboration, cooperation and partnership for protected and conserved area systems throughout the continent, involving all governance authorities and organisations as well as a pan-African mechanism to monitor delivery of APAC commitments.

In 2019, CAPLAC III established a Protected Area Day to be celebrated annually on 17 October. Already each year during the ongoing restrictions of the pandemic, the organisers have celebrated the event with well-organised online events. APAC decided to follow suit with a request to the African Union Commission to declare 18 July of each year as the 'Africa Protected and Conserved Areas Day' to be observed and celebrated across the continent. The APC Declaration called for further development of the Asia Protected Areas Partnership as a regional forum for protected area agencies, and encouraged the Partnership to convene regular Asia Parks Congresses in the future.

IUCN WCPA was a key partner in convening all three regional congresses with many Commission members



Mt Kinabulu, Sabah Malaysia © Marc Hockings

contributing to workshops and streams. Immediately after APC, WCPA held its first face-to-face meeting of the new steering committee in Kinabalu Park, Sabah to develop a clear strategic plan of action by the Commission over the next three years. WCPA commits to supporting follow-up actions on the congress priorities including additional emphasis and stronger work programmes on urban parks, ecosystem restoration, and the nexus between biodiversity conservation, climate and human health.

CONCLUSION

It should not be surprising that declarations from all three regional conferences had common themes. Many of the priority streams and events focused on topics that are of key concern to the conservation community: more inclusive and equitable conservation; effective systems of protected areas and other effective area-based conservation measures; sustainable financing. They emphasise the nexus between solutions for both biodiversity loss and climate change, with protected and conserved areas serving as nature-based solutions to these global environmental challenges. Nevertheless, the declarations directly reflect the experience and deliberations of the thousands of people involved in the events, with a few interesting regional differences in priorities and emphasis. Such regional specifics include a greater focus on urban and marine conservation in Asia and on a sustainable wildlife economy in Africa.

Key messages and calls to action align well with global aspirations expected to be agreed in the Global Biodiversity Framework of the Convention on Biological Diversity. Priorities articulated in each congress align closely with the draft language of the Framework, particularly Target 3, calling for ambitious expansion of the area under some form of conservation, especially areas of particular importance for biodiversity and its contributions to people, …effectively managed and equitably governed, …ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, … integrated into wider landscapes and seascapes.

From planning to delivery, these regional conferences constitute a powerful example of the commitment of many people and organisations coming together to deliberate and agree on pathways to effective conservation: government agencies, IUCN Members, regional offices and Commissions. The congress declarations express a collective aspiration to do more, with diverse stakeholders, with more support for protected and conserved areas as natural solutions to biodiversity loss, climate change and health crises. In the words of the earlier CAPLAC III declaration, “The next decade is crucial!” a sentiment that was echoed in Asia and Africa.

ENDNOTES

[1](https://www.internationalrangers.org/toolkit/ranger-code-of-conduct-2/)

SUPPLEMENTARY ONLINE MATERIAL

1. Kota Kinabalu Declaration
2. Kigali Call for Action for People and Nature

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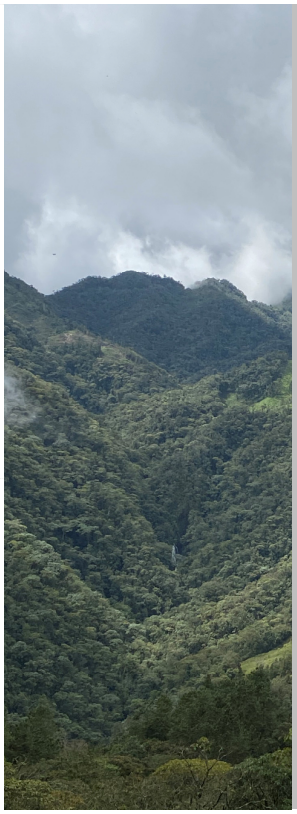
RESUMEN

En 2022, se realizaron dos importantes congresos regionales sobre áreas protegidas y conservadas, el 2º Congreso de Parques de Asia y el Congreso Inaugural de Áreas Protegidas de la UICN en África, en Sabah, Malasia y Ruanda, respectivamente. Estos congresos, muy concurridos y altamente inclusivos, fueron hitos significativos para el establecimiento de prioridades regionales para la próxima década, y para la preparación de la COP15 del CDB, destacando los éxitos, desafíos y oportunidades de la conservación, fomentando el compromiso y la colaboración. En ambos congresos se dió una importante voz a los pueblos indígenas y a las comunidades locales, así como a los jóvenes, para debatir los problemas más difíciles de cada región. Esta editorial resume las tendencias y recomendaciones de estos importantes encuentros.

RÉSUMÉ

En 2022, deux congrès régionaux majeurs sur les aires protégées et conservées, le 2e Congrès des parcs d'Asie et le Congrès inaugural des aires protégées d'Afrique de l'UICN, ont été organisés respectivement à Sabah, en Malaisie, et au Rwanda. Ces congrès, qui ont attiré un grand nombre de participants, ont constitué des étapes importantes dans la définition des priorités régionales pour la prochaine décennie et dans la préparation de la COP15 de la CDB, en mettant en lumière les succès, les défis et les opportunités de la conservation et en encourageant l'engagement et la collaboration. Ils ont donné une voix importante aux peuples autochtones et aux communautés locales, ainsi qu'aux jeunes, pour discuter des questions difficiles dans chaque région. Cet éditorial résume les tendances et les recommandations de ces grands rassemblements.



ANTI-PERSONNEL MINES AFFECT TREE DIVERSITY IN THE SELVA DE FLORENCIA NATIONAL NATURAL PARK, COLOMBIA

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ABSTRACT

Armed conflicts alter the dynamics of human communities settled near protected areas. This situation modifies the use intensity of natural resources in these areas. Particularly, zones with anti-personnel mines seem to be reservoirs of biodiversity because the conflict causes these areas to be abandoned and excluded from extractive activities. Colombia has endured five decades of armed conflict, which prompted farmers to abandon rural areas and, in some cases, reduced the exploitation of natural resources in those regions, favouring the conservation of native forests. In this study, we aimed to determine the indirect effects of the armed conflict on the tree diversity of Selva de Florencia National Natural Park, Central Andes, Colombia. We established vegetation transects in areas that, during the armed conflict, had anti-personnel mines (mined zone) and areas free of anti-personnel mines (non-mined zone) within the park. We determined that species richness, composition and structure differed between mined and non-mined zones. We found larger tree sizes and more timber trees in the mined zone compared to the non-mined zone. Our results suggest that anti-personnel mines create inaccessible zones within the park, where activities such as selective logging ceased for almost two decades. Accordingly, the armed conflict favoured forest conservation. The information gathered here is relevant to post-conflict protection and management.

Key words: forced displacement, landscapes of fear, native forests, post-conflict, selective logging, timber forest use

INTRODUCTION

Ninety percent of armed conflicts between 1950 and 2000 occurred in countries important for biodiversity conservation (Hanson et al., 2009; Lawrence et al., 2015). Historically, several studies have documented that armed conflicts cause adverse direct and indirect effects on biodiversity through, for example, habitat loss, reduced wild populations, and/or alterations to ecosystem functioning (Lawrence et al., 2015; Loucks, et al., 2009). Moreover, protected areas are highly vulnerable to the indirect effects that armed conflicts can have on biodiversity (Gaynor et al., 2016; Ordway, 2015). Armed conflicts alter the social dynamics of the communities living near protected areas (e.g. conflicts can either prompt the establishment or abandonment of human settlements). Consequently, protected areas can become a refuge for conflict groups or displaced persons, who can drastically alter the forests by overharvesting for firewood, the timber trade, or the construction of military camps, or housing for refugees (Bauman & Kuemmerle, 2016; Dudley et al., 2002; Hanson, 2018). However, areas subjected to armed conflict can also become biodiversity reservoirs as these sites are abandoned or excluded from economic activities (Bauman & Kuemmerle, 2016; Lawrence et al., 2015; Sánchez-Cuervo & Aide, 2013). For example, the Korean Demilitarized Zone is a mined area that became a de facto protected area for many endemic and

threatened species (Healy, 2007). In ecological terms, the indirect effects of armed conflict on biodiversity appear to resemble a landscape of fear (a spatial variation in perceived predation risk of prey leading to changes in their behaviour and, consequently, on the structure of habitats, see Palmer et al., 2022; Gaynor et al., 2019). In our context, humans (prey) change their behaviour regarding the exploitation of resources within the protected area due to armed conflict. Therefore, the indirect effects that armed conflicts may pose on biodiversity are a controversial topic that must be addressed in future post-conflict mitigation strategies (Hanson, 2018).

In Colombia, the armed conflict has lasted over 50 years and is mainly centred in critical areas for biodiversity conservation (Hanson et al., 2009). In this regard, Sánchez-Cuervo and Aide (2013) have suggested that armed conflict in Colombia might promote biodiversity conservation (i.e. allowing vegetation to regrow) by reducing human disturbance in abandoned areas. One of the areas most affected by the armed conflict is the Tropical Andes biodiversity hotspot, which hosts over 10 per cent of the world's vascular plant species (Young et al., 2015). Notably, the Selva de Florencia National Natural Park (SFNNP), located within this hotspot, is an area that was disputed by left-wing guerilla groups, the national army and paramilitary groups from the 1990s. The non-state armed groups that occupied the park until a peace agreement was signed in 2016 used anti-personnel mines to limit access to the park (García et al., 2015; Unidad de Víctimas, 2016). Therefore, armed groups heavily restricted farmer access to the park core zone for nearly two decades. According to García et al. (2015), this military strategy promoted the environmental conservation of this region. Farmer communities migrated to urban centres and abandoned activities related to timber exploitation, which were often illegal. Overall, SFNNP offers an ideal scenario to explore the indirect effects of armed conflict on biodiversity.

We assessed tree species richness and vegetation structure in two zones of the park: a non-mined and a mined zone, to establish the possible indirect effects of the armed conflict on SFNNP's forests. Considering that the forest area was mined, and this limited the extraction of timber resources, we expected forests located in the mined zone to have a higher diversity of trees than those in the non-mined zone. The forests located on the edge overlap with several human settlements that rely on selective logging for construction and firewood. Additionally, we identified and compared the trees used for timber in the two study zones.

METHODS

Study area

The Selva de Florencia National Natural Park was declared a protected area in 2005. It is located on the eastern slope of the Central Andes in the Caldas region, Colombia (5°29'07.85" N 75°04'09.66" W, Figure 1). The park covers 10,000 hectares and has an elevational range between 850 and 2,400 m a.s.l. The average annual precipitation and temperature are 8,000 mm and 19°C. The SFNNP is considered a strategic area for biodiversity conservation as it is located in the Chocó-Magdalena biogeographical province and constitutes a habitat for various endemic and threatened species (Organización Colparques, 2018). The park has historically been inhabited by 20 farmer families who developed subsistence farming and selective logging for firewood and commercial purposes. Therefore, the park has trails from its edge to the interior (Herrera et al., 2016). The armed conflict drastically affected the park and its surroundings from 1996 to 2010. In particular, the presence of mined areas and other unexploded ordnances during that period reduced by 90 per cent the areas of the park that could be easily accessed (Herrera et al., 2016). Thus, the park became inaccessible to farmers, loggers and even park employees. In 2016, the Oficina del Alto Comisionado para la Paz of the Colombian government initiated the humanitarian demining programme in the park interior.

Vegetation sampling

We selected the San Antonio river basin to conduct the tree sampling since this area was mostly demined by 2016. We defined two zones in the basin (with an elevational range between 1,361 and 1,690 m) based on the presence of anti-personnel mines during the armed conflict (information provided by locals using an

Selva de Florencia National Natural Park, Colombia. © G.Castaño-Villa

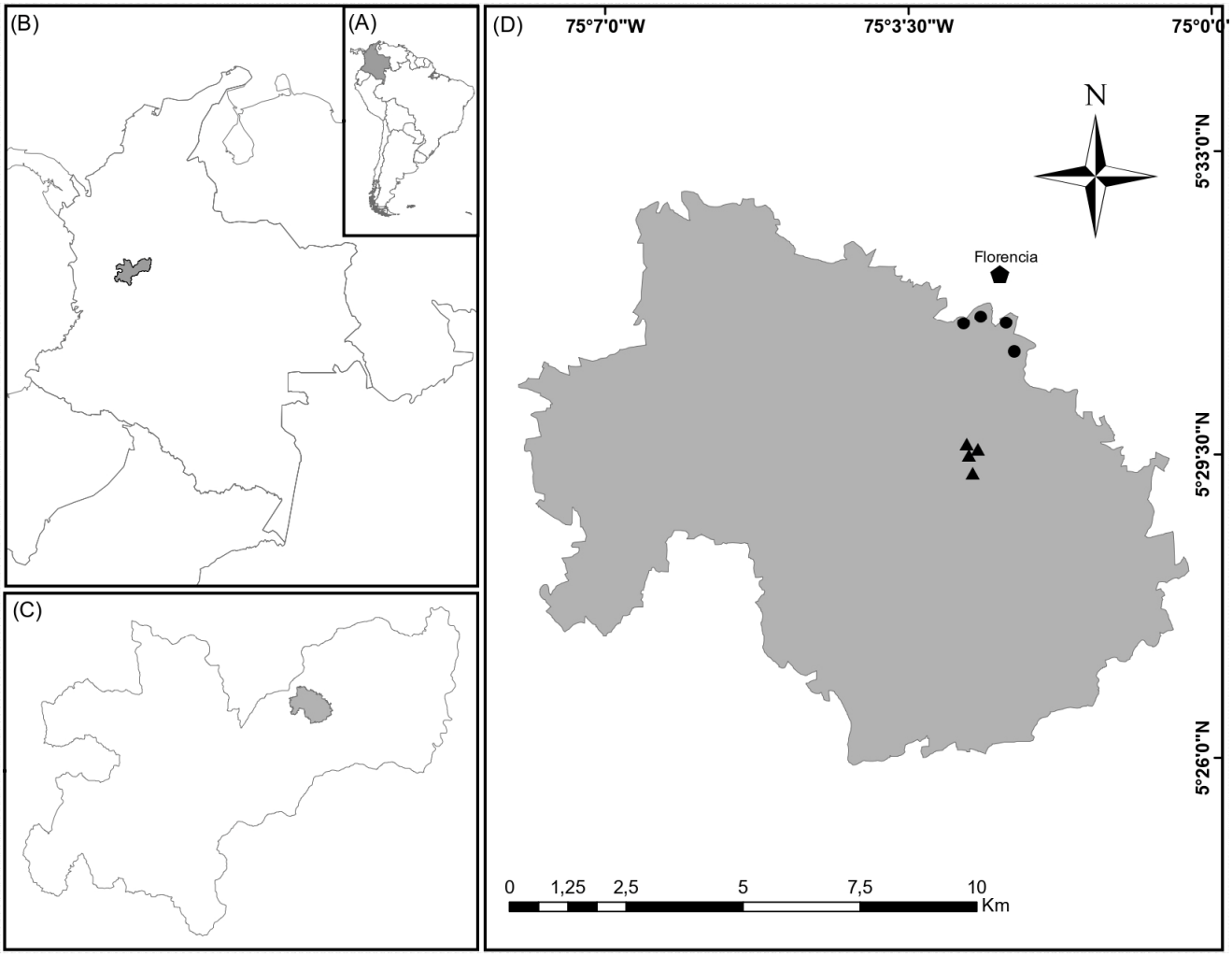

Figure 1. Study area. (A) Location of Colombia in South America; (B) Location of the Caldas region in Colombia; (C) Location of Selva de Florencia National Natural Park within the Caldas region, and (D) location of the sampling sites within the national park. Non-mined zone (●), and mined zone (▲).

unstructured interview), accessibility (measured as the duration of the walk to the site) and distance from the closest human settlement (township of Florencia). Both areas present the same forest type, with similar abiotic characteristics (i.e. topography, geology and rainfall). Accordingly, the study zones corresponded to the non-mined zone (1 km and 1-hour walk) and mined zone (4.6 km and 5-hour walk; Figure 1). We identified secondary forests (forests not older than 30 years) in each zone with the help of park employees and residents. To determine the species richness and composition, and vegetation structure, between October 2017 and April 2018, we established four Gentry forest transects (50 x 2 m) in each zone, with modifications from Villareal et al. (2004). Transects were separated by at least 100 m. Thus, transects have a 30 gradient and at least 100 m from trails or streams to reduce the possible effects of landscape heterogeneity on forest structure. Additionally, the sampled forests did not show evidence of recent natural disturbances, such as fallen trees or landslides.

In each transect, we counted all the individuals trees with a DBH > 1 cm (DBH: diameter at breast height, measured at 130 cm above the ground). Also, we registered the height of canopy trees at each transect through visual estimation (tree height estimates were made by only one person who has previous experience in measuring trees using a Haga altimeter). In order to identify the species, we collected botanical specimens and deposited them at the herbarium of Universidad de Caldas (FAUC). Plant species identification followed the taxonomic keys of Galeano and Bernal (2010) and Bernal et al. (2018). Furthermore, the samples were compared to the herbarium collections of Universidad de Caldas (FAUC) and Universidad de Antioquia (HUA). We also referred to the virtual collections of the Field Museum (2018), Global Plants (2018), Herbario

Nacional de Colombia (2018) and the Missouri Botanical Garden (2018). Species distribution and taxonomic classification were corroborated following Bernal et al. (2018) and the Angiosperm Phylogeny website version 14 (Stevens, 2001). The collected individuals were categorised according to DBH as large trees (DBH≥10 cm, hereafter trees) or small trees (1>DBH<10 cm). The trees were further categorised as timber species (used for construction, tool and crafts manufacturing, and firewood) or non-timber species (without any known local use). The uses were determined with the help of park employees and literature on the study area (Camacho & López, 2002; David et al., 2014).

Data analysis

We compared the species richness of trees between the two study zones to establish the possible indirect effects of the armed conflict. First, we determined differences in tree species richness by visually assessing the overlap of the lower and upper 84 per cent confidence intervals of the expected richness (Sest: expected number of species in t pooled samples, given the reference sample, see Colwell, 2019). We used this indicator for its usefulness in contrasting diversity values (MacGregor-Fors & Payton, 2013). We considered expected species richness to be significantly different (at an a level of 0.05) if confidence intervals do not overlap (MacGregor -Fors & Payton, 2013; Oksuz et al., 2020). The sampling efficiency (expressed as a percentage) was calculated as the ratio between the observed and expected richness, calculated using the bootstrap estimator (Castaño-Villa et al., 2014; Fontúrbel et al.,2020). Expected richness (Sest) and bootstrap estimator were calculated using 999 permutations on EstimateS version 9.1 (Colwell, 2013). Second, to compare the species composition between mined and non-mined zones, we performed a one-way analysis of similarities (ANOSIM), a non-parametric permutation test based on species abundance (Clarke, 1993). This analysis was conducted using the Jaccard similarity index using 999 permutations, a measure used in previous studies to compare plant communities (Hernández-Vargas et al., 2019).

With the information collected in the vegetation sampling, we defined four vegetation structure variables (basal area, canopy height, diameter at breast height, and density). The structural vegetation variables of the two zones were compared with Student's t-test and Wilcoxon test (when data did not fit a normal distribution). Goodness-of-fit to a normal distribution was assessed through a Shapiro–Wilk test. Homogeneity of variances was assessed using a Levene test. The total tree density (total individuals per DBH category at each zone) was compared through an X^2 test. The ANOSIM, t-Student, Wilcoxon test and X^2 were conducted in R version 3.4.3 (R Development Core Team, 2016), using the MASS and Lattice packages (Sarkar, 2008; Venables & Ripley, 2002).

RESULTS

Species richness and composition

We recorded 33 tree families and 58 genera within the study area. Furthermore, we found 135 tree morphospecies and identified 58 of these at the species level (Table S1). We recorded 94 morphospecies in forests located in the non-mined zone and 54 morphospecies in forests located in the mined zone. We obtained an average sampling efficiency of 79.4 per cent in the two zones (Table 1). Species richness of small trees was higher in the non-mined than in the mined zone (Figure 2A, non-mined: S_{est} = 59, and mined: S_{est} = 20). On the other hand, we did not find significant differences in tree species richness between the two zones (Figure 2B, non-mined: S_{est} = 35, and mined: S_{est} = 35). In the non-mined zone were commonly found plants of the families Arecaceae (e.g. *Wettinia kalbreyeri, Geonoma concinna* and *Bactris setulosa*) and Euphorbiaceae (e.g. *Alchornea* spp. and *Tetrorchidium macrophyllum*). Sixty percent of the morphospecies recorded in the non-mined zone were exclusive to this zone. Also, 30.7 per cent of the morphospecies were exclusive to the mined zone. The non-mined and mined zones shared only 9.6 per cent of the plant morphospecies. Moreover, the floristic composition (small and large trees) differed between the non-mined and mined zones (ANOSIM R = 0.60, p = 0.004)

Forest structure

The forest vegetation structure differed between the two zones with DBH of the trees and small trees being larger in the mined than non-mined zone (Trees: W = 2846.0;

Table 1. Observed and expected species richness for zones located in the non-mined and mined zones of Selva de Florencia National Natural Park. The expected species richness was calculated using a bootstrap estimator.

	Non-mined zone	Mined zone	Total
Species richness			
Observed	93	55	135
Expected	119	67	-
Sampling effectiveness (%)	77.8	81.0	-

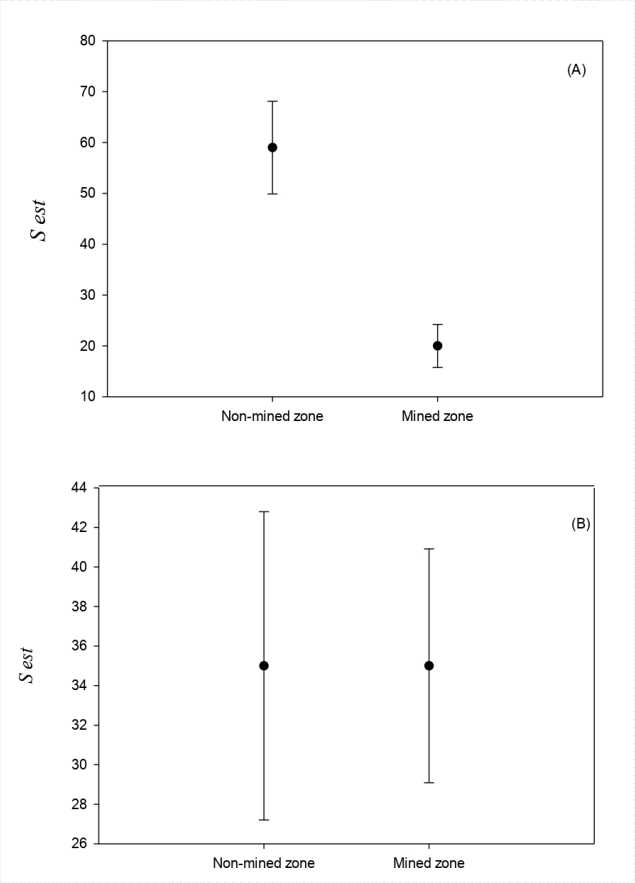

Figure 2. Expected species richness (Sest) for (A) Small trees (1>DBH<10 cm) and (B) Trees with DBH ≥10 cm in the non-mined (n = 4) and mined zones (n = 4) of Selva de Florencia National Natural Park. Error bars represent an 84% confidence interval of the expected richness estimations. Expected species richness to be significantly different (at an a level of 0.05) if confidence intervals do not overlap.

p = 0.019 and Small trees: W = 1815.5; p = 0.005; Figure S1). The average basal area was greater in the mined zone (mean = 2.30 ± 0.36 cm) than non-mined zone (mean = 0.71 ± 0.25 cm) (t6 = 7.20; < 0.001). Tree density in the mined zone was 123 and in the non-mined zone 59 individuals. In contrast, the density of small trees was greater in the non-mined zone (92 individuals) than in the mined zone (33 individuals). The density of trees and small trees differed between the two zones (X^2 = 48.65; p < 0.001, Table S2). Canopy height did not differ between mined and non-mined zones (W = 140.0; p = 0.104; Figure S2).

Plant uses

We identified 58 species of trees (i.e. 43 per cent of total morphospecies registered) historically used in the region for construction (houses, fences and poles), tool manufacturing and firewood (Table S1). Several species, such as *Acalypha macrostachya*, *Cecropia garciae*, *Miconia affinis*, *Miconia caudata*, *Isertia laevis* and *Elaeagia utilis*, are used locally for construction and are only found in the mined zone. In addition, in the mined and non-mined zone we identified ten and eight trees used for firewood, respectively (e.g. *Clusia dixonii* and *Cordia bicolor*). According to tree use, the number of trees and small trees with any use (i.e. construction, tool manufacturing or firewood) significantly differs between mined and non-mined zones (X^2 = 20.2, p < 0.001; Table S2). The remaining 32 per cent of trees in the non-mined zone are suitable for firewood, while 58 per cent of trees can be used for construction.

DISCUSSION

Our results suggest that forest degradation during 20 years of armed conflict was lower in the mined zones compared to the non-mined zone of the park. The period of relative protection due to the armed conflict may have resulted in substantial recruitment and growth of several trees. This phenomenon is likely indirectly associated with the armed conflict that affected the region for nearly two decades and which resulted in 40 local victims of anti-personnel mines reported in this region between 2002 and 2009 (Oficina del Alto Comisionado para la Paz, 2019). For 20 years, farmers were displaced to urban centres. They abandoned their extractive and agricultural activities inside the park. The farmers who extracted timber resources in the park limited their access to the mine-free park zones (the farmers were alerted to the presence of anti-personnel mines by the belligerent groups). Farmers abandoned extractive activities in the mined zone during the armed conflict and reduced the selective logging of fine timber trees (locally used for construction and carpentry) (García et al., 2015). Therefore, selective logging within the park was abandoned due to fear of the mined fields. This situation is similar to what occurred in the Korean Demilitarized Zone, where the presence of anti-personnel mines promoted this area as an animal and plant refuge since its inaccessibility allowed protection of the forests (Dudley et al., 2002; Kim, 1997).

The changes in forest species richness, composition, structure and use in the park may reflect variations in the intensity of anthropogenic disturbances in the park during the armed conflict. During this time, the park mined zone became inaccessible to people unrelated to the conflict. Consequently, this zone does not show evidence of recent selective logging since commercial timber trees are still standing (DBH > 30 cm), and are not found in the other park zones. This finding suggests that reducing selective logging intensity favoured forest conservation during the conflict. Likewise, more intense

anthropogenic disturbances in the park's non-mined zone may explain the higher small tree diversity. During the armed conflict, this zone remained subject to sporadic selective logging for household uses. This low disturbance level may have positively affected plant diversity, similar to the effect of fallen trees and the formation of forest canopy gaps (Dechnik-Vásquez et al., 2016; Imai et al., 2016). These canopy gaps, caused by selective logging, display high plant diversity and dominance by pioneer species such as *Chusquea latifolia*, *Cecropia hispidissima*, *Cecropia montana* and *Handrosanthus chrysantha* sub. *pluvicola* (Berry et al., 2008; Gaui et al., 2019). The armed conflicts alter the use of natural resources near settlements and promote significant biodiversity changes (Ordway, 2015).

CONCLUSIONS

Our results show the effects of armed conflicts on tree richness, composition and forest structure. During the armed conflict, the park's mined zone became inaccessible, precluding selective logging and resulting in the mined parts of the forest today having larger trees. Consequently, this phenomenon favoured forest conservation during the armed conflict. Unfortunately, during the post-conflict period, the national government has not consolidated an institutional presence in national parks, which is why illegal farms and illicit crops have expanded within them. Therefore, in post-conflict, the government entities should promptly initiate strategies to reduce selective logging within the park (e.g. surveillance and control measures). Also, it would be essential to create community forest plantations in the park buffer zone that sustainably supply the needs for wood for construction and firewood.

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SUPPLEMENTARY ONLINE MATERIAL

Table S1. Total morphospecies registered in Selva Florencia National Natural Park for non-mined and mined zones.

Table S2. Tree density in study area

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RESUMEN

Los conflictos armados en todo el mundo alteran la dinámica de las comunidades humanas asentadas en áreas protegidas. Esta situación modifica la intensidad de uso de los recursos naturales en estas áreas. En particular, las zonas con minas antipersonal parecen ser reservorios de biodiversidad porque el conflicto hace que estas áreas sean abandonadas y excluidas de las actividades extractivas. Colombia ha soportado cinco décadas de conflicto armado, que llevó a los agricultores a abandonar las zonas rurales y, en algunos casos, redujo la explotación de los recursos naturales en esas regiones, favoreciendo la conservación de los bosques nativos. En este estudio, nuestro objetivo fue determinar los efectos indirectos del conflicto armado en la diversidad de árboles del Parque Nacional Natural Selva de Florencia, Andes Centrales de Colombia. Para ello, establecimos transectos de vegetación en zonas que durante el conflicto tuvieron minas antipersonales (en la actualidad desminadas) y en zonas libres de minas antipersonal (no minadas) dentro del parque. Determinamos que la riqueza, composición y estructura de especies difieren entre las zonas que estuvieron minadas y las no minadas. Encontramos árboles más grandes y una mayor cantidad de árboles maderables en la zona que estuvo minada en comparación con la zona no minada. Nuestros resultados sugieren que las minas antipersonales crearon zonas inaccesibles dentro del parque, donde las actividades como la tala selectiva se interrumpieron durante casi dos décadas. En consecuencia, el conflicto armado favoreció la conservación de los bosques. La información recopilada aquí es relevante para la protección y gestión en el post conflicto.

RÉSUMÉ

Les conflits armés modifient la dynamique des communautés humaines installées à proximité des zones protégées. Cette situation modifie l'intensité d'utilisation des ressources naturelles dans ces zones. En particulier, les zones où se trouvent des mines antipersonnel semblent être des réservoirs de biodiversité car le conflit provoque l'abandon de ces zones et leur exclusion des activités extractives. La Colombie a subi cinq décennies de conflit armé, ce qui a incité les agriculteurs à abandonner les zones rurales et, dans certains cas, a réduit l'exploitation des ressources naturelles dans ces régions, favorisant la conservation des forêts indigènes. Dans cette étude, nous avons cherché à déterminer les effets indirects du conflit armé sur la diversité des arbres du parc naturel national de Selva de Florencia, dans les Andes centrales, en Colombie. Nous avons établi des transects de végétation dans des zones où, pendant le conflit armé, il y avait des mines antipersonnel (zone minée) et des zones exemptes de mines antipersonnel (zone non minée) au sein du parc. Nous avons déterminé que la richesse, la composition et la structure des espèces différaient entre les zones minées et non minées. Nous avons trouvé des arbres de plus grande taille et plus d'arbres à bois dans la zone minée que dans la zone non minée. Nos résultats suggèrent que les mines antipersonnel ont créé des zones inaccessibles au sein du parc, où des activités telles que l'exploitation forestière sélective ont cessé pendant près de deux décennies. En conséquence, le conflit armé a favorisé la conservation de la forêt. Les informations recueillies ici sont pertinentes pour la protection et la gestion post-conflit.

ALTERNATIVE APPROACHES TO INTEGRATED CONSERVATION AND DEVELOPMENT: EQUITABLE GOVERNANCE AT LAKE MBURO NATIONAL PARK, UGANDA

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ABSTRACT

Equity and governance are vital in facilitating sustainable biodiversity conservation as alternative approaches to integrated conservation and development. However, they have not always been prioritised by protected area managers and policy implementers in various interventions. A qualitative assessment was undertaken to explore the positioning of equitable governance in pursuing conservation and development objectives at Lake Mburo National Park. Data reveals that the current integrated conservation and development interventions fall short of equitable governance principles. The more that people are involved in decision making and equitably share resources, the more they are likely to be co-managers of protected area resources. Currently, those who bear the most conservation costs are not well targeted by conservation benefits, are likely to develop resentment and engage in unauthorised resource use. Key principles of governance categorised under the dimensions of equity were used as yardsticks for the assessment. The study concludes that governance and equity are potential alternative approaches to adopt in the implementation of integrated conservation and development. We recommend the application of an equitable governance framework in order to achieve sustainable conservation.

Key words: equity, unauthorised resource use, protected area management, governance assessment, Uganda Wildlife Authority

INTRODUCTION

The concepts of governance and equity which some scholars combine to mean equitable governance (Dawson et al., 2017; McDermott et al., 2013; Schreckenberg et al., 2016) have become vital in the context of protected areas conservation (Twinamatsiko et al., 2015; Schreckenberg et al., 2016). Global and national conservation policy has evolved to include stronger emphasis on governance and equity issues (Franks & Booker, 2018). This is further emphasised by the 3rd and 6th World Parks Congresses and Aichi Target 11 of the Convention for Biological Diversity (CBD) (Twinamatsiko et al., 2014; Dawson et al., 2017). Governance and equity are understood in the context of power, relationship and accountability (Dawson et al., 2017). Equitable governance is an important aspect of protected area management and contributes to better conservation outcomes (McDermott et al., 2013; Dawson et al., 2017; Twinamatsiko et al., 2015; Franks & Booker, 2018). Equitable dimensions such as recognition of actors in conservation, procedures that relate to decision making and distribution of the costs and benefits of conservation are vital in facilitating sustainable conservation and effective protected area management (Dawson et al., 2017). Achieving equity is premised on the application of these key dimensions (De Jonge, 2011; McDermott et al., 2013; Martin et al., 2016; Schreckenberg et al., 2016; Dawson et al., 2017). There is a clear linkage between equity and governance because these dimensions entail aspects of the processes and structures through which decisions are made and by whom, thus describing procedural equity. The three

dimensions of equity are categories that explain the principles of good governance in protected areas.

There is a global debate on whether integrated conservation and development interventions are equitably implemented to address people's livelihoods (Hughes & Flintan, 2001; Simpson, 2008; Blomley et al., 2010; Twinamatsiko et al., 2014). There is often contestation between local communities and protected areas premised on inadequate benefits from protected areas to address their livelihood needs amidst conservation costs (Archabald & Naughton-Treves, 2001; Bush & Mwesigwa, 2008). As a result of the perceived inequitable distribution of benefits, unauthorised resource use takes place which therefore necessitates tackling illegal wildlife trade from the grassroots. Twinamatsiko et al. (2014) and Harrison et al. (2015) indicate that those who engage in poaching are poorer people and those who perceive less involvement within the adjacent communities of protected areas. Moreover, after over three decades of an integrated conservation and development approach, there is still evidence of unauthorised resource use, limited motivation of local people to participate in conservation activities and glaring resentment of conservation programmes implementation (Twinamatsiko et al., 2014; Harrison et al., 2015). This revelation necessitates alternative approaches to integrated conservation and development.

The integrated conservation and development (ICD) approach has evolved since 1985 in Uganda to provide alternative mechanisms to achieve sustainable conservation (Roe, 2008; Salafsky, 2011; Blomley et al., 2010; Kremen et al., 1998; Wells & Brandon, 1993; Albert, 1995). Since 1985 ICD has evolved from the substitution and compensation era to benefit sharing and to power sharing (Blomley et al., 2010). The ICD concept was intended to offer a more socially acceptable alternative to the traditional fines and fences – the protectionist approach to conservation and protected area management (Hughes & Flintan, 2001). Wells and Brandon (1993) noted that ICD projects stabilise land use outside protected area boundaries and increase local incomes to reduce pressure from further exploitation of natural resources. ICD aims to provide services and employment to park adjacent communities to encourage acceptance of conservation policies and reduce pressure on the environment. Similarly, Roe (2008) suggested that ICD projects should enhance the conservation of biodiversity by focusing on the social and economic needs of the nearby communities. This creates reconciliation of protected area management and the needs of local people. Governance and equity have gained momentum as alternative approaches to protectionism to augment protected area management in Uganda (Franks & Blomley, 2004). This study therefore assessed the application of locally prioritised governance and equity principles (dimensions) at Lake

Fauna in Lake Mburo National Park © Amelia Ampumuza

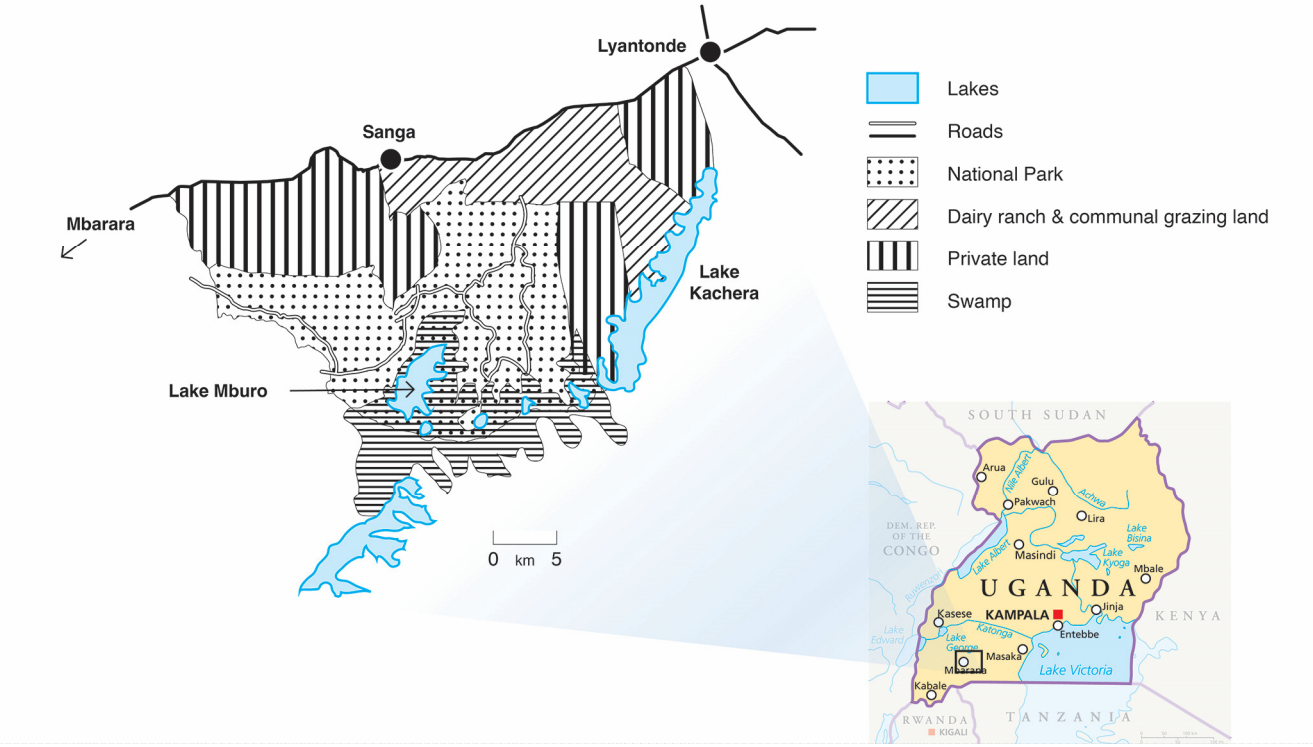

Figure 1. Map of Lake Mburo National Park Source: redrawn from UWA, 2012

Mburo National Park to understand the strengths, weaknesses and priority areas for action.

METHODOLOGY

Site location

The study was conducted at Lake Mburo National Park (hereafter referred to as Mburo) (Figure 1). Mburo is Uganda's smallest savannah national park covering an area of 370 km² located in the drier southwestern part of Uganda known as the Cattle Corridor. The park is managed by Uganda Wildlife Authority (UWA), a government agency with the responsibility to manage resources. Encompassing 13 lakes, Mburo forms part of a 50 km long wetland system and provides important habitat to over 350 bird species. It is also home to species such as Elands, Impala, Leopards, Buffaloes, Giraffes and Waterbucks. Mburo borders with three districts of Kiruhura, Isingiro and Mbarara City inhabited by pastoralists and cultivators (see land use patterns in Figure 1) whose local language is Runyankore. The main economic activities are pastoralism and arable farming which mostly depend on the resources inside the park.

Mburo was gazetted a national park in 1983 after a history as a controlled hunting area from 1933 and later a game reserve from 1963. Following gazettement, all resource access within the park was prohibited including grazing, fishing and hunting and the rangeland outside the park was subdivided into small ranges and subsistence farming plots. Many people were negatively impacted and this fueled resentment and conflict. As an attempt to address the conflict, in 1986 some adjustments were made to the boundaries of Mburo to appease local people and promote positive relations with the park.

Assessment methodology

Overview of methods and approach

The study undertook an in-depth qualitative assessment of governance and equity principles/dimensions. The assessment was a two-stage process that included a preliminary assessment and follow-up validation. The assessment followed the standard procedure of conducting the Governance Assessment for Protected and Conserved Areas (GAPA) as detailed in Booker and Franks (2019). The first stage was conducted between August and September 2018 while the second phase was conducted in 2019 and 2020. In the second phase of assessment, follow-up interviews and focus group discussions with communities were carried out to validate and ascertain the extent of application of selected governance and equity principles.

The assessment was convened by UWA with the support of a facilitation team from Mbarara University of Science and Technology, the International Institute for Environment and Development and the Centre for

Research Uptake in Africa. The 10 good governance principles already identified by IUCN and the GAPA manual were presented to the participants (Borrini-Feyerabend et al., 2013). After discussion on which ones applied in the context of Mburo, six principles were prioritised and selected for assessment using a multi-stakeholder assessment approach. The governance principles and equity dimensions selected were:

1. Effective participation of relevant actors in decision making;
2. Fair benefit sharing according to criteria agreed by relevant actors;
3. Accountability for fulfilling responsibilities, other actions and inactions;
4. Fair and effective processes for dispute resolution;
5. Recognition and respect for the rights of all relevant actors;
6. Achieving conservation and other objectives efficiently and as planned.

The assessment included preparation, scoping, information gathering, validation and ideas for action, action planning and follow-up (Figure 2). After action planning, follow-up interviews/focus group discussions were conducted. Figure 2 illustrates the methodological assessment process and approach.

Data collection and analysis

In 2018, we conducted two workshops (scoping and validation) and data gathering using key informant interviews and focus group discussions. At the beginning, nine key stakeholders were identified by UWA and invited to prepare for the first workshop as a scoping exercise. Its purpose was to understand the governance assessment concept, agree on the governance principles that apply to Mburo and identify key informants. The participants of the scoping workshop included five UWA officials, four researchers and ten representatives of local governments of Kiruhura, Isingiro and Mbarara. The UWA officials included the chief warden, community conservation warden, law enforcement warden, assistant warden in charge of intelligence, and assistant warden in charge of problem animal management. Local government representatives were drawn from the community development, natural resource and district administration sectors. The validation workshop was attended by 42 participants that included all participants of the scoping workshop and other key government technical leaders at both central and local government levels, civil society representatives, community representatives and political leaders.

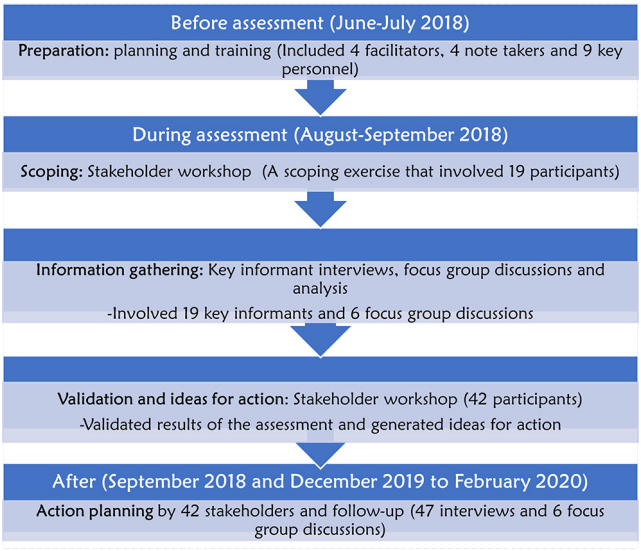

Figure 2. Assessment process and methods used

The second stage of assessment conducted in 2019 and 2020 employed 47 key informants and six focus group discussions. The key informants included UWA staff, local government officials, civil society and community representatives. Secondary data regarding sustainable and equitable governance of protected areas worldwide and also specifically regarding Mburo was collected using desk review. Data processing and analysis from the workshops, focus group discussions and key informant interviews was transcribed and entered with the aid of NVIVO version 11. Data was analysed qualitatively using thematic analysis. Discussion of each principle was based on standardised open questions which focused first on strengths and then on challenges of the principle in practice, underlying causes for challenges, and ideas for action to improve the situation.

RESULTS

Effective participation of relevant actors in decision making

Results reveal that some key aspects of effective participation as a procedural equity dimension are not systematically implemented though there has been a positive evolution of conservation from the protectionist approach. A strength of the current governance system is the election of local people to roles of authority such as local council chairpersons – who are responsible for identifying local priorities for projects to be funded by revenue sharing. The local council representatives and community leaders are always invited to participate. However, a related challenge is that local council representatives and community leaders have limited influence and while they might be invited to attend park meetings, they cannot impact on decision making.

Instead, stakeholders complained that decision making is dominated by park officials and government representatives. It was reported that where stakeholders have felt less involved and their decisions not respected, they have resented protected area activities. A case in point is when local residents shunned a meeting organised by a ranger citing lack of respect for the previous community resolutions. This therefore affects the procedural dimension of equity which relates to full involvement of local stakeholders in decision making.

The role played by UWA, local governments and some community leaders is evident in the formulation of guidelines such as the general management plans and Memorandums of Understanding (MoUs) between communities and protected area management. Some MoUs mentioned are for resource access and revenue sharing. Local people, including women's groups, were said to be participating in the selection of projects to fund under a revenue sharing programme, for instance livestock and handicrafts. This was reflected in the words of a key informant as:

> One of the areas of participation is when we get benefits such as revenue sharing whereby residents benefit from community projects. We are invited to give our views whether they will be taken or not. Lack of consideration of our views results in resentment towards park activities. (Key Informant 3, 2020)

Women participants revealed that they sometimes participate in decision making by identifying their needs for revenue sharing projects (such as livestock or handicraft projects) but they generally felt excluded from decision making. These women protested that it is unfair that they are not able to participate in decision making related to resource access – especially resources they depend on such as fish and firewood. Also, local people participate in community conservation education meetings and the related programmes implemented by UWA. The participation of community members was reported as taking place through selected community representatives such as local council chairpersons and protected area committees, for example the revenue sharing committee. In other instances, the study was informed that local people participate in the governance of protected areas as informers to UWA by reporting problem animals which stray onto community farms and land. Community members also reported poaching and illegal hunting activities and unauthorised grazing in the park although this is not associated with any direct benefits.

Beyond park level, another challenge identified is the limited representation of local people in the formulation of national policies and site level guidelines despite their implications on people's lives. Stakeholders offered examples including the revenue sharing and fishing guidelines. In this context, park officials and government representatives have more influence over decision making than local people. The other concern mentioned was the lack of adequate planning processes that involve all stakeholders. Community members expressed a concern that policies and plans are developed from the top down rather than the bottom up. Local people do not have the opportunity to decide on what relief they should receive to counter their losses as a result of wild animal destruction. This too increases people's resentment of conservation efforts.

Community dialogue in Isingiro © Medard Twinamatsiko

Fair benefit sharing according to criteria agreed by relevant actors

The important benefits which local communities currently access include resources from the park such as handicraft materials, firewood, fish, water, poles and medicinal plants. Others include a share of revenue derived from tourism activities in the park which has been used to fund community/livelihood projects, for example the construction of schools, roads, community halls, water points, health units and other infrastructure. The other benefit mentioned was the selling of items from community activities to tourists. Participants further pointed out that the protected areas provided some casual employment to community members in park related activities. One of the study participants expressed the view:

> Schools and dams have been constructed, resource sharing is doing good, we even received money and constructed a health facility. (Key Informant 20, 2020)

For community members there are clear governance and equity challenges in the way benefits are shared related

to fishing permits, sports hunting revenue and tourism revenue. There is a suspicion that fishing permits, for example, are rented by permit holders to people migrating from areas outside the communities bordering Mburo, in contravention of the rules that govern these resource access permits. Community members perceive unfairness or inequity in the way revenue from sports hunting and tourism is distributed – sports hunting is seen as only benefiting one community around Mburo, while tourism revenue is seen as favouring Kiruhura district over Isingiro and Mbarara. Community members also reported non-payment and delays in the disbursement of tourism revenue sharing with little or no explanation from government officials.

An important challenge for Mburo is resentment towards management actions due to the negative impacts of conservation on people's lives – including restricted resource access and human–wildlife conflict. In particular, women and men are concerned that wild animals leave the park and pose a risk to their lives or the lives of their families through death or injury. Additionally, wild animals inflict damage on crops and can kill livestock incurring significant costs to households. All stakeholders highlighted that there is no practical official policy of compensation in Uganda, but households may receive a small payment known locally as 'compassion' at the discretion of park officials. Although the government enacted the Uganda Wildlife Act in 2019, it is not yet applied on the ground (Parliament of Uganda, 2019). There is reported failure of park management to control human–wildlife conflict. For instance, animals have a right to enter people's lands and destroy their sources of livelihoods whereas people are not allowed to freely enter the national park. This is a critical underlying factor that is affecting community–park relations.

A further issue was delays in payments and sometimes non-payment of revenue sharing funds meant to be immediately disbursed to the local communities. There were reported leakages in the process of transferring benefits to the actual beneficiaries. Most stakeholders concurred that although UWA disburses funds to the districts on time, the districts do not quickly meet their obligation to remit money to the communities affected. The concern raised was that along the chain, there are delays in channelling funds downwards to the final recipients which are the local communities. In most cases, the amount of money sent to the districts will have drastically reduced by the time it reaches the final recipient:

> Revenue sharing is not inclusive so few people benefit from it, there is inequitable sharing of resources, for example in Isingiro, demand is greater than supply, with a high population density. (FGD, Masha, 2019)

Community revenue sharing meeting © Amelia Ampumuza

Accountability for fulfilling responsibilities, other actions and inactions

The results illustrate a lack of adequate transparency and information sharing between and among stakeholders at Mburo. Community members and their representatives reported that there is little information and explanation given to local people on issues concerning Mburo from park and district government officials. Local leaders were accused by some community members as not being proactive in obtaining park related information from officials or sharing information with the people they represent. However, local leaders and officials noted that there are regular meetings on updates relevant to Mburo between park officials and local council chairpersons, and attendance of public meetings by community members can be low. An important issue reported by all stakeholders is limited awareness amongst actors of each of the stakeholders' responsibilities.

Many of the stakeholders underlined that lack of awareness about revenue sharing limits local people's ability to hold accountable those officials responsible for managing revenue sharing funds – including project management and procurement committees, district and sub-county government officials and UWA officials. This is a concern given that all stakeholders observed that as revenue sharing funds pass through these various levels of administration there is leakage and loss of finance. There were also other allegations of community projects not representing value for money due to embezzlement of funds, and more generally, a lack of follow-up and monitoring of revenue sharing projects. Such governance and equity issues with tourism revenue sharing have been seen elsewhere in Uganda at Bwindi Impenetrable National Park (see Franks & Twinamatsiko, 2017).

UWA officials revealed that they have no connection with the district personnel who do not put to use the money meant for serving local communities. There were cases where contractors connived with district officials and set up signs on project sites where no work was actually carried out. This was said to result from local people not knowing how revenue sharing is calculated and the formula for distributing funds between districts and communities. Therefore, UWA, the district, sub-county and project management committees should be held responsible for not building the capacity of local communities.

Fair and effective processes for dispute resolution

Local council and park officials have formed conflict resolution committees / tribunals to respond to grievances around Mburo. At times, communities may also hold dialogue meetings – especially following events of human–wildlife conflict. However, for communities, unresolved governance and equity challenges fuel their feelings of resentment towards the park – reported unresolved grievances include those related to resource access, human–wildlife conflicts and prosecution or penalties for illegal resource use (for example confiscating community livestock found in the park). Even where there are processes to deal with grievances, local people feel that park officials often do not respect the agreed process. For example, some community stakeholders perceived that local people are arrested on suspicion of illegal resource use without sufficient investigation or consultation with community conflict resolution committees. A scheme that is helping to reduce disputes is UWA's user resource access programme which has allowed permitted access to Lake Kibikwa.

Recognition and respect of the rights of all relevant actors

Recognition and respect of the rights of all relevant actors was a difficult principle to discuss due to contextual sensitivities regarding talking about the rights of community stakeholders. According to the local people, an important governance challenge is that many government and park leaders interpret rights as privileges. There are issues related to rights of access to historical sites and some areas of pasture within the park. Some community stakeholders detailed unresolved historical cases of human rights abuses by park officials when dealing with people suspected of poaching or illegally harvesting other natural resources within Mburo.

Reported strengths of the current governance system include permission for local pastoralists to access water within Mburo during extreme dry periods, and women are permitted to access medicinal plants. Every Saturday in Rubare market, the sale of fish is only permitted to local people to ensure that communities access fish at low prices for improved nutrition. And, once a year on 31st December all local people are given free entry to visit the park.

Achieving conservation and other objectives efficiently and as planned

There is evidence of the commitment of park officials to fulfil their mandate in protecting the national park. The conventional evolution towards equity and governance are not yet a characteristic of UWA operations and approaches as evidenced by greater budget and human resource allocation to law enforcement compared to community conservation. As part of collaborative management, the park was said to be providing social services and support to communities, and one of the services mentioned was providing scholarships to selected students in the communities. Also mentioned was how people can now live near the park boundaries with less fear compared to before the establishment of the community conservation department. This has resulted from efforts to control wildlife from attacking local communities. This effort has changed the negative attitudes of people towards the protected area. Stakeholders informed the study that some of the human–wildlife interventions have reduced crop raiding although this needs to be further strengthened.

DISCUSSION

The governance and equity assessment approach demonstrates a strong alternative mechanism to ICD to promote sustainable conservation of biodiversity. This is in line with Dawson et al. (2017), McDermott et al. (2013) and Schreckenberg et al. (2016). Integration, however, requires the meaningful involvement of stakeholders. Communities were able to identify aspects within the six principles of governance and the three dimensions of equity – procedural, distributive and recognitive equity that are instrumental to improving the landscape of decision making for better and equitable conservation. It is evident that the functioning of the protected area is dependent on a better working relationship with the community. Greater governance and equity strengthen community support for conservation and development. This revelation relates to the finding by Twinamatsiko et al. (2015) that the more people felt involved and that they benefited from Bwindi Impenetrable National Park, the more they increased their conservation support.

In examining the accountability of actions and inactions by stakeholders, there is evidence of limited

transparency about what happens at national level regarding protected area plans and policies. This concealment of information may have a detrimental effect on the conservation practices of local people on whom the laws apply. Further, local communities seem to have a low level of awareness of their rights in respect to wildlife resources. Yet from previous studies such as Martin et al. (2016) and Dawson et al. (2017), procedural equity and equitable governance increase motivation for biodiversity conservation. It is still an uphill task for the key stakeholders to provide adequate information to the local communities on what rights of access they have to key resources in the protected area.

In the integration of conservation and development, the alternative livelihoods provided to the local communities seem not to be targeted at the people who require support in the context of bearing the costs of conservation. This directly relates to the distributive equity dimension and principles (Schreckenberg et al., 2016). This was reflected in the livestock projects provided to community members, where in some situations they were provided to households that were seen to be already well off and not those in dire need. This practice contradicts the previous assertions by Walker (2012) to target those that bear the costs of conservation. This imbalance in revenue sharing does not meet the principle of equity benefit sharing (Kremen et al., 1998; Schreckenberg et al., 2016). Resource access arrangements are appreciated by local communities, but cases of rich local community members buying permits from poor members is creating tensions within the very communities where service access is contested. There is a growing need for greater involvement of local people in decision making. This is in agreement with Martin et al. (2016) and Twinamatsiko et al. (2015) that found there is a positive relationship between local involvement and conservation support. Dawson et al. (2017) further articulates the conservation outcome generated as a result of respecting and valuing other conservation stakeholders. Following these results, the delays in revenue sharing down to the grassroots level require an emergency redress. Funds from revenue sharing are not directly channelled to the parish and are not monitored by the park and parish chiefs of the communities meant to receive the funds. This creates leakages which relates to the findings by Franks and Twinamatsiko (2017) on how revenue sharing leakages negatively impact the final beneficiaries.

The laxity in effectively implementing the legislation on compensation is promoting conflict between local people and protected area managers thus affecting sustainable governance and conservation of wildlife resources. It is evident that communities are losing their crops due to wild animals. According to Hughes and Flintan (2001), giving alternative livelihoods to those who suffer losses to conservation is vital to replace the traditional fines and fences for local people. Compensation is a direct benefit for the cost that conservation imposes on local people (Bush & Mwesigwa, 2008; Archabald & Naughton-Treves, 2001; Walker, 2012). Reviewing revenue sharing guidelines therefore appears to be a better option to facilitate the effective implementation of the compensation law to reduce resentment towards the parks from the communities in times of losses incurred due to wild animals from the park.

In an attempt to fully achieve conservation objectives and other developmental objectives, it is evident that stakeholders have to be coordinated by a central authority which is in a position to respond to local needs as Kremen et al. (1998) and Hughes and Flintan (2001) articulate in the case of Madagascar. Furthermore, stakeholders at higher levels of protected area governance suggested the use of the project implementation cycle to address the real problems faced by communities. In addition, stakeholders should increase projects for women around protected areas since animals destroy gardens cultivated by women and as such, they fail to feed their children and the elder members of the family. The greater involvement of women is a procedural equity dimension and addresses the equitable governance question in protected areas. The arguments mentioned here relate to the justifications of Blomley et al. (2010), Roe (2008) and Salafsky (2011) to integrate holistic aspects of conservation and development for better conservation outcomes.

CONCLUSIONS AND RECOMMENDATIONS

This study establishes that governance and equity are potential alternative approaches to the implementation of integrated conservation and development given their effectiveness in delivering conservation outcomes. However, critical challenges have been identified in the application of governance and equity principles and dimensions at Mburo, especially the limited involvement of the local people and lack of equitable sharing of benefits. If not addressed, these challenges have a potential adverse effect of intensifying people's resentment of conservation. Local communities bear most conservation costs and live closer to the park boundary, yet have not been effectively targeted by integrated conservation and development interventions. This also relates to the recognition and contextual

dimensions of equity as well as perception of participation and accountability shortfalls. The communities that have historical property rights such as the Bahima pastoralists and who do not have a negative effect on Mburo resources, have not been given special consideration during the implementation process of conservation and development programmes.

The key obstacle to translating natural resource benefits into livelihood improvement rests on the procedural and distributive inequities. This relates to the limited involvement of local people which affects the level of benefit appreciation and ownership, poor implementation approaches, a highly bureaucratic system and a poor monitoring system by the stakeholders that are charged with the monitoring task. If natural resource benefits do not translate into livelihood security, collaborative community-based conservation will not be achieved. Poaching is likely to scale up in the context of local communities becoming conduits of illegal wildlife trade. This is likely to hinder efforts towards reducing unsustainable resource use. There is, therefore, a need for natural resource benefits to translate into livelihood security in order to achieve collaborative community-based conservation.

Limited information access, capacity and empowerment have been identified as key gaps in the sharing of revenue and resources from the park. Therefore, local leaders and residents should be empowered to be informed on the details of the processes involved. There is a need to allocate money to parishes rather than districts to allow supervision and monitoring of the projects by local councils. The general public should be sensitised and educated about the importance of women's participation in decision making. The contradictions between the mandate of UWA and local government in the distribution of revenue sharing funds ought to become a focus of protected area managers or otherwise will continue to be a source of dissatisfaction for local people. Given the evolution of integrated conservation and development from substitution to power sharing, and based on the recent pronouncement of compensation policy in the Uganda Wildlife Act (Parliament of Uganda, 2019), it is evident that governance and equity can work as alternative approaches in the implementation of integrated conservation and development interventions. Local communities continue to appreciate the tourism revenue from the park although with implementation challenges. Strengthened local governance and equity frameworks in protected area management fit well in strategy five of the third National Development Plan (NPA, 2020) and in the greater realisation of CBD targets.

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RESUMEN

La equidad y la gobernanza son vitales para facilitar la conservación sostenible de la biodiversidad como enfoques alternativos para la conservación y el desarrollo integrados. Sin embargo, los gestores de áreas protegidas y los responsables de la aplicación de políticas no siempre les han dado prioridad en diversas intervenciones. Se realizó una evaluación cualitativa para explorar el posicionamiento de la gobernanza equitativa en la consecución de los objetivos de conservación y desarrollo en el Parque Nacional del Lago Mburo. Los datos revelan que las actuales intervenciones integradas de conservación y desarrollo no cumplen los principios de gobernanza equitativa. Cuanto más participen las personas en la toma de decisiones y compartan equitativamente los recursos, más probabilidades tendrán de ser cogestores de los recursos de las áreas protegidas. En la actualidad, los que soportan la mayor parte de los costes de conservación no reciben los beneficios de la misma, y es probable que desarrollen resentimiento y se dediquen a un uso no autorizado de los recursos. Para la evaluación se utilizaron principios clave de gobernanza clasificados en las dimensiones de la equidad. El estudio concluye que la gobernanza y la equidad son posibles enfoques alternativos para la aplicación de la conservación y el desarrollo integrados. Se recomienda la aplicación de un marco de gobernanza equitativa para lograr una conservación sostenible.

RÉSUMÉ

L'équité et la gouvernance sont essentielles pour faciliter la conservation durable de la biodiversité en tant qu'approches alternatives à la conservation et au développement intégrés. Cependant, les gestionnaires d'aires protégées et les responsables de la mise en œuvre des politiques ne leur ont pas toujours accordé la priorité dans le cadre de diverses interventions. Une évaluation qualitative a été entreprise pour explorer le positionnement de la gouvernance équitable dans la poursuite des objectifs de conservation et de développement au parc national du lac Mburo. Les données révèlent que les interventions actuelles de conservation et de développement intégrés ne respectent pas les principes de la gouvernance équitable. Plus les gens sont impliqués dans la prise de décision et partagent équitablement les ressources, plus ils sont susceptibles d'être cogestionnaires des ressources des aires protégées. Actuellement, ceux qui supportent le plus de coûts de conservation ne sont pas bien ciblés par les bénéfices de la conservation, sont susceptibles de développer du ressentiment et de s'engager dans une utilisation non autorisée des ressources. Les principes clés de la gouvernance, classés sous les dimensions de l'équité, ont été utilisés comme critères d'évaluation. L'étude conclut que la gouvernance et l'équité sont des approches alternatives potentielles à adopter dans la mise en œuvre de la conservation et du développement intégrés. Nous recommandons l'application d'un cadre de gouvernance équitable afin de parvenir à une conservation durable.

DEVELOPING AN OUTCOMES-BASED APPROACH TO ACHIEVING TARGET 3 OF THE GLOBAL BIODIVERSITY FRAMEWORK

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ABSTRACT

The draft Global Biodiversity Framework proposes to increase protected areas and OECMs to at least 30 per cent of land and ocean by 2030 (30x30). Such areas are central to conservation, but only if effectively managed and equitably governed. In practice, governments often recognise areas that do not achieve successful outcomes or respect human rights and fail to recognise other effective governance systems. We argue that protected areas and OECMs should only be recognised as fully contributing to 30x30 if they are on track to achieve positive and sustained biodiversity outcomes while respecting human rights. Three principles are important:

- Delivery of positive outcomes relating to biodiversity;
- Recognition and respect for rights-holders and stakeholders living in or near the area or dependent on its natural resources; and
- Meeting human needs through ecosystem services.

Four levels in making progress towards Target 3 can be distinguished:

1. Areas that are currently fully effective;
2. Areas that are currently partially effective or on track to being effective;
3. Areas that are currently ineffective due to reversible issues; and
4. Areas that are currently and will continue to be ineffective due to irreversible issues.

Some policy implications of this typology, its strengths and weaknesses, and how it might be further developed are discussed.

Key words: protected area, OECM, management effectiveness, biodiversity conservation, equity, outcomes

INTRODUCTION

In Draft 1 of the post-2020 Global Biodiversity Framework (GBF), the Convention on Biological Diversity (CBD) proposed a target for at least 30 per cent of the planet to be in effective systems of protected areas and other effective area-based conservation measures (OECMs) by 2030 (30x30). This is seen as a key component of its goal to reduce threats to biodiversity (wording from 2021):

> Target 3. Ensure that at least 30 per cent globally of land areas and of sea areas, especially areas of particular importance for biodiversity and its contributions to people, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes (CBD, 2021).

Target 3 continues to be discussed within the CBD Open Ended Working Group, but the figure of 30 per cent has

strong support. Like Aichi Biodiversity Target 11, Target 3 includes "other effective area-based conservation measures" (OECMs) now with a definition adopted by Parties to the CBD in 2018. Target 3's ambition builds on (i) scientific evidence on the urgent need to reverse ecosystem collapse and species extinctions (Díaz et al., 2019), and (ii) broad consensus on the inadequacies of implementing Aichi Biodiversity Target 11 and a need to ensure sufficient efforts are directed to safeguard the Earth's remaining natural heritage.

Over 100 governments have committed to the target as part of the High Ambition Coalition for Nature and People[1] and over 70 as part of the Global Ocean Alliance[2], advocating a global deal to halt species loss and protect ecosystems vital to human health and economic security. Previously an aspirational goal, the target is now seen as critical to protect biodiversity and mitigate and adapt to climate change.

However, Target 3 has been criticised for perceived inadequacies in wording and aims (Maron et al., 2021). Fears have been voiced that should sites with loose rules and poor delivery be recognised as OECMs, the results will be counterproductive (Ball & Nixon, 2022). Additionally, there are concerns that an inappropriate process of protected area designation and OECM recognition could erode the rights and self-determination of Indigenous peoples and local communities that manage areas with high biodiversity, leading to injustice and harm (Schleicher et al., 2019; Gurney et al., 2021).

This paper examines the implications of the draft Target regarding (i) the types of area-based conservation to be included, which would enable people to live in harmony with nature and (ii) how this understanding can be translated into effective and equitable conservation outcomes. This is clarified by a typology that classifies area-based conservation in terms of its ecological and social effectiveness, based around relevant principles. The paper is conceptual; we are aiming to start a conversation and to highlight the need for an outcomes-based approach rather than present a prescriptive action plan. We identify some of the steps needed to make this model into a practical conservation tool and urge that these issues will be considered carefully during negotiations for and implementation of Global Biodiversity Framework Target 3.

Ecuador - Napo Wildlife Lodge owned and run by indigenous peoples © Equilibrium Research

AREA-BASED CONSERVATION IN TARGET 3

Mechanisms, location, governance, effectiveness and equity

Target 3 will not be implemented in a vacuum but builds on existing national protected area networks and other less recognised areas of high biodiversity, such as many ICCAs. It draws on a long history of planning, practice and development regarding area-based conservation. Draft Target 3 recognises two mechanisms for area-based conservation relevant to meet the 30 per cent target: protected areas and other effective area-based conservation measures or OECMs (see Box 1 for definitions).

The IUCN World Commission on Protected Areas (WCPA) has issued guidance (IUCN WCPA, 2021) stating its support for the wording in Draft Target 3 that only protected areas and OECMs should count towards the 30x30 target. In addition, Target 3 has a range of other preconditions, as outlined in the following paragraphs.

Location: Target 3 recognises that to protect the full range of ecosystems and species, protected areas and OECMs need to be located in priority places for biodiversity ("areas of particular importance to biodiversity") that are "well-connected" and integrated in an "ecologically representative" system. This implies the need for accurate data on the location of all types of biodiversity, still lacking in most places, and careful planning, negotiation and management to secure ecological connectivity. Selection can be assisted by global prioritisation processes, such as Key Biodiversity Areas, often aligned with systematic conservation planning and local and Indigenous knowledge (Smith et al., 2018). However, given the importance of community participation, the extent to which location of new protected areas and OECMs is exclusively data-driven will vary.

Governance: The target will focus increasingly on land and water outside state protected areas, including the high seas. This relates to various forms of sectoral and

Box 1

Protected area: The CBD defines a protected area as: "a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives.[3]"

The International Union for Conservation of Nature (IUCN) has a different definition, which the CBD recognises as equivalent (Lopoukhine & Ferreira de Souza, 2012): "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." This is clarified by some principles, including: "…only those areas where the main objective is conserving nature can be considered protected areas; this can include many areas with other goals as well, at the same level, but in the case of conflict, nature conservation will be the priority" (Dudley, 2008).

Both the CBD and IUCN recognise a range of management approaches and governance types as applicable in protected areas, as long as these areas also meet the definition of a protected area.

The CBD defines an **Other effective area-based conservation measure (OECM)** as "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, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio-economic, and other locally relevant values" (CBD, 2018).

While the main distinction between protected areas and OECMs is defined by the primacy of biodiversity conservation in management objectives, there are still grey areas, particularly in the case of protected landscapes and seascapes (IUCN Category V). The OECM framework may enable increased recognition and support for the conservation potential of Indigenous peoples' and local communities' territories and areas, by being more suited to their lands and territories than protected area status; yet it is still unclear whether this will be achieved in practice (Jones et al., 2018).

private governance but, at least on land, it chiefly reflects an acknowledgement of the existing and increased role for Indigenous Peoples and Local Communities (IPLCs) in Target 3, which will not be achievable without their leadership, partnership and support. The Target provides a huge opportunity to strengthen security of land, water and resource tenure and support for IPLC-led conservation, but only if rooted in a rights-based approach and guided by principles of procedural justice (Gurney et al., 2021). Establishment of new protected areas and OECMs in their territories must be initiated following local customs and/or approved by the relevant IPLC actors through processes that respect human rights obligations (e.g. UNDRIP, 2007), including Free Prior and Informed Consent (FPIC) and equitable benefit sharing and governance. Such territories may be counted either as protected areas or OECMs, depending on goals established by the relevant IPLC group rights-holders and/or stakeholders, and on full recognition of IPLC rights and governance in national frameworks for OECMs. And within protected areas other approaches, including a variety of privately protected areas, will be increasingly important.

Effectiveness: Target 3 requires that protected areas and OECMs be 'effective'. Effectiveness is traditionally used to describe how well an area is being managed – "primarily the extent to which it is protecting values and achieving goals and objectives" (Hockings et al., 2006). Numerous studies have assessed protected areas both in terms of whether they are located in optimal places for biodiversity (Joppa & Pfaff, 2009) and their management effectiveness. Research suggests (Jones et al., 2018) that at least a third of protected areas globally are under threat, losing natural areas and wildlife resources, and less than a quarter are adequately funded (Coad et al., 2019). Many have not been properly implemented in practice ('paper parks'), and others do not have a level of protection against extractive and destructive activities needed to achieve long-term conservation (Grorud-Colvert et al., 2021). The global portfolio of protected areas currently does a less than adequate job of protecting biodiversity, though at a national scale there has been some progress, and the CBD has a preliminary estimate that extinction risk of birds and mammals would have been two to four times higher without protected areas (Secretariat of the Convention on Biological Diversity, 2020). Assessing how and when OECMs deliver conservation outcomes is at a preliminary stage (Alves-Pinto et al., 2021). Additionally, 91 per cent of IPLC lands are considered to be in good or fair ecological condition and 36 per cent of the global coverage of Key Biodiversity Areas lie within IPLC lands (WWF et al., 2021).

A stronger focus on effectiveness should influence national conservation strategies. In countries with large networks of poorly managed protected areas, the emphasis may be on improving what is there (quality). In countries with low protected area coverage, the objective will be to increase the area under protected areas and OECMs (quantity), while at the same time ensuring that both new and existing sites are effective.

Equitable conservation: Being effective is a prerequisite but protected areas and OECMs also need to be "equitably managed" by assuring long-term sustainability through collaboration and fair benefit-sharing with rights-holders and stakeholders. CBD Decision COP XIV/8, Annex II (2018) provides guidance: "Appropriate procedures are in place to ensure that the diversity of rights holders and stakeholders are recognized, that rule- and decision-making is inclusive, and the costs and benefits are equitably shared." A stronger focus on equity is demanded by civil society, and underpins effective conservation, and will be a major factor in Target 3. Equitable conservation can be a driver of success, with studies documenting that sites co-managed with local communities often deliver better conservation outcomes (Zafra-Calvo & Geldmann, 2020). In countries where equity aspects of protected areas and OECMs are currently weak, a main emphasis will be conflict resolution and improved rights recognition in existing areas, while a stronger focus on equity will also influence how new areas are established or recognised.

Reporting protected areas and OECMs

The final Target 3 wording will provide a framework against which CBD Parties report to the World Database on Protected Areas (WDPA) and World Database on OECMs (WD-OECM). While the Target wording will be agreed by consensus among Parties, CBD Parties independently decide what is reported according to national policies and legislation, rather than the decision being made by the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). UNEP-WCMC, which manages the WDPA and WD-OECM, advises governments to adhere to the CBD and IUCN definitions of a protected area and CBD definition of an OECM, and NGOs and civil society to work with governments to improve data quality. Nonetheless, protected areas that do not meet these definitions are sometimes reported to the WDPA by governments, and conversely areas that do meet the definition (e.g. some privately protected areas and ICCAs) may be omitted.

Data on management effectiveness is collated by UNEP-WCMC in the Global Database on Management Effectiveness (GD-PAME). The indicators derived from the GD-PAME currently provide only a limited picture of effectiveness (Geldmann et al., 2021), and UNEP-WCMC is developing a roadmap towards more meaningful indicators of effectiveness – encompassing the quality of governance, management and conservation outcomes (UNEP-WCMC, 2022). The resulting new and critical data infrastructure and indicators will support an outcomes-based approach to implementation of Target 3.

Overarching principles for effective and equitable conservation outcomes, based on existing language in CBD draft targets

To ensure accurate interpretation and application of Target 3 that is consistent and aligned with its intent will require a universal set of principles (or a common lens) applied to all categories of protected areas and OECMs regarding their eligibility for being reported towards Target 3 and more importantly, their ability to help achieve its aims.

In the following section three overarching principles are suggested to provide additional detail about what is included within 'intent' in this context. These lay out how draft Target 3 should be implemented, with relevant language from CBD drafts included in italics. We recognise that texts may change, but the quotations selected have all been reasonably constant during the negotiations.

Principle 1. Delivery of positive outcomes relating to biodiversity: "*The integrity of all ecosystems is enhanced, with an increase of at least 15 per cent in the area, connectivity and integrity of natural ecosystems, supporting healthy and resilient populations of all species, the rate of extinctions has been reduced at least tenfold, and the risk of species extinctions across all taxonomic and functional groups is halved, and genetic diversity of wild and domesticated species is safeguarded, with at least 90 per cent of genetic diversity within all species maintained*" [GBF draft Goal A] AND "*biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people*" [2050 Vision].

Principle 2. Recognition and respect for rights-holders and stakeholders who live within or near the area and/or are dependent on it: "*Ensure equitable and effective participation in decision-making related to biodiversity by indigenous peoples and local communities, and respect their rights over lands, territories and resources*" [draft Target 21].

Principle 3. Meeting human needs through restoring, maintaining and enhancing ecosystem services: "*Nature's contributions to people are valued, maintained or enhanced through conservation and sustainable use supporting the global development agenda for the benefit of all*" [GBF Goal B]. Delivery of ecosystem services should not be at the expense of biodiversity outcomes or human rights.

Four elements must be in place for the principles to be successful. These are also the characteristics that need to be analysed in any attempt to assess the intent to meet the principles:

Design: Areas individually, or in an ecologically connected network (including where necessary transboundary conservation and strategically placed smaller reserves), are located in optimal places for biodiversity, and are sufficient in area coverage and management effectiveness to meet conservation objectives, including:
a. "*areas of particular importance to biodiversity", and "ecologically representative*" sites containing priority species or ecosystems.
b. "*well-connected systems of protected areas and OECMs*", that provide ecosystem integrity, long-term resilience, and integration into wider landscapes and seascapes.
c. "*its contributions to people*", including tangible and intangible values and ecosystem services [all quotes from draft Target 3].

Governance and social equity: "*equitably managed*" [draft Target 3], "*for the benefit of all*" [draft Goal B] and also draft Target 21 on rights of Indigenous peoples and local communities. Local rights-holders, especially Indigenous peoples, are recognised and their rights respected and protected. For Indigenous peoples and local communities with collective and customary ties to their lands, this includes ensuring no decisions potentially impacting on their rights are taken without their Free Prior and Informed Consent. Governance is by legitimate rights-holders and complies with customary and legal requirements for transparency, accountability, equity and fairness and includes credible and effective social safeguards and dispute mechanisms (Zafra-Calvo et al., 2017). Custodians are safe in their occupations and have the timely and competent support of relevant governance entities. Economic and social benefits, and any incentives and compensation payments, are spread equitably amongst rights-holders (Dudley et al., 2016), and monitored.

Conservation management: "e*ffectively … managed*" [draft Target 3]: management reflects rules and regulations defined by governance entities and is effective at achieving desired biodiversity outcomes, including ecosystem restoration if necessary, is financially efficient and is verified by regular monitoring and reporting of key effectiveness criteria (Mascia et al., 2014).

Long-term site security: "l*ong-term sustainability of all categories of nature's contributions to people is ensured*" [draft Milestone B.2], which assumes that local commitment, political and legal commitment, and financial commitment are all at a scale sufficient to effect conservation over the long term.

Restoring traditional agriculture, Al Shouf Biosphere Reserve, Lebanon © Marc Hockings

Contextual risks

Not all the steps outlined above will be achievable immediately in every site. Delivery of effective, equitable, long-term, area-based conservation is heavily influenced by factors that may be outside the control of those responsible for managing individual sites, or even systems of protected areas and OECMs. Conditions for permanence and effectiveness take time to achieve, as does agreement on conservation strategies. Ensuring social equity (Schreckenberg et al., 2016) in a site is often hampered by broader social and political conditions. The ability to prioritise sites of high biodiversity value will depend on how thoroughly the regional, national or local biodiversity has been assessed and mapped. Regardless, protected areas and OECMs should be recognised or established and managed in ways that facilitate achievement of these objectives, either within their boundaries or in broader land- and seascapes.

Assessing and supporting national readiness for 30x30 is an urgent priority. Within a country, area-based conservation is influenced by many factors, for example, the amount of natural habitat remaining (Locke et al., 2019); the existing legislative system; awareness of current biodiversity loss; the political strength of the environment ministry as compared with other ministries and the treasury; the agricultural, fisheries and extractive industries; large corporations; government recognition for customary and formal property rights; and security issues such as insurgency and organised crime (e.g. illegal, unregulated and unreported fishing). Considerations may be affected by donor priorities, issues like debt relief, and global markets for products that compete for space with conservation. Wildlife may move outside protected areas and OECMs and migratory species can be impacted in other parts of their range. Environmental shocks, from climate change and other factors, will influence conservation. Understanding whether factors that impact on the quality of protected areas and OECMs are endogenous or exogenous, and whether they are abatable or non-abatable by management authorities, will be important in planning interventions.

While these factors may all affect countries' collective ability to meet Target 3, the overarching principles remain valid. They may be used to improve the status of existing and new protected areas and OECMs and to facilitate progression of sites along a continuum of improvement.

The utility of an outcomes-based approach to achieving 30x30

The GBF is about valuing, conserving, restoring and wisely using biodiversity, in line with the CBD's other objectives of sustainable use and fair and equitable benefit-sharing. Effort spent on creating, identifying and investing in protected areas and OECMs is only worthwhile if they actually preserve, maintain and restore biodiversity. Currently, some protected areas do not deliver effective conservation. This may be due to lack of funds, weak governance, poor management, flawed design, weak laws and poor enforcement or due to degradation through environmental change. Others may achieve conservation of nature but impact negatively on human rights and well-being (Duffy, 2010). Responses to Aichi Target 11 often emphasised the "at least 17 per cent of land and 10 per cent of ocean" part of the target, rather than "especially areas of particular importance for biodiversity, effectively and equitably managed, ecologically representative and well-connected".

Effectiveness was discussed a great deal during negotiations for the Aichi targets, but then largely ignored. It is likely that the area component of Target 3 will receive most attention in the current GBF as well, and it is therefore essential to ensure that the focus on quality is stressed, by distinguishing protected areas and OECMs that are genuinely contributing to Target 3 to a greater or lesser extent, from those that are currently failing (but could turn around and contribute with adequate management) and those that may never contribute significantly to the Target due, for example, to poor design or location (Jonas et al., 2021). Elements of such an approach have already been proposed (Grorud-Colvert et al., 2021) and are in use (Sullivan-Stack et al., 2022) in marine protected areas.

A requirement for effectiveness is included in the IUCN definition of a protected area ("to achieve the long-term conservation of nature") and the CBD definition of an OECM ("governed and managed in ways that achieve positive and sustained long-term outcomes for the in-situ conservation of biodiversity"). But in practice, governments have continued to report protected areas that do not achieve these outcomes and have failed to recognise other governance systems that are effective. Bringing a focus on outcomes into consideration will increase the real value of the Target, although the practical challenges of achieving this should not be underestimated.

Effectiveness does not only relate to ecology. The CBD notes the requirement for an "effectively and equitably managed system of protected areas" [draft Target 3, our emphasis; see also Box 2]. To meet the wider aims of the 2050 Vision and the Sustainable Development Goals (Kettunen et al., 2021), protected areas and OECMs also need to respect relevant social (human rights and needs)

and equity considerations, as laid out above, and to be monitored against these.

We therefore argue that protected areas and OECMs should only be recognised as fully contributing to the 30x30 target if they are on track to achieve positive and sustained biodiversity outcomes while respecting human rights.

We suggest protected areas and OECMs of all management approaches and governance types can be assessed against four states, with suggested implications in italics:

1. Areas are currently **fully effective** in achieving credible and measurable ecological outcomes (or identified conservation values in the case of OECMs), and relevant social outcomes: *The site counts towards the Target and requires continued investment and monitoring*.

2. Areas are **currently partially effective** or **on track** to achieving credible and measurable ecological outcomes (or identified conservation values in the case of OECMs), and relevant social outcomes: *The site counts towards the Target but requires further work to increase effectiveness*.

3. Areas are **currently ineffective** in meeting credible and measurable ecological outcomes (or identified conservation values in the case of OECMs) and relevant social outcomes due to **reversible** issues such as lack of financing, weakness in management, outside influences (e.g. political instability, social disruption, armed conflict, floods), or fixed management rules and governance systems that prevent effective conservation or undermine human rights: *The site currently does not count towards the Target and should be subject to urgent efforts to adapt management and support the site to achieve its intended outcomes*.

4. Areas are **currently and will continue to be ineffective** in meeting credible and measurable ecological outcomes (or identified conservation values in the case of OECMs) and relevant social outcomes, due to **irreversible** issues such as long-term damage to the site, inherent and significant flaws in the design or other contextual risks: *The site does not count towards the Target and is unlikely to do so in the future*.

Such an approach can support analysis of and advocacy for individual sites and national systems and in time, protected areas and OECMs could be assessed against this framework using data reported to the WDPA and WD-OECM. Note that the typology focuses on current status; some sites are likely to become less effective over time (e.g. due to climate change). Including projections of ecosystem change could bring a useful additional dimension into the analysis even though these will often be speculative.

These distinctions will not be precise. Guidance is needed, for example, about definitions of 'effective', 'ineffective', 'relevant', 'equitable', 'inequitable' (where notions of 'equity are context specific, Gurney et al., 2021), clarity about who defines this for a site, how often effectiveness is evaluated, and how ineffective a protected area or OECM needs to be (and for how long) before it stops making a meaningful contribution. CBD language on OECMs recognises the potential of an area to achieve effectiveness over time. Many sites will see a decline in some species, particularly under climate change, without being ineffective overall and new ecosystem values continue to emerge. We would expect number 4 above to be unusual. None of these obstacles are insurmountable. The concept that governments and civil society should not accept ineffective or inequitable protected areas and OECMs is increasingly recognised by governments and donors and it is important to draw some boundaries about what this means.

Putting ideas into practice

All of the above will require careful and rigorous development, with close attention to equity. Clarity is needed about who defines the proposed outcomes for a given site and what is needed to measure progress, as different stakeholders and rights-holders may have different opinions. Clear goals and standards are needed to measure conservation outcomes, along with the skills

Box 2: Equitable and effective area-based conservation measures

In 2018, Parties to the CBD developed guidance for OECMs. In doing so, they clearly elaborated guidance for "effective area-based conservation measures", which includes considerations of equity and can be applied to protected areas and OECMs (Jonas et al., 2021). This includes requirements that sites are equitably governed, have sustained governance and management, deliver the long-term and effective conservation of biodiversity and, where relevant, conserve ecosystem functions and services and respect local values. These criteria, agreed by CBD Parties, provide a clear rationale for applying the framework we set out in this paper.

Clearing invasive plants from a protected forest, Sabah Malaysia © Equilibrium Research

and resources to monitor these. Intended conservation outcomes for individual protected areas will respond to global positions (here the GBF goals and targets) but should also be influenced by local conceptualisations of human–nature relations. Intended social outcomes need to be agreed at a very local level and include the priorities of both local rights-holders and often also of stakeholders in the wider area (e.g. people living further down a water catchment). This implies that agreement is reached on the identity of rights-holders and stakeholders. Some sites that do not match the definition of protected areas or OECMs may contribute to other CBD targets relating to sustainable use; these belong in the remaining 70 per cent; for example, a whole-ocean approach is vital for effective and sustainable ocean management.

Measuring progress

Ongoing work by UNEP-WCMC and its partners will provide a framework for reporting on the effectiveness of protected areas and OECMs, with indicators in development that will cover the quality of governance, management and outcomes. Questions remain about how progress towards ecological and social "outcomes" should be measured, and this will depend on factors such as resources, expertise, baseline data, etc. Two broad options exist (and can be used in combination):

1. Measuring by intent and enabling conditions plus simple supporting data (e.g. size, level of protection, stage of establishment) (Grorud-Colvert et al., 2021), setting of objectives, governance bodies, presence of management plan, monitoring plan and supportive legislation; often drawing on information gained through use of an existing assessment approach such as the METT (Stolton et al., 2021) and/or GAPA (Franks & Booker, 2018).

2. Measuring by assessment of outcomes of management on changes in ecological and social conditions over time, represented by trends in selected indicators, including through restoration (e.g. utilising proxy indicators to measure aspects of ecosystem condition) (Nicholson et al., 2021), and where possible some key species indicator data, and identified social indicators.

The two approaches are linked, in that 1 provides for the input while 2 speaks to the output. Without effective input of management, planning and governance, the conservation outcomes are seldom positive. The emergence of protected area management standards, such as the IUCN Green List of Protected and Conserved Areas Standard (Hockings et al., 2019) and species-specific standards such as Conservation Assured | Tiger Standards (Conservation Assured, 2018), provide a combination of both approaches.

DISCUSSION AND CONCLUSIONS

The principles and typology suggest a framework that could, with development, provide a range of benefits in terms of further rigour and accuracy in understanding and reporting on Target 3 of the Global Biodiversity Framework. There are signs that governments are

starting to recognise the importance of effectiveness and equity outcomes, rather than simply the classification of an area in the WDPA. We note for instance that the UK Department of Environment, Food and Rural Affairs has recommended that the UK's national parks and Areas of Outstanding Natural Beauty, reported as IUCN protected area category V in the WDPA, do not currently provide effective enough conservation to be included within the UK's 30x30 reporting.

More work is needed to understand how establishing a typology based on outcomes can be used as a positive conservation tool, particularly given the resources and capacity needed to document effectiveness within these areas in diverse conditions. Monitoring of protected areas and OECMs will need to be financed and carried out, after agreement is reached on what will be monitored (i.e. the desired outcomes in a particular place) and how. Rights-holders and landowners often resent outsiders making judgements about their territories and this potential conflict will be heightened where funding rests on a positive outcome. What happens if a protected area is valuable for conservation but has a poor human rights record? Or a protected area has the support of a local community but is losing species? Both these and other tricky situations are likely to occur.

There are also some potential drawbacks. A fundamental question relates to what should be done with any information collected. Concern is expressed that identifying something as "ineffective" or "not counting" might allow governments to justify further rollback and PADDD events (protected area downgrading, downsizing and degazettement, Mascia & Pailler, 2011), or be used by some governments and companies to argue that if the protected area is ineffective it should be opened for mining or other exploitation. The messaging surrounding any assessments needs to be handled very carefully. On the other hand, maintaining silence about protected areas established in ways that make them unable to secure the values for which they were created, or result in serious human rights violations, or are managed so badly that their values disappear, sets up conservation strategies to fail and provides critics with a reason to argue that protected areas are a failed model. It also risks 'protected area fatigue', where nations stop embracing bold efforts to undertake area-based conservation.

The ideas outlined above are a beginning; more work is needed to make them a reality. Further research will explore critical issues in depth. This will include how the ideas can be integrated with existing systems, such as the IUCN Green List Standard. Ideas around the 'green economy', 'nature positive' and biodiversity finance are developing fast and will be pivotal in developing economic incentives. Measurement and reporting of social outcomes will require very careful development.

All these issues need further thought, development and testing. And finally, it must be remembered that protected areas and OECMs are only one part of a response to environmental degradation, which requires broad-reaching and fundamental changes in the way that society, industry and commerce views the natural world. Sustainable management of the other 70 per cent of the planet needs to be strengthened, under other GBF Targets such as 1 (integrated spatial planning), 5 (sustainable use of wild species) and 10 (sustainable management of areas under agriculture, aquaculture and forestry). But getting management right on at least 30 per cent of land and ocean is a good place to start.

ENDNOTES

[1]https://www.hacfornatureandpeople.org/
[2]https://www.gov.uk/government/topical-events/global-ocean-alliance-30by30-initiative
[3]https://www.cbd.int/convention/articles/?a=cbd-02

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RESUMEN

El proyecto de Marco Global de la Biodiversidad propone aumentar las áreas protegidas y los OECM hasta alcanzar al menos el 30% de la tierra y el océano para 2030 (30x30). Estas áreas son fundamentales para la conservación, pero sólo si se gestionan eficazmente y se gobiernan de forma equitativa. En la práctica, los gobiernos suelen reconocer áreas que no logran resultados satisfactorios ni respetan los derechos humanos y no reconocen otros sistemas de gobernanza eficaces. Sostenemos que las áreas protegidas y las OECM sólo deberían ser reconocidas como una contribución plena al 30x30 si están en camino de lograr resultados positivos y sostenidos en materia de biodiversidad, respetando al mismo tiempo los derechos humanos. Hay tres principios importantes:
- Obtención de resultados positivos relacionados con la biodiversidad
- Reconocimiento y respeto de los titulares de derechos y de las partes interesadas que viven en la zona o cerca de ella o que dependen de sus recursos naturales
- Satisfacción de las necesidades humanas a través de los servicios de los ecosistemas

Se pueden distinguir cuatro niveles en el progreso hacia la Meta 3:
1. Zonas que actualmente son plenamente efectivas.
2. Áreas que actualmente son parcialmente efectivas o están en camino de serlo.
3. Áreas que actualmente no son efectivas debido a problemas reversibles.
4. Áreas que actualmente son y seguirán siendo ineficaces debido a problemas irreversibles.

Se discuten algunas implicaciones políticas de esta tipología, sus puntos fuertes y débiles, y cómo podría desarrollarse.

RÉSUMÉ

Le projet de cadre mondial pour la biodiversité propose de porter les zones protégées et les OECM à au moins 30 % des terres et des océans d'ici 2030 (30x30). Ces zones sont essentielles à la conservation, mais seulement si elles sont gérées efficacement et gouvernées équitablement. Dans la pratique, les gouvernements reconnaissent souvent les zones qui n'obtiennent pas de bons résultats ou ne respectent pas les droits de l'homme et ne reconnaissent pas les autres systèmes de gouvernance efficaces. Nous soutenons que les zones protégées et les OECM ne devraient être reconnues comme contribuant pleinement au 30x30 que si elles sont en mesure d'obtenir des résultats positifs et durables en matière de biodiversité tout en respectant les droits de l'homme. Trois principes sont importants :
- La réalisation de résultats positifs en matière de biodiversité
- Reconnaissance et respect des détenteurs de droits et des parties prenantes vivant dans ou à proximité de la zone ou dépendant de ses ressources naturelles.
- La satisfaction des besoins humains grâce aux services écosystémiques

On peut distinguer quatre niveaux dans la progression vers l'objectif 3 :
1. Les zones qui sont actuellement pleinement efficaces.
2. Les zones qui sont actuellement partiellement efficaces ou en passe de l'être.
3. Les zones qui sont actuellement inefficaces en raison de problèmes réversibles.
4. Les zones qui sont actuellement et continueront d'être inefficaces en raison de problèmes irréversibles.

Certaines implications politiques de cette typologie, ses forces et ses faiblesses, et la manière dont elle pourrait être développée sont discutées.

MANAGEMENT EFFECTIVENESS AND DEFORESTATION IN PROTECTED AREAS OF THE BRAZILIAN AMAZON

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ABSTRACT

The establishment and management of protected areas are critical strategies for biodiversity conservation and preventing tropical forest loss. We analysed 2020 management effectiveness data from Brazil's SAMGe evaluation platform in 133 areas of the Brazilian Amazon under varying deforestation pressures. We did not find any significant correlation between overall management effectiveness and deforestation, whereas distance to roads was negatively correlated. There is a higher occurrence of prohibited uses and fewer encouraged uses within highly deforested protected areas. Moreover, most of these areas also presented higher equipment expenditure scores, suggesting that resources are allocated towards protection actions. Most deforestation is likely driven by opportunity, as highly perturbed locations are generally much less isolated than those with very low deforestation scores. To avoid forest loss, complementary strategies that reduce the external forces leading to deforestation must urgently be implemented.

Key words: biodiversity conservation, environmental policies, management effectiveness assessment

INTRODUCTION

The creation of protected areas is a key strategy for biodiversity conservation worldwide (Hockings et al., 2006; Maxwell et al., 2020). Studies have evidenced their effectiveness as shields against deforestation (Joppa & Pfaff, 2011; Spracklen & Garcia-Carreras., 2015; Shah et al. 2021), although they vary in their protection capacity because of location characteristics, governance structure, local economic growth, and intensity of surrounding agricultural activity (Shah et al., 2021).

Recently, the creation of protected areas in Brazil has not only stalled, but there now is substantial political pressure for their reduction, downgrading or elimination altogether (known as the PADDD process; Pack et al., 2016; Tesfaw et al., 2018). The undermining of biodiversity conservation policies in Brazil during 2019 and 2020 saw a consequent advance in deforestation and setbacks in the implementation of multiple monitoring and law enforcement instruments (Amigo, 2020; Lovejoy & Nobre, 2019). This resulted in the highest rates of Amazon deforestation in the last 12 years, with more than 10,000 km² of cover lost in 2019 and similar rates in 2020 (INPE, 2021). This period has thus seen a substantial retrogression in comparison to the deforestation trends of the 2000s.

In the Brazilian Amazon, protected areas cover more than 2.4 million km² and serve as shields against the advancing deforestation frontier (Baragwanath & Bayi, 2020; Walker et al., 2020; Pfaff et al., 2015). These areas include two types of protected area recognised by Brazilian legislation: conservation units and Indigenous lands. The former have the fundamental objective of protecting biodiversity and are governed by the National System of Conservation Units, within the scope of environmental policy (Supplementary Online Material (SOM)). Indigenous lands have specific regulations within the scope of Indigenous policy and aim to preserve native ways of life (SOM text S1). Both are important to protect the forest and maintain climate stability in a global context (Walker et al., 2020; Nolte et al., 2013) and must be effectively managed to ensure they are fulfilling their role.

The impact and function of protected areas in conservation science and practice can be quantified using management effectiveness assessments (Maxwell et al., 2020), which have been incorporated into the international biodiversity conservation goals (Aichi Targets under the Convention on Biological Diversity, for 2011 to 2020). Post-2020 conservation targets are defined under the Global Biodiversity Framework, which recognises in its third target that the mere

creation of protected areas is insufficient to guarantee the fulfilment of their conservation objectives (CBD, 2021). Thus, management effectiveness is a relevant indicator of protected territories' ability to adapt to land use challenges and effectively address pressures and long-term threats in addition to generating their expected benefits (Geldmann et al., 2015).

There are some 69 different tools applied around the world to assess the management effectiveness of protected areas (UNEP-WCMC & IUCN, 2021). Despite some similarities, this heterogeneity motivated the establishment of basic guidelines by IUCN that resulted in six primary indicators: context, planning, inputs, processes, products and results (Hockings et al., 2006). In Brazil, multiple management assessment tools have been introduced in recent years (Pellin & Ranieri, 2016). Recently, the Management Analysis and Monitoring System (SAMGe, in Portuguese) has stood out because of its institution-wide use by the Chico Mendes Institute for Biodiversity Conservation (ICMBio), the federal agency responsible for conservation units' management (ICMBIO, 2019; SOM text S1).

Government agencies can use management assessments to identify priority actions by analysing a given protected area's scores (Coad et al., 2015). The use of these assessments became commonplace in the early 2000s (Coad et al., 2015). Brazil's SAMGe online assessment (created in 2016) currently uses six indicators corresponding to the IUCN management elements. It is populated with data annually by protected area managers, ideally following a participatory process. Records combine field data relevant to the protected areas' goals, biodiversity status, management actions and identified threats (ICMBIO, 2019). Its score is based on attainment of the protected area goals, with consideration to the interaction of conservation targets (e.g. endangered species or habitats), societal use and management initiatives (SOM, Figure S1). Each indicator and the overall effectiveness score are calculated from 0 (worst) to 1 (best scenario). Thus, management can be classified as not effective (0 to 0.2), of reduced effectiveness (0.2 to 0.4), moderately effective (0.4 to 0.6), effective (0.6 to 0.8) or highly effective (0.8 to 1).

The SAMGe evaluation also requires the inventorying of encouraged, allowed and prohibited activities occurring within the protected area (ICMBIO, 2019). Encouraged uses are expressly described in the protected area system legislation or the management instruments/ strategies required to achieve conservation goals (ICMBIO, 2019). They include uses that are also conservation goals, such as sustainable tourism or research activities in national parks (ICMBIO, 2019). SAMGe shares a limitation with other tools in that it ultimately depends on managers' perceptions (Coad et al., 2015; Geldmann et al., 2021). Nevertheless, it is a valuable contribution to protected area metrics that otherwise would not be available and that, combined with ecological indicators, can inform the protected areas impact and promote effective area-based conservation strategies. This study evaluates whether deforestation within protected areas is related to management effectiveness scores and whether individual management indicators differed considering different deforestation intensities. We also identify patterns in protected area resource use that may be associated with the threat of deforestation.

METHODS

Protected areas

The Legal Amazon covers approximately 5 million km², including all states of Brazil's northern region (Acre, Amazonas, Amapa, Para, Rondonia, Roraima and Tocantins), Mato Grosso state and part of Maranhao state. This is equivalent to 59 per cent of Brazil's territory (Santos et al., 2021). Brazilian protected areas, in the form of conservation units, cover 22.17 per cent of the Legal Amazon, totalling approximately 1.3 million km² (CNUC, 2020).

Conservation units are divided into two groups. Strictly protected areas aim to preserve nature and only allow indirect use of natural resources (corresponding to IUCN protected area categories I, II and III). Sustainable use units incorporate nature conservation with the sustainable use of natural resources (corresponding to IUCN categories IV, V and VI). Herein, protected areas are analogous to conservation units, as they are the sole type of protected area evaluated by the SAMGe platform (see text S1 for Brazilian protected area types).

The criteria for inclusion were that the protected area be located within the Legal Amazon, have undergone a 2020 management effectiveness assessment with the SAMGe tool (this encompasses about 40 per cent of all Amazon protected areas), and have spatial delimitation data available in the public National Register of Conservation Units (CNUC, 2020). Protected areas meeting these criteria are listed in Table 1.

Deforestation and management effectiveness

Management effectiveness data from the SAMGe platform[1] consisted of assessments from 133 Amazon protected areas during 2020 (125 federal and 8 state managed areas) (SAMGe, 2020). We chose SAMGe for

Table 1. Protected areas included in the analysis

Brazilian management categories	Brazilian management group	IUCN category	Number of areas with SAMGe assessment	Area covered by category (in km²)	Governance regime
Biological reserve	Strictly protected	Category Ia	11	39,972.03	By government
Ecological station	Strictly protected	Category Ia	11	62,281.72	By government
Park	Strictly protected	Category II	21	176,846.81	By government
Area of relevant ecological interest	Sustainable use	Category IV	3	189.31	Shared governance
Environmental protection area	Sustainable use	Category V	7	22,732.21	Shared governance
Forest	Sustainable use	Category VI	34	196,144.53	Shared governance
Sustainable development reserve	Sustainable use	Category VI	1	8,735.77	Shared governance
Extractive reserve	Sustainable use	Category VI	45	126,140.10	Shared governance
Total			**133**	**630,494.92***	

* Total area discounting overlaps.

this study due to both the availability of current and accessible data and to the assessment structure having a clear link with each area's conservation targets. We evaluated the overall effectiveness scores, each of the six indicator scores (context, planning, inputs, processes, results, and outputs and services), and the types of use reported for each area (encouraged, allowed and prohibited uses).

To identify deforestation rates in the 133 protected areas, the geographic databases of their locations were cross-referenced with data from the MapBiomas monitoring project. The MapBiomas system validates and refines deforestation alerts with high-resolution images for native vegetation in all Brazilian biomes (SOM text S1, MapBiomas, 2020). Deforestation alerts for 2020 are catalogued for areas greater than 0.1 km²; zero deforestation was considered for areas with lower levels. We also calculated the mean distance of each protected area from roads based on data from the Institute of Man and the Environment of the Amazon[2] .

To assess whether deforestation within protected areas in 2020 was related to overall management effectiveness scores or to road accessibility, we applied a Kendall partial correlation test considering deforestation levels in 2020, management effectiveness in 2020 and average distance from roads. The Kendall method is suitable for data with non-normal distribution and with a high incidence of repeated values (Akoglu, 2018).

To assess if management components differ between protected areas with differing levels of deforestation, we divided protected areas into three categories: areas without detected deforestation (76 areas); areas with below-average deforestation (< 2.08 km², 40 areas); and areas with above-average deforestation (>2.08 km²,

A deforested forest fragment © FreeImage

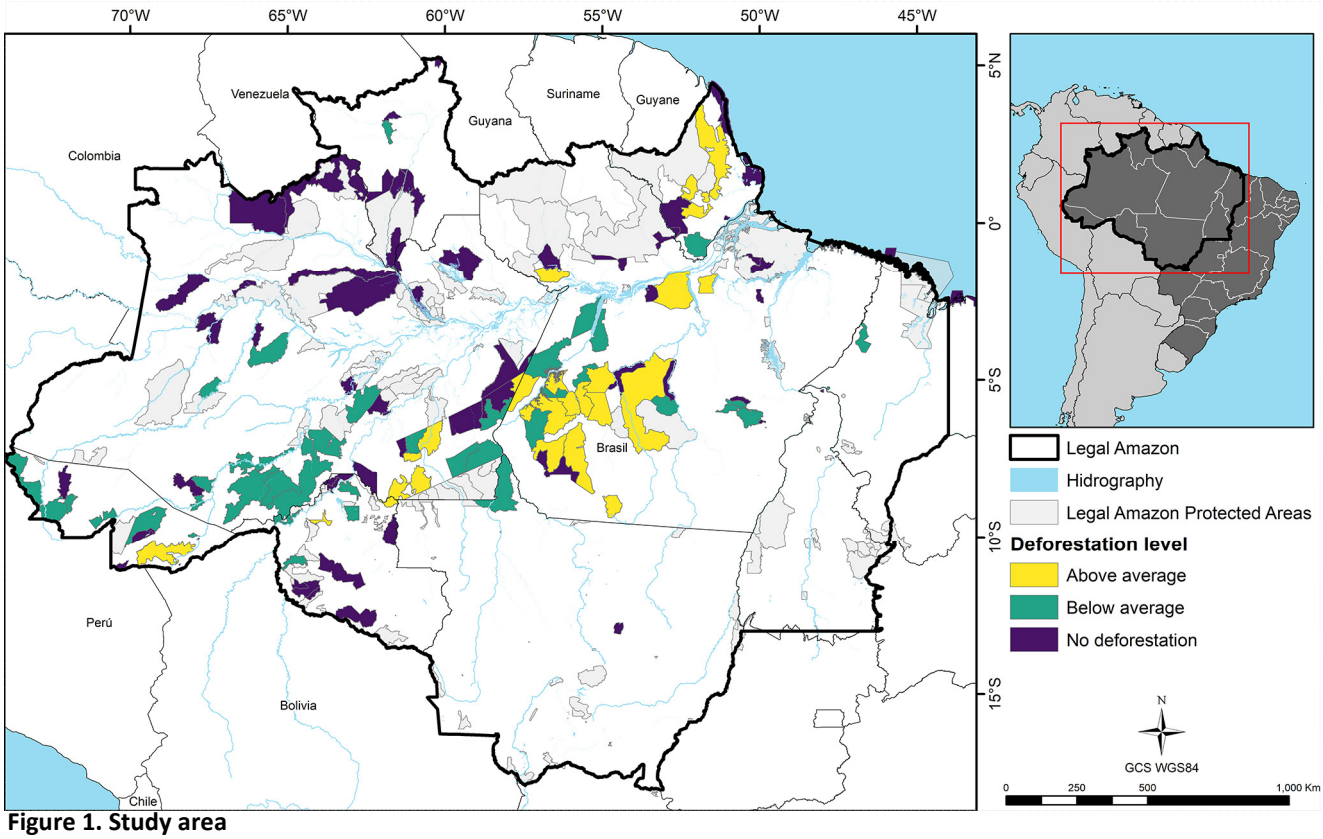

Figure 1. Study area

17 areas) (Figure 1). As deforestation varied strongly among protected areas, this classification allowed us to compare unthreatened areas and areas with two distinct levels of pressure: least versus most affected.

The effect of deforestation rate on each management effectiveness indicator was investigated in relation to the three classes of protected area defined above: without detected deforestation, with below-average deforestation, and with above-average deforestation. We used one-way ANOVA for data with normal distribution and Kruskal-Wallis for data with non-normal distribution to evaluate difference between groups. Data normality was verified through the Shapiro-Wilk test and the homogeneity of variances using Levene's test. For all tests, a significance level of 0.05 was considered.

Finally, we examined the frequencies of encouraged, allowed and prohibited uses in each of the protected area classes in order to identify patterns in reported protected area uses that might be associated with deforestation threat. All analytical procedures were performed using the R software (R Core Team, 2021).

RESULTS

In the 133 areas studied, total deforestation was 276.63 km² in 2020, with 226.37 km² occurring within 90 sustainable use protected areas (0.06 per cent of this group's total area) and 50.26 km² within the 43 strictly protected areas (0.01 per cent of this group's total area). Among the former, national and state forests experienced 160.90 km² of deforestation, environmental protection areas 37.79 km², and extractive reserves 27.54 km². Taking the total number of 330 Amazon conservation units, they registered 1,299.8 km² of deforestation in 2020 (MapBiomas, 2020). Thus, whereas our sample represents 40 per cent of Amazon protected areas, it only encompasses 21 per cent of protected area deforestation, suggesting that SAMGe may be applied primarily in less deforested areas. Moreover, the total deforestation in protected areas is a small fraction of the biome's entire deforestation of approximately 8,430 km², where private land comprises the majority (MapBiomas, 2020). Deforestation ranged from 0 (in the 76 areas) to 85.16 km² (SD = 9.15) in the 17 areas with higher-than-average deforestation (Table 2; 12.78 per cent of the total). The average rate of deforestation for protected areas overall was 0.03 per cent (SD = 0.11). Thus, most of the deforestation took place within a few protected areas.

The overall average management effectiveness score of the 133 protected areas was 54.09 per cent (SD = 8.46), 54.9 per cent (SD = 6.97) for strictly protected areas and 53.7 per cent (SD = 9.10) for sustainable use areas. Thus, most protected areas evaluated show similar and

Table 2. Effectiveness and deforestation values in the 17 most deforested Amazon protected areas

Area name	State	Effectiveness	Deforestation (km²)	Per cent deforestation
Jamanxim's National Forest	Para	51.65	85.16	0.65
Altamira National Forest	Para	61.24	42.90	0.59
Tapajós Environmental Protection Area	Para	50.51	37.43	0.18
Nascentes Serra do Cachimbo Biological Reserve	Para	47.88	22.32	0.65
Chico Mendes Extractive Reserve	Acre	59.41	17.21	0.18
Terra do Meio's Ecological Station	Para	47.13	10.33	0.03
Jamanxim's National Park	Para	56.67	9.52	0.11
Itaituba II National Forest	Para	51.86	6.88	0.17
Saraca-Taquera's National Forest	Para	50.48	4.24	0.10
Bom Futuro's National Forest	Rondonia	51.82	3.96	0.40
Campos Amazônicos's National Park	Amazonas Rondonia Mato Grosso	52.49	3.72	0.04
Amapa's State Forest	Amapa	52.79	2.85	0.01
Riozinho do Anfrísio Extractive Reserve	Para	60.90	2.78	0.04
Amana's National Forest	Para	46.42	2.51	0.04
Verde Para Sempre Extractive Reserve	Para	58.97	2.37	0.02
Caxiuana's National Forest	Para	52.68	2.32	0.07
Aripuana's National Forest	Amazonas	40.44	2.20	0.03

moderate effectiveness scores (SOM Figure S1), possibly because they are managed by the same federal agency and thus have the same institutional and legal structure and share the same management guidelines.

We found no correlation between the overall effectiveness results and deforestation ($p = 0.57$), but a negative correlation between deforestation and distance from roads ($r = -0.2$; $p < 0.001$).

The overall management effectiveness score was not significantly different among our three deforestation categories. In areas without deforestation, the average was 54.92 per cent (SD = 7.73), in areas below-average 53.18 per cent (SD = 10.56) and in areas above-average 52.55 per cent (SD = 52.55). Among the latter, 15 have moderate management effectiveness (between 40 per cent and 60 per cent) and two have high effectiveness (> 60 per cent) (Table 2), suggesting that even well managed areas experienced deforestation in 2020.

The variance in the most deforested areas is smaller for the context indicator, oscillating close to the average of 44 per cent. Other indicators presented greater variability (SOM Figure S2). The indicator most associated with high and moderate effectiveness values in the 17 most deforested areas is inputs, which stands out as the best rating in 12 of the 17 areas. Among the 17 areas with the highest deforestation rates, 12 are in Para state.

There was no difference between the three deforestation classes and individual management indicators ($p > 0.05$ in all tests). Figure 2 and Table 3 present results for each group of management effectiveness indicators for the three deforestation categories. Table 3 presents the management indicator values with their respective averages for the three deforestation classes and specific values referring to the 17 most deforested areas in this study.

Considering the individual components of the input indicator (external support, technical capacity, equipment, staff number and financial resources), there was a statistical difference for the equipment value, Kruskal-Wallis test ($X^2(2) = 6.35$; $p < 0.05$) (Figure 3). For this indicator, areas without deforestation scored significantly lower than areas with above-average deforestation (Dunn's post-hoc test, $z = 2.36$; $p < 0.05$).

We found that in areas with above-average deforestation, prohibited uses accounted for 42.8 per cent of all uses, 37.9 per cent were allowed uses and 18.5 per cent encouraged uses. In other protected area classes, the most prominent are allowed uses (42.6 per cent), followed by encouraged (26.2 per cent) and prohibited (26.42 per cent) uses.

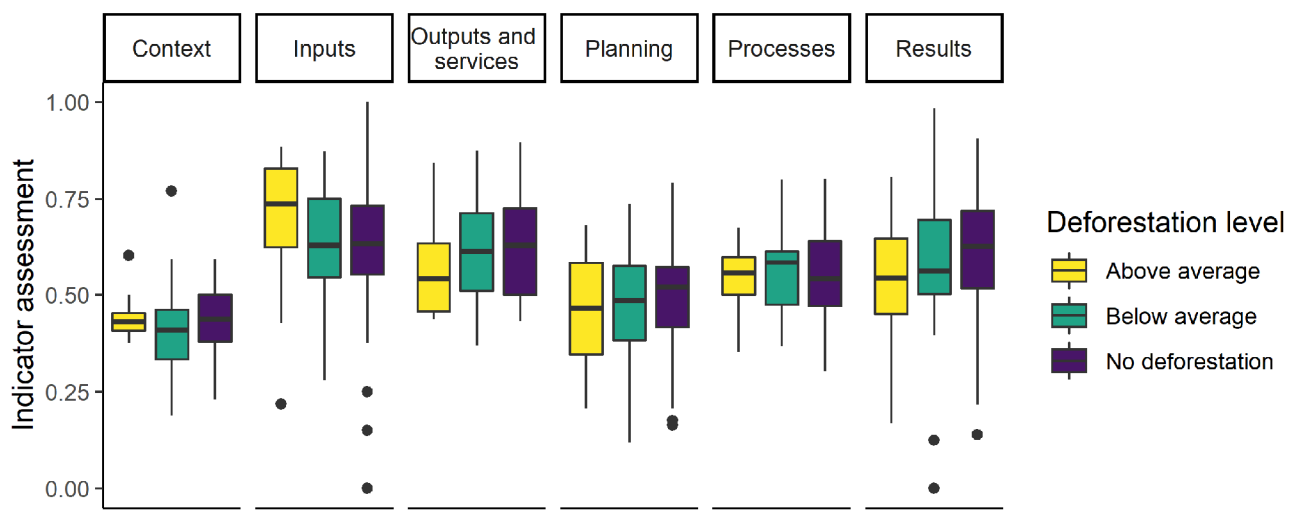

Figure 2. Results for each management indicator in the deforestation categories. There was no statistical difference between these indicators by deforestation category

Table 3. Values of each management indicator for the 17 most deforested Amazon protected areas

Area	Context	Planning	Inputs	Processes	Results	Outputs and services
Jamanxim's National Forest	0.41	0.36	0.84	0.60	0.51	0.46
Altamira National Forest	0.47	0.61	0.87	0.60	0.63	0.54
Tapajós Environmental Protection Area	0.39	0.29	0.78	0.66	0.46	0.54
Nascentes Serra do Cachimbo Biological Reserve	0.40	0.29	0.70	0.57	0.41	0.58
Chico Mendes Extractive Reserve	0.50	0.68	0.52	0.68	0.80	0.45
Terra do Meio's Ecological Station	0.41	0.48	0.72	0.47	0.28	0.53
Jamanxim's National Park	0.50	0.45	0.84	0.63	0.54	0.49
Itaituba II National Forest	0.45	0.35	0.88	0.61	0.45	0.46
Saraca-Taquera's National Forest	0.42	0.47	0.74	0.45	0.56	0.44
Bom Futuro's National Forest	0.43	0.28	0.63	0.56	0.49	0.84
Campos Amazônicos's National Park	0.43	0.35	0.69	0.52	0.59	0.64
Amapa's State Forest	0.60	0.60	0.22	0.35	0.81	0.69
Riozinho do Anfrísio Extractive Reserve	0.38	0.58	0.83	0.52	0.75	0.68
Amana's National Forest	0.43	0.21	0.79	0.60	0.40	0.50
Verde Para Sempre Extractive Reserve	0.44	0.62	0.77	0.50	0.65	0.60
Caxiuana's National Forest	0.42	0.51	0.43	0.45	0.65	0.75
Aripuana's National Forest	0.43	0.47	0.50	0.52	0.17	0.44
Average for areas with above-average deforestation	**0.44**	**0.45**	**0.69**	**0.55**	**0.54**	**0.57**
Average for areas with below-average deforestation	**0.40**	**0.48**	**0.62**	**0.55**	**0.59**	**0.62**
Average for areas without deforestation	**0.43**	**0.50**	**0.64**	**0.55**	**0.62**	**0.63**

DISCUSSION

Amazon protected areas are bulwarks against the advancing deforestation frontier. The proportion of forest clearing in these regions is considerably lower than in unprotected areas (Pfaff et al., 2015; Assunção & Gandour, 2018; Alves-Pinto et al., 2022). Most protected areas analysed herein have negligible deforestation rates. However, those that are more

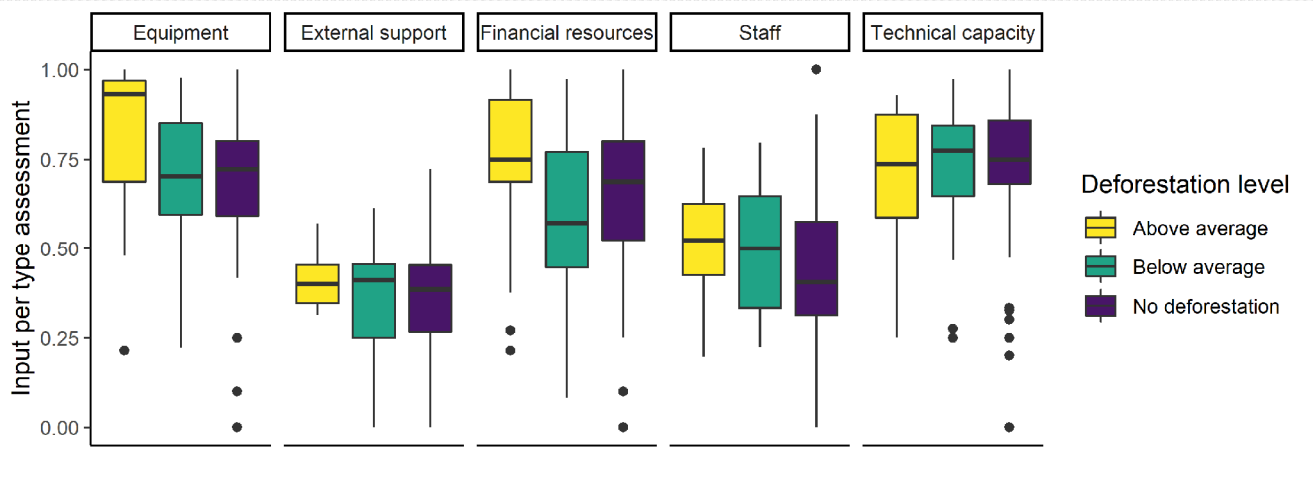

Figure 3. Results for each component of the input indicator in deforestation categories. There is a statistical difference only in equipment between areas without deforestation and with above-average deforestation.

impacted may still have moderate or high management effectiveness scores. Even in the most affected areas, we postulate that potential for perturbations would be substantially greater in the absence of protection (Baragwanath & Bayi, 2020; Walker et al., 2020; Alves-Pinto et al., 2022).

The analysed protected areas presented mostly moderate overall management effectiveness regardless of their status as either strict protection or sustainable use. Thus, management indicators were not related to deforestation, whilst accessibility by roads had a positive correlation. Deforestation levels are likely associated with specific combinations of territorial and management characteristics in each protected area, such as the influence of large infrastructure projects and advancement of the agricultural frontier (Gullison & Hardner, 2018). Thus, external forces may be more determinant of forest loss than attributes expressed in management effectiveness assessments, explaining the lack of correlation found in this and previous studies (Nolte & Agrawal, 2013). For example, 12 of the 17 most deforested protected areas are in Para state, the most deforested of Brazil's Amazon states (MapBiomas, 2020).

Discussions with residents of a Brazilian protected area © IPÊ

In addition to improving protected area management, complementary policies, such as inspection and monitoring via satellite, are crucial. Monitoring and law enforcement effectively reduce illegal logging, as they quickly identify deforested areas and increase financial penalties (Gandour & Assunção, 2019). The strategic performance of surveillance monitoring has already avoided the loss of 27,000 km² of forest per year in the Brazilian Amazon (Gandour & Assunção, 2019).

Our results reinforce the tenuous relation between management effectiveness and tangible conservation outcomes (Geldmann et al., 2021; Coad et al., 2015). In our analysis, deforestation was detected in only a few areas and management indicators did not vary strongly between protected area categories. Thus, we did not identify differences in management indicators that reflected deforestation levels. Moreover, the most deforested areas generally still had moderate effectiveness scores. A similar pattern was found in Mexico, where areas with high effectiveness scores also presented higher deforestation because of their location (Powlen et al., 2021). Whereas Mexican protected areas with high management effectiveness had more success in reducing forest clearing, in the Brazilian protected areas evaluated herein, deforestation is likely determined by opportunity.

Protected areas with higher deforestation rates also presented higher rates of prohibited uses and lower rates of encouraged uses. While some uses may not impact conservation goals, some have the potential to decrease habitat ecological integrity, for example,

livestock, farming and land grabbing. This demonstrates that law enforcement is not only failing to combat deforestation, but also other illegal activities. Moreover, these areas also presented a lower rate of uses that directly contribute to the achievement of management goals, such as scientific research and ecological tourism. This may be related to management efforts being focused on combating threats rather than producing benefits.

Protected areas with higher deforestation rates also presented higher scores in the input element of equipment. This may indicate that, in some cases, essential attributes for management are a consequence of the pressures within the territory, rather than reflecting its performance in containing forest loss. Thus, increased threats from deforestation would pressure managing agencies to allocate equipment to face those pressures. Many of the areas analysed receive long-term funding from the Amazon Region Protected Areas Program (ARPA), which does not provide resources for technical staff (a responsibility left to the public managing agencies) (Silva & Bueno, 2017). We thus found a significant difference between the components of the input indicator, which had higher values for equipment and financial resources, and lower values for technical staff. According to 2020 data from the ICMBio Workforce Panel (ICMBIO, 2021), only 219 employees were allocated to 125 federal protected areas covering more than 620,000 km² in northern Brazil. This translates to a ratio of 1.75 employees per protected area, or more than 2,840 km² per employee, and highlights the shortage of human resources within Amazon protected areas. Despite the low number of employees per area, the input indicator revealed that the available employees had adequate technical capacity to meet protected area management needs. This conclusion deserves special attention since technical capacity has previously been associated with the ecological functioning of protected areas (Geldmann et al., 2018).

We provide evidence that expanding management effectiveness does not necessarily translate into reduced short-term deforestation as the allocation of resources can initially result in increased effectiveness before the results of management actions are observed. In addition, external forces beyond the control of managing agencies have a significant impact on protected areas' capacity to confront deforestation and can be more decisive than management aspects (Shah et al., 2021). Nevertheless, the literature reinforces the importance of management quality in generating conservation impacts and ensuring socio-economic benefits (Oldekop et al., 2016; Geldmann et al., 2018). In addition, monitoring and surveillance policies are essential to ensure an effective reduction in deforestation driven by opportunity in the Amazon biome.

CONCLUSION

Although protected areas are essential for Amazon conservation, we did not find a significant correlation between management effectiveness and deforestation in the areas studied. Deforestation occurred in few areas and management effectiveness scores were generally low regardless of deforestation level. In other words, where outside pressures are high and opportunity exists, protected areas are not able to withstand deforestation. Resources do seem to be allocated to address deforestation, suggesting that management action may translate into conservation results only after a longer period of time. Most deforested areas were also more impacted by illegal resources uses other than deforestation and reported fewer activities related to their main goals (i.e., the delivery of results to conservation and to society).

Finally, we show that allocating resources is important to the effectiveness of the Amazon protected areas system. However, in order to assure the effective fulfilment of its creation goals and the provision of services to society, the most deficient elements of the management cycle must be improved. Furthermore, containing deforestation rates requires monitoring and surveillance actions to reduce external forces that threaten these territories.

ENDNOTES

[1] http://samge.icmbio.gov.br/#resultados
[2]Imazon; https://www.imazongeo.org.br/#/

SUPPLEMENTARY ONLINE MATERIAL

Supplementary text and figures

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RESUMEN

El establecimiento y la gestión de áreas protegidas son estrategias fundamentales para la conservación de la biodiversidad y la prevención de la pérdida de bosques tropicales. Analizamos los datos de eficacia de la gestión de 2020 de la plataforma de evaluación SAMGe de Brasil en 133 áreas de la Amazonia brasileña sometidas a distintas presiones de deforestación. No encontramos ninguna correlación significativa entre la eficacia general de la gestión y la deforestación, mientras que la distancia a las carreteras estaba correlacionada negativamente. Hay una mayor presencia de usos prohibidos y menos usos fomentados dentro de las áreas protegidas altamente deforestadas. Además, la mayoría de estas áreas también presentaron puntuaciones más altas en cuanto a gastos de equipamiento, lo que sugiere que los recursos se destinan a acciones de protección. Es probable que la mayor parte de la deforestación esté motivada por la oportunidad, ya que los lugares muy perturbados suelen estar mucho menos aislados que los que presentan puntuaciones de deforestación muy bajas. Para evitar la pérdida de bosques, es urgente aplicar estrategias complementarias que reduzcan las fuerzas externas que conducen a la deforestación.

RÉSUMÉ

La création et la gestion des zones protégées sont des stratégies essentielles pour la conservation de la biodiversité et la prévention de la disparition des forêts tropicales. Nous avons analysé les données sur l'efficacité de la gestion en 2020 provenant de la plateforme d'évaluation brésilienne SAMGe dans 133 zones de l'Amazonie brésilienne soumises à diverses pressions de déforestation. Nous n'avons pas trouvé de corrélation significative entre l'efficacité globale de la gestion et la déforestation, alors que la distance aux routes était négativement corrélée. Il y a une plus grande occurrence d'utilisations interdites et moins d'utilisations encouragées dans les zones protégées fortement déforestées. De plus, la plupart de ces zones présentent également des scores de dépenses d'équipement plus élevés, ce qui suggère que des ressources sont allouées aux actions de protection. La majeure partie de la déforestation est probablement due à l'opportunité, car les endroits fortement perturbés sont généralement beaucoup moins isolés que ceux dont les scores de déforestation sont très faibles. Pour éviter la disparition des forêts, il est urgent de mettre en œuvre des stratégies complémentaires qui réduisent les forces externes conduisant à la déforestation.

EXPLORING COMMUNITY SATISFACTION IN PARK MANAGEMENT: INSIGHTS FROM PROTECTED AREAS IN MYANMAR

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ABSTRACT

Positive relations between local people and protected and conserved area (PA) authorities are important for effective and equitable conservation. Such relations, however, are often strained. Therefore, in this study we explore the heterogeneity in satisfaction in park management amongst people living near to five PAs in Myanmar. Specifically, we examined how a diverse set of predictor variables relate to satisfaction in park management. Of all respondents, 2 per cent perceived park management to be very poor, 17 per cent considered it poor, 73 per cent considered it good, and 8 per cent considered it very good. Level of satisfaction in community involvement in conservation associated most strongly with satisfaction in park management, followed by satisfaction in community benefits from conservation activities. The extent to which park management and rangers were seen to treat communities with respect both related strongly and positively to level of satisfaction in park management. Experience of human–wildlife conflict had a negative association with satisfaction in park management. Finally, perceived alignment between conservation regulations and community values had a positive relationship with satisfaction in park management. Our findings highlight the importance of community involvement in and benefit from conservation activities in Myanmar, as well as the significance of park rangers and overall management treating local communities with respect.

Key words: wildlife, ranger, conservation, communities

INTRODUCTION

Protected areas across the world are increasingly expected to achieve a diverse set of conservation, social and economic objectives (Le Saout et al., 2013; Watson et al., 2014; West et al., 2006). Aichi Target 11 of the Convention on Biological Diversity exemplifies this expectation by encouraging the effective and equitable management of PAs (CBD, 2010). Positive relationships between PAs and local people, which can be incentivised and assisted by explicit inclusion of positive park–people relations in PA management plans, are an important component of effective and equitable protected area management.

Park–people relations can be explored from various perspectives. A wealth of previous research shows that general attitudes towards PAs can be heterogeneous amongst local people, with attitudes often shaped by demographic traits and personal experiences of benefits and disbenefits from respective PAs (Anthony, 2007; Fiallo & Jacobsen, 1995; Infield & Namara, 2001; Parker et al., 2022; Shibia, 2010). A related but more specific entry point for examining park–people relationships is the attitudes of local community members towards the authorities responsible for managing PAs, namely rangers and park management (Allendorf et al., 2012).

Attitudes amongst local communities towards park authorities can be diverse and complex and may not always be aligned with other dimensions of park–people relations. In Myanmar, for instance, Allendorf et al. (2006) report that even community members with

positive conservation attitudes may conflict with PA management activities like the reclamation of PA land from local communities and punishment for the illegal extraction of natural resources. Studies in India, Nepal and South Africa have similarly found that whilst local residents tend to hold positive attitudes towards PAs, they have negative opinions of park authorities (Allendorf et al., 2007; Anthony, 2007; Karanth & Nepal, 2012). Moreover, environmental and human rights abuses committed by rangers can have particularly detrimental impacts on the trust between local people and park authorities (Duffy et al., 2019). Identifying and tackling such abuses (e.g. Carlson, 2015; Mabele, 2016) is thus vitally important for establishing positive relationships between local communities and park authorities and for supporting the rangers to high standards of personal conduct. In addition to park authority conduct, relations between park authorities and local communities are impacted by wider context, for example, the extent to which local people benefit from conservation, as well as various social, cultural and historical factors (Anagnostou et al., 2020; Duffy et al., 2019; Dutta, 2020; Mutanga et al., 2015). In complement to these community-centred studies, research into ranger perspectives highlights that rangers tend to consider strong ranger–community relationships as important but, in some cases, hard to develop and maintain (Allendorf et al., 2007; Belecky et al., 2019; Infield & Namara, 2001; Lepp & Holland, 2006; Moreto et al., 2017; Woodside & Vasseleu, 2021).

Myanmar is situated in one of the most biodiverse regions of Asia (Myers et al., 2000; Wikramanayake et al., 2001). The country contains around 44, predominantly terrestrial, protected areas (PAs) that cover approximately 6 per cent of the country's land area and contain threatened species like Tiger (*Panthera tigris*), Elephant (*Elaphas maximus*) and Gurney's Pitta (*Hydrornis gurneyi*) (Aung, 2007; Rao et al., 2002; Shwe et al., 2020). Across Myanmar, local people typically engage with nearby PAs in various ways, for example, via encounters with wildlife and natural resource collection (Aung, 2007; Forest Department, 2015; Instituto Oikos & BANCA, 2011). Inadequate PA funding often impedes the ability of PA authorities to carry out certain activities, including community engagement (Aung, 2007; Myanmar, 2018; Rao et al., 2002). Nevertheless, previous studies on community attitudes towards conservation and PAs in Myanmar indicate that attitudes are usually mixed and, in some cases, tend towards positive (Allendorf et al., 2012; Allendorf et al., 2017; Htay et al., 2022; Htun et al., 2012).

Although studies of park authority and local community relations in Myanmar are more limited than research on general attitudes towards PAs, Allendorf et al. (2006) identify conflicts with park management as one of the most commonly reported negative perceptions by community members living near their three case study PAs in Myanmar. Also, Allendorf et al. (2017) report that evidence-based changes to the management of Chatthin Wildlife Sanctuary led to a decrease in the proportion of local community members that reported conflicts with park management as a negative perception of the park, although it was still stated by almost a third of respondents. Furthermore, WWF's ranger perception survey suggests that relations between park authorities and communities may be tense for certain PAs in Myanmar, as 33 per cent of rangers had experienced verbal abuse in the previous 12 months and 21 per cent had been threatened (Belecky et al., 2019). Also, 40 per cent of the respondent rangers did not think that community members trusted them (Belecky et al., 2019).

In this study, we focused on local community perceptions of park management in five protected areas managed by government across Myanmar using data gathered via structured questionnaires. Our main objective was to enrich our understanding of the factors that shape the heterogeneity in local community satisfaction in park management in these areas. In particular, we aimed to improve our understanding of how factors that closely relate to the actions of park authorities (e.g. knowing rangers, meeting rangers, attending meetings with park authorities, perceived respect from rangers and park authorities), as well as benefits from conservation, experience of human–wildlife conflict, and extent of perceived alignment between conservation rules and regulations and community values, relate to community satisfaction with park management.

Interviewing community member © FOW/WWF

METHODS

Study area

Surveys were carried out in 78 villages around five protected areas in Myanmar (Figure 1): Chatthin Wildlife Sanctuary (20 villages), Indawgyi Wildlife Sanctuary (18 villages), Mahamyaing Wildlife Sanctuary (20 villages), Rakhine Yoma Elephant Reserve (18 villages) and Shwesettaw Wildlife Sanctuary (20 villages). These five protected areas were selected so that park–people relations could be explored across a set of protected areas that vary with respect to various characteristics (e.g. management systems, geographies and landscapes, threats faced). This said, local people around each of these sites generally interact with the parks and park management, for instance, through encounters with wildlife and natural resource collection (Instituto Oikos & BANCA, 2011). Local communities around these sites also engage with these parks and park management through various conservation activities, such as the community forestry initiatives (Instituto Oikos & BANCA, 2011). Also, all of these sites have permanently assigned rangers, bar the Mahamyaing Wildlife Sanctuary, where rangers rotate in from nearby parks for around 6 months (P Soe 2021, personal communication).

Data collection

This study uses data from a community perception survey conducted in 2018 with people living in 78 villages within 20 km of five protected areas in Myanmar (Figure 1). A distance of 20 km from the parks was selected as it was assumed individuals within this distance are likely to interact with the park in some way (e.g. encounter wildlife, collect resources, meet rangers, attend meetings hosted by park management). Participant selection for the study involved multiple stages: first, in villages in close proximity to selected protected areas, the field team met with the village chair to explain the study objectives. Next, the research team was provided access to the community ledger, which included the list of households, the name of the family head, and additional information on the family (e.g. age, sex, etc.). Third, the field team conducted systematic random sampling to identify households to approach. For each household, the head of the household was included in the study, as well as the spouse (if applicable), and any children over the age of 20. Study participants were informed of the entirely voluntary and anonymous nature of the survey prior to the administration of the survey, as well as of their right to remove themselves at any point. Community perception surveys were conducted by two Friends of Wildlife staff with the support of two local guides, whose presence as local community representatives was in part to make interviewees more comfortable. The responses to the community surveys were collected in three ways: 1) completed individually by the respondent, 2) completed by the respondent individually, but in a group setting with other participants, and 3) one-on-one with a member of the research team in the event that the respondent was illiterate. Respondents completed the surveys in their homes or at a community council office. All completed surveys were kept securely by the Friends of Wildlife staff and specific responses were never disclosed. Once all the surveys had been carried out, the responses were used to populate a password-protected spreadsheet. The password to access this spreadsheet was only given to individuals who needed access to the raw data in order to complete the analyses for this study. This study was approved by the University of Central Florida's Institutional Review Board (SBE-17-13597).

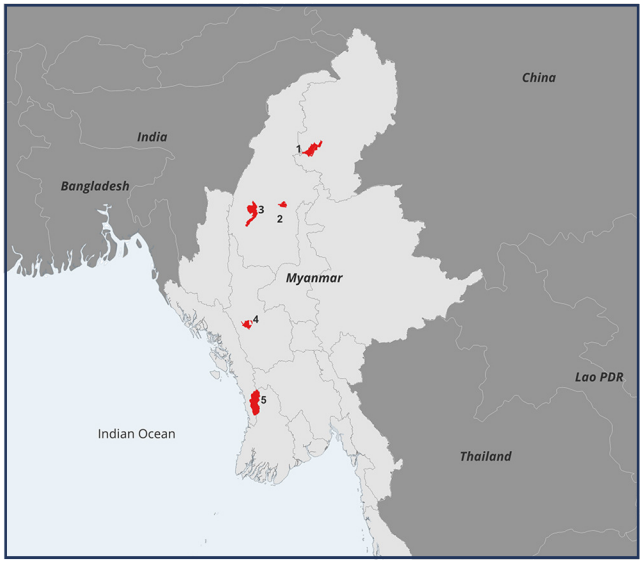

Figure 1. Protected areas included in the study: 1. Indawgyi Wildlife Sanctuary (139); 2. Mahamyaing Wildlife Sanctuary (149); 3. Chatthin Wildlife Sanctuary (288); 4. Shwesettaw Wildlife Sanctuary (295); 5. Rakhine Yoma Elephant Range (264). Numbers of responses from each area are given in parentheses.

Data analysis

We constructed an ordinal logistic regression mixed model with satisfaction in park management as the dependent variable. Levels of satisfaction in park management were gauged with the question, "Overall, how satisfied are you with the following? Park management" and had a 4-point Likert-type item ranging from 'Very Poor' to 'Very Good'. Our independent variables included a number of demographic variables and variables related to whether respondents had met rangers or attended meetings

Community discussion about protected areas © Hkun Lat / WWF-Aus

hosted by park authorities, the extent to which rangers and park management were seen to treat communities with respect, level of satisfaction in community involvement in and benefits from conservation, experience of human–wildlife conflict (including crop loss, wildlife depredation, personal harm and harm to a member of the family), and extent to which conservation rules and regulations were seen to align with community values. Details of the variables can be found in Table S1 (supplementary online material) and a priori hypotheses for how each independent variable relates to satisfaction in park management can be found in Table S2 (supplementary online material). The nearby protected areas was treated as a random variable to account for the spatial clustering of respondents. The clmm function in the R package 'ordinal' (Christensen, 2019) in R version 4.0.0 (R Core Team, 2020) was used to fit the model. All independent variables had acceptably low levels of heteroscedasticity and collinearity with other independent variables. We found no problematic breaches of the proportional odds assumption following both graphical and statistic tests (Liu & Zhang, 2018). The appropriateness of the logit link function was established by comparing QQ plots for models with different link functions. Average effect sizes on community satisfaction with park management were then calculated for each independent variable that had a significant association with the dependent variable (i.e. $p<0.05$) in the ordinal regression model. Average effect sizes were calculated as the average of the differences in the effect size between the lowest and highest end of the range of the focal independent variable at every level of satisfaction of park management.

RESULTS

Respondent profiles and perceptions of park authority and community relations

A total of 1,135 responses were obtained from 78 villages around five protected areas in Myanmar. Eighty-one per cent of respondents were male and 19 per cent female. Mean age of respondents was 46 (SD=12) and 96 per cent were married. Modal and median level of state education, on a scale of 0 (none) to 10 (final year of high school and above), was 4 (44 per cent), the final year of elementary school. A vast majority of respondents worked as farmers (96 per cent). Mean time spent living near to the respective protected area was 46 years (SD=12).

Fifty per cent of respondents had attended at least one meeting hosted by park authorities and 93 per cent agreed or strongly agreed that park management treat communities with respect. Twenty-nine per cent of respondents had met a ranger. In fact, 22 per cent of respondents had a family member or friend that worked as a ranger, and one had been employed as a ranger. The majority of respondents agreed or strongly agreed that rangers treated community members with respect (88 per cent). Fifteen per cent of respondents had heard or witnessed a ranger engaging in misconduct.

Fifty-four per cent of respondents agreed or strongly agreed that they were satisfied with the benefits to local communities from conservation activities. Regarding human–wildlife conflict, 20 per cent of respondents had experienced crop loss, 5 per cent had experienced livestock depredation and 1 per cent had been harmed or had a family member that had been harmed. Twenty-two per cent had experienced at least one of these types of human–wildlife conflict. Sixty-four per cent of respondents agreed or strongly agreed that they were satisfied with the extent of community involvement in conservation. Fifty-seven per cent agreed or strongly agreed that current wildlife laws reflect local community values.

Of the 328 community respondents who had met rangers, the vast majority reported that the ranger had treated them with respect (99 per cent) and listened to their needs and concerns (91 per cent). Similarly, the vast majority thought that the ranger had been polite (96 per cent), helpful (95 per cent) and knowledgeable (95 per cent). Of the 568 community respondents who had attended a meeting hosted by park management, the vast majority agreed or strongly agreed that the meeting provided useful information regarding the benefits of the conservation area (94 per cent) and local conservation efforts (94 per cent). Additionally, 97 per cent of respondents agreed or strongly agreed that the meeting provided useful information regarding conservation regulations and 88 per cent agreed or strongly agreed that the meeting provided useful information on the work being performed by park rangers and management.

Eighty-one per cent of community respondents considered park management as good or very good. The proportions of local residents who perceived their park management as good or very good were similar for Chatthin Wildlife Sanctuary (82 per cent), Rakhine Yoma Elephant Range (81 per cent), Indawgyi Wildlife Sanctuary (80 per cent) and Shwesettaw Wildlife Sanctuary (79 per cent), but lower for Mahamyaing Wildlife Sanctuary (66 per cent). Our ordinal model indicated that various factors associate with satisfaction in park management (Table 1). Regarding park authorities, perceived respect from rangers and park management both had strong, positive relationships with satisfaction in park management. Satisfaction in the level of community benefits from conservation activities had a strong, positive relationship with satisfaction in park management, and experience of human–wildlife conflict had a negative association. Satisfaction in the level of community involvement in conservation activities had a positive relationship with satisfaction in park management. Perceived alignment between conservation regulations and community values had a positive relationship with satisfaction in park management.

Of the factors with associations with community satisfaction in park management (i.e. p-value <0.05), the variable with the largest association was level of satisfaction in community involvement in conservation

Table 1. Coefficients, SE and p-values for the ordinal model that examined the associations of various factors with satisfaction in park management. Significance levels are denoted by . for very low (0.1), * for low (0.05), ** for intermediate (0.01) and * for high (0.001)**

Variable	Coefficient	SE	P-Value	Significance
Age	0.00	0.01	0.79	
Gender (Male; Baseline: Female)	-0.28	0.18	0.12	
Education (State-Level)	0.10	0.36	0.78	
Rangers Treat Communities with Respect	1.05	0.40	0.01	**
Awareness of Rangers Engaging in Misconduct (No; Baseline: Yes)	0.33	0.25	0.18	
Family or Friend as Ranger	0.11	0.20	0.60	
Met Rangers (Yes; Baseline: No)	-0.26	0.19	0.18	
Park Management Treats Communities with Respect	1.40	0.41	0.00	***
Ever Attended Meeting (Yes; Baseline: No)	0.28	0.16	0.09	.
Experience of Human–Wildlife Conflict	-0.54	0.17	0.00	**
Satisfaction in Community Benefits from Conservation	1.49	0.28	0.00	***
Satisfaction in Community Involvement in Conservation	1.84	0.29	0.00	***
Alignment of Conservation Regulations with Community Values	0.75	0.29	0.01	**

Table 2. Association sizes for the significant independent variables (i.e. p-value <0.05) across all levels of dependent variable of community satisfaction in park management in the ordinal model

Variable	Relationship with Satisfaction in Park Management	Association Size
Satisfaction in Community Involvement in Conservation	Positive	0.26
Satisfaction in Community Benefits from Conservation	Positive	0.23
Park Management Treats Communities with Respect	Positive	0.21
Rangers Treat Communities with Respect	Positive	0.11
Alignment of Conservation Regulations with Community Values	Positive	0.09
Experience of Human–Wildlife Conflict	Negative	0.06

activities (Table 2). This was followed by level of satisfaction in the benefits to local communities from conservation activities. Perceived respect from park management and rangers both had notable sizes of association with satisfaction in park management. Alignment of conservation regulations with local community values and experience of human–wildlife conflict had the smallest association sizes.

DISCUSSION

Our findings identify several factors that appear to associate with satisfaction in park management among local community members, including factors related to the park authorities themselves and factors related to the wider conservation context. Given that previous studies have identified similar variables as key reasons why people might differ in their perceptions of protected areas and protected area authorities (Anthony, 2007; Lepp & Holland, 2006; Moreto et al., 2017; Mutanga et al., 2017; Sirivongs & Tsuchiya, 2012), it is conceivable that the associations identified in our study reflect causative relationships.

First, our results highlight the importance of wider conservation context for community perceptions of park management, as satisfaction in community involvement in conservation and satisfaction in community benefits from conservation had the largest association sizes with satisfaction in park management. These findings reiterate established conservation paradigms of the importance of community involvement and benefits (Aryal et al., 2017; Hacker et al., 2020; Shanee & Shanee, 2015) and echo the findings of studies that highlight how wider conservation context can affect the relations between park authorities and local communities (Anagnostou et al., 2020; Duffy et al., 2019; Dutta, 2020; Mutanga et al., 2015). In Myanmar, the onus on promoting community involvement and benefit from conservation activities related to protected areas largely lies with authorities at the national level as land tenure and access issues associated with protected areas are handled by the Forest Department of the Ministry of Natural Resources and Environmental Conservation (P Soe 2021, personal communication). This control of community involvement and benefit at the national level means that a substantial part of relations between park management and local communities may lie beyond the control of park authorities working at the sites.

Our findings also identify positive associations between the perceived extent to which rangers and park management treat communities with respect and satisfaction in park management. These associations reiterate previous studies that stress the importance of rangers and, especially, park management treating local communities with respect for developing and maintaining strong and positive relationships (Allendorf et al., 2007; Lepp & Holland, 2006; Mutanga et al., 2017). Interestingly though, our results did not suggest a strong association between simply having met a ranger or attended a meeting hosted by park authorities and satisfaction in park management; perhaps because meeting a ranger or attending a park meeting could refer to such a diverse set of experiences. Instead, our results indicate that particularly important factors regarding park authorities are whether rangers and park management are perceived to treat communities with respect.

Although brief, we believe that this analysis is useful as it further highlights the importance of communities feeling that park authorities treat them with respect, as well as stresses the importance of the wider context for the quality of park authority and local community relationships. Analogous future research could explore the ideas of this study with more rigour and in greater depth; for instance, by engaging a more representative group of participants (e.g. improved gender balance), using additional potentially relevant variables (e.g. personal dependence on natural resource collection), or utilising qualitative research techniques to examine the more nuanced concepts (e.g. perceived respect from park authorities, and the impacts of having interacted

with rangers or park management in different circumstances). Such research would benefit from engaging both local communities and park authorities to examine perspectives on both sides of these bilateral relationships.

CONCLUSION

Our brief study suggests that wider conservation context is important for developing positive relationships between local communities and park authorities, for instance via community involvement in conservation activities and community benefits from conservation. As the extent of community involvement and benefit largely rests with authorities at the national level in Myanmar, this factor may well be beyond the control of many park authorities operating in protected areas in the country. Nevertheless, our study also suggests positive relationships for the extent to which rangers and, especially, park management are perceived to respect local communities and satisfaction in park management. Hence, one general way in which rangers and park management might be able to contribute towards developing and maintaining strong relationships with local communities is by treating local people with sufficient respect. As discussed, future, more in-depth, studies could explore these concepts more rigorously and in greater detail and thus further deepen our understanding of the factors that shape relationships between local communities and park management.

Park management staff in field © Marc Hockings

SUPPLEMENTARY ONLINE MATERIAL

Supplementary tables S1 and S2

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RESUMEN

Las relaciones positivas entre la población local y las autoridades de las áreas protegidas y conservadas (ACP) son importantes para una conservación eficaz y equitativa. Sin embargo, estas relaciones suelen ser tensas. Por ello, en este estudio exploramos la heterogeneidad de la satisfacción en la gestión de los parques entre las personas que viven cerca de cinco ACP en Myanmar. En concreto, examinamos cómo un conjunto diverso de variables predictoras se relaciona con la satisfacción en la gestión de los parques. De todos los encuestados, el 2% consideraba que la gestión de los parques era muy deficiente, el 17% la consideraba deficiente, el 73% la consideraba buena y el 8% la consideraba muy buena. El nivel de satisfacción en la participación de la comunidad en la conservación se asoció más fuertemente con la satisfacción en la gestión del parque, seguido de la satisfacción en los beneficios de la comunidad de las actividades de conservación. La medida en que la gestión del parque y los guardabosques trataban a las comunidades con respeto se relacionaba fuerte y positivamente con el nivel de satisfacción en la gestión del parque. La experiencia de los conflictos entre los seres humanos y la vida silvestre tenía una asociación negativa con la satisfacción en la gestión del parque. Por último, la percepción de alineación entre las normas de conservación y los valores de la comunidad tenía una relación positiva con la satisfacción en la gestión del parque. Nuestros resultados ponen de manifiesto la importancia de la participación de la comunidad en las actividades de conservación en Myanmar y de los beneficios que éstas reportan, así como la importancia de que los guardaparques y la administración en general traten a las comunidades locales con respeto.

RÉSUMÉ

Les relations positives entre les populations locales et les autorités responsables des aires protégées et conservées (APC) sont importantes pour une conservation efficace et équitable. Cependant, ces relations sont souvent tendues. Par conséquent, dans cette étude, nous explorons l'hétérogénéité de la satisfaction dans la gestion des parcs parmi les personnes vivant à proximité de cinq APC au Myanmar. Plus précisément, nous avons examiné comment un ensemble diversifié de variables prédictives est lié à la satisfaction dans la gestion des parcs. Sur l'ensemble des personnes interrogées, 2 % ont estimé que la gestion des parcs était très mauvaise, 17 % l'ont jugée mauvaise, 73 % l'ont jugée bonne et 8 % l'ont jugée très bonne. Le niveau de satisfaction de l'implication de la communauté dans la conservation est le plus fortement associé à la satisfaction de la gestion du parc, suivi par la satisfaction des bénéfices communautaires des activités de conservation. La mesure dans laquelle la direction du parc et les gardes forestiers sont perçus comme traitant les communautés avec respect est fortement et positivement liée au niveau de satisfaction dans la gestion du parc. L'expérience de conflits entre l'homme et la faune a une association négative avec la satisfaction dans la gestion des parcs. Enfin, l'alignement perçu entre les règles de conservation et les valeurs de la communauté a une relation positive avec la satisfaction dans la gestion du parc. Nos résultats soulignent l'importance de l'implication de la communauté dans les activités de conservation au Myanmar et les avantages qu'elle en retire, ainsi que l'importance pour les gardes forestiers et la direction générale de traiter les communautés locales avec respect.

LOCAL COOPERATIVES´ CONTRIBUTION TO REALISING A GREEN ECONOMY IN NATURE PARKS IN LUXEMBOURG

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ABSTRACT

This paper investigates the role of local cooperatives in promoting a green economy in nature parks in Luxembourg. Relying on a rich dataset of mainly farmers' cooperatives, the study evaluates the socio-economic, ecological and governance outcomes of local cooperative production practices in two nature parks. Results indicate that local cooperatives modify traditional agricultural strategies to promote production systems that respect natural environmental processes and improve local competitive advantage. Their actions promote an inter-community network for conserving land and aquatic biodiversity, even though transitioning to organic production remains challenging for the cooperatives. The paper concludes that the adoption of organic production would distinguish nature parks from other biodiversity-rich local areas. As such, continuous and comprehensive policy actions from nature park authorities, such as dedicated training courses and financial incentives, are required to increase the adoption of organic production.

Key words: biodiversity protection, regional branding, intercommunal cooperation, organic agriculture

INTRODUCTION

A crucial aspect of the notion of a green economy is its stance on improving well-being and social equity while significantly reducing environmental risks and ecological scarcities (UNEP, 2011; Mastini et al., 2021; Aldieri & Vinci, 2018). More recently, the concept has been developed to explore various financial and risk management policies (Bem et al., 2022; Rusydiana & Bahri, 2022), including technological innovations in urban transport, energy and buildings (Baravikova, 2020; Affolderbach, 2017). However, a green economy is not limited to technological and organisational challenges that demand impressive financial stability and expertise (Schulz & Bailey, 2014). It is much more about the socio-ecological difficulties, caused by the Anthropocene, and the institutions seeking solutions (Hidle, 2019; Adams, 2017). Accordingly, its approaches have to address projects beyond the financial and technology spheres, given that these will provide a robust platform for understanding the sustainability transition within different contexts (Schulz & Bailey, 2014; Affolderbach, 2017). These claims raise questions about how the green economy concept works in non-technological or non-financial sectors such as protected areas, particularly nature parks. In light of this, the study aims to explain how local cooperatives' production strategies influence well-being and reduce biodiversity loss in Luxembourg's nature parks.

Local cooperatives in Western Europe have developed exponentially, playing an essential role in improving sustainability via multiple objectives and diverse roles (Luo et al., 2020; Castilla-Polo & Sánchez-Hernández, 2020). These autonomous associations of persons (ICA, 2007) are an essential paradigm for sustainable development (Gertler, 2004), especially in the agricultural sector, and are strengthening local communities by creating resilient socioeconomic and ecological business models (Bretos & Marcuello, 2017). Consequently, these are structures for developing sustainable food production systems in rural areas (Dower & Gaddis, 2021; Wilder, 2019; Pejnovic et al., 2017), with a non-negotiable role in the collective adoption of environmentally friendly practices (Candamir, 2021) and farming technologies (Abebaw & Haile, 2013). Cooperatives can help local areas improve their economic performance in product processing and marketing (Liu et al., 2019). Again, they can significantly impact local employment (Michalek et al., 2018), increase income and reduce poverty in remote areas (Ofori et al., 2019).

In Luxembourg, local cooperatives, mainly in the agricultural sector, have a long history and tradition, dating as far back as 1875. Today, although these cooperatives are gaining ground as vehicles of change to promote a sustainable society, research about their

actions in protected areas, especially in nature parks, is lacking.

To address this, this study examines the ecological, socio-economic and governance outcomes of local cooperative production strategies in Luxembourg's nature parks to examine their potential as indicators for the green economy. Addressing this question is vital if nature park authorities are to enhance environmentally and socially responsible production in park areas.

STUDY AREA AND METHODS

Luxembourg is a small country hosting three nature parks in 'rurban' areas, where agriculture is the main activity. Approaches for agricultural production in these parks are disharmonious and conflicting and can have irreversible consequences, leading to a decline in local biodiversity. The principal challenge for Luxembourg's nature parks is to balance the dual-objective of conserving and maintaining local ecological resources while ensuring the development of rural agricultural strategies. Consequently, nature park authorities have to ensure that agricultural activities protect, restore and preserve the natural and cultural heritage, as well as guarantee a secured socio-economic and cultural development for the inhabitants in park areas. To achieve this, sustainable agricultural production activities are needed to reduce the harmful impacts on or maintain important local ecosystems. Local cooperatives are increasingly becoming known for promoting such activities in park areas, making them compelling cases for this study. A joint aspiration among cooperatives in these areas is to build a more inclusive and sustainable society through local production processes. Nature parks are, therefore, essential platforms to help promote cooperative projects that do not damage local ecosystems. This study's investigation focused on two nature parks, Upper Sûre (Öewersauer) and Our (Figure 1), and the cooperatives Ourdaller and Vum Séi.

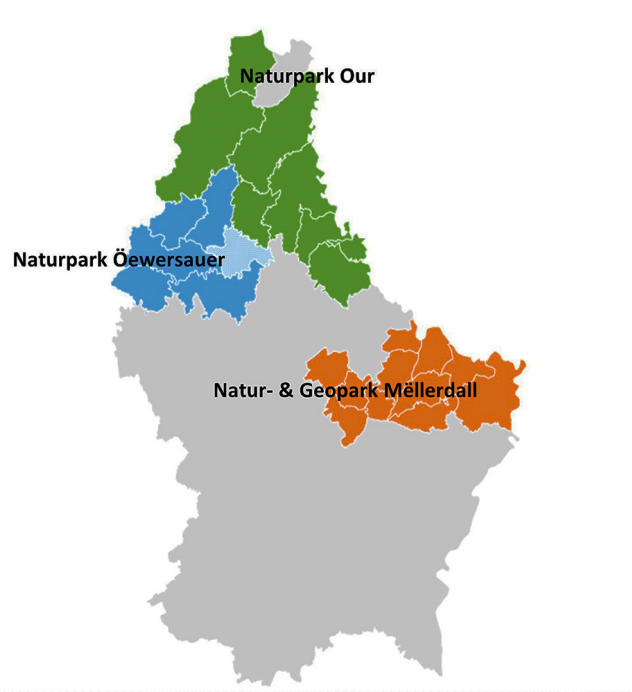

Figure 1. Nature parks in Luxembourg (Source: adapted from Naturpark.lu

The Upper Sûre Nature Park was created in 1989 encompassing five municipalities in the north-west of Luxembourg near the Belgian border, and covers approximately 183 km2, of which 50% is forested and 42% agricultural land (Upper Sûre Nature Park, 2014). It was intended to bring together different actors to discuss bottom-up development and improve regional value. The Vum Séi cooperative is located in this park.
Founded in 2005, the Our Nature Park covers 306 km2 with 21,000 inhabitants and eight municipalities. The park is part of the Ardennes located at a cross-border point between Belgium, Germany and Luxembourg, with numerous protected plants and bird species, such as the Little Owl (*Athene noctua*), various bats (*Antrozous*) and the European Otter (*Lutra lutra*) (Feyeh, 2016). Here, local cooperatives use the Ourdaller brand to reconcile nature conservation and the region's economic development.

Data collection

Exploratory field studies: These were conducted to observe the different strategies of local cooperatives in Luxembourg's nature parks and relate these to the concept of a green economy and sustainable development. As a tool for in-situ research, non-participant observation provided a much deeper understanding of the empirical context of the study (Yeung, 2003), including understanding the different production approaches practised by stakeholders of small and medium-sized cooperatives in park areas. Visits to seven firms owned by local cooperatives took place between June and July 2018 to meet and talk with stakeholders about their views on greening the economy of the nature parks through sustainable production. Notes were taken during this process by the researcher.
The selection of places visited was led by the study objectives and concepts. Because it was imperative to understand the different patterns and processes of green activities in park areas, the empirical fieldwork focused on local production units to appreciate regional production systems. A trip to a regional supermarket created for marketing park products was also crucial in

understanding the views of local consumers vis-à-vis local cooperatives and regional products. More generally, the different areas visited were mainly activity-oriented. Being in the field not only provided reliable data through direct observations and experiential recording, but was also crucial for identifying relevant stakeholders for interviews.

Interviews: Thirteen interviews with public and private individuals were conducted from November 2018 to May 2019, including seven representatives of local cooperatives (farmers/producers) and six other stakeholders interested in nature park activities (two private individuals, three nature park authority staff and one researcher). Apart from four in-person interviews, the rest were conducted by phone and lasted about thirty minutes in French or English. Three main criteria influenced the selection of interview participants: firstly, cooperative actors involved in local production in the nature parks chosen for their practical or theoretical knowledge about the sustainable production patterns in these areas; secondly, policy experts who are regularly involved in directing the administrative and development activities of the nature parks; and thirdly, ordinary citizens in park areas whose views were important in relating local cooperatives with the regional economy.

Information from the interviews was recorded using an audio sound recording device. The MAXQDA software for qualitative data analysis was used to logically code and organise the transcribed files into different themes and categories for topical and normative analysis.
Document analysis: Secondary information from peer and grey literature provided a framework to understand and establish meanings and relationships between nature parks, the green economy and local cooperatives, and was essential in adjusting the research path, alongside preparing questions for the expert interviews. Peer-reviewed literature centred around local cooperatives, green economy and sustainable development, including protected areas and nature parks. Content from various administrative policy and project files, public and local authorities, flyers, maps, seminars and conference papers, reports, and other applicable internet sites about parks in Luxembourg were valuable in analysing the production strategies of local cooperatives.

RESULTS AND DISCUSSION

Information gathered from the experimental observation characterised local cooperatives in parks in Luxembourg as platforms to valorise local resources and potentials through innovative crop cultivation and processing projects. As described in the interviews, the activities carried out by these cooperatives have inevitable socio-economic and environmental consequences and have opened up new paths for sustainable governance of the park areas. Operating within many sectors, the Ourdaller and the Vum Séi are the two most prominent agricultural cooperatives relative to all existing cooperatives in the study areas. They primarily engage in sustainable production practices and are major players in building local sustainability. These cooperatives have diverse functions, with a common characteristic of value-added, quality production, rural employment, ecological restoration, regional marketing of local goods, and improving local competitiveness (Table 1).

Cooperatives' environmental actions

Participants agreed that cooperatives are mainly agricultural and that through their production activities, they promote environmental awareness on the need to protect local land and drinking water resources. This is why most of the products from these cooperatives are produced according to the ecological regulations laid out by the nature park authorities. In this regard, the raw materials used for local products are cultivated with little or no chemical fertilisers and/or pesticides in a

Table 1. Cooperatives' role in greening nature parks in Luxembourg

Ourdaller and the Vum Séi cooperatives		
Environmental (Ecological awareness)	**Socio-economic** (Value creation and product marketing)	**Governance** (Cooperation)
Community responsibility for sustainable use of land and aquatic resources	Creating new and quality products	Intercommunity network for resource management
Environmental knowledge sharing	Increasing access to market and marketing power	Participation of local citizens in parks' objectives
Reducing pesticides	Improving employment	
Promoting an organic farming network	Promoting regional branding	
	Agricultural innovation and economies of scale	

Table 2. Local cooperatives and their products

	Local cooperatives	Sustainable products
Upper Sûre Park	Bléi Vum Séi, Tei Vum Séi Speltz Vum Séi , Véi Vum Séi Duch Vum Séi, Käre Vum Séi	Medicinal and aromatic toiletries, confectionary, medicinal and aromatic tea, cereals, biscuits, beer, sausages and other meat products, , grains (wheat, spelt and rye), cloth and fabrics, and pillow fillings
Our Nature Park	**OURDALLER** (BEO, BEOLA, BEOGRAN)	Vegetable oil, honey, beer, grains and cereals

traceable and transparent manner, and crafted by hand to achieve the highest possible quality. Animals are also reared extensively using environmentally sound practices on limited parcels of land. It was also observed that local cooperatives promote education for a green economy. They often organise awareness campaigns for local school children about the importance of ecosystem services in park areas. These exercises emphasise the importance of sustainable production to conserve aquatic and terrestrial biodiversity.

Socio-economic strength of local cooperatives

Participants acknowledged a lack of quantitative socio-economic data to show how cooperatives are contributing to improving the economy and the environment of park areas. However, many of them noted that it is evident that the initiatives of these cooperatives have enhanced the economic value and improved the branding value of local products. This has projected the image of park products within the local economy and has helped engage young people in nature park activities through local employment. Cooperatives have become regional symbols in the Upper Sûre and Our parks through the 'Vum Sei' and 'Ouedaller' labels. When participants discussed the role of local cooperatives in promoting green economic activities in these parks, they also reflected that local and regional citizens are now more aware of a new form of economic activity since the cooperatives were created. For them, cooperatives have opened up new regional markets for Vum Sei and Ourdaller products (Table 2). They have created new demand for sustainable local products in the form of artisanal food and non-food products using medicinal and aromatic plants. Consequently, through these regional brands, local inhabitants are more conscious that they belong to an ecological region.

Participants also mentioned that the creation of local cooperatives in park areas had reintroduced some traditional crops, such as industrial hemp (*Cannabis sativa*). This is a practice that disappeared from the region some fifty years ago. Today, local farmers cultivate hemp and process its seeds and leaves commercially. Buckwheat (*Fagopyrum esculentum*) is another recently introduced crop with a high nutritional value. There is a high local demand for it due to its importance in local beer production (Ourdaller beer).

The mustard plant (*Sinapis*) is different from other introduced crops in that it has traditionally been cultivated to maintain soil stability and enrich the humus layer. The plant's seed had no economic value and was not harvested or processed, but today, local farmers use mustard seeds to produce six different mustard products. Now, one of the main mustard

Hemp farm in the Our Nature Park © Norbert Eilenbecker

Locally processed mustard © Franklin Feyeh

products in Luxembourg's local markets originates from the Ourdaller cooperative in the Our Nature Park.

Governance aspects of local cooperatives

The study findings suggest that one of the greatest successes of the cooperatives in the Luxembourg parks is at the level of inter-communal cooperation, creating a platform for everyday decision-making among local producers from different parks. This is the new paradigm (Mose, 2007) in protected area governance (Borrini-Feyerabend et al., 2013) in which stakeholders are continuously brought together in decision-making processes using a common language (Qalyoubi, 2012). Together with regional and state actors, cooperatives are part of a synergy to decide on aspects related to nature conservation, park labels and the marketing of regional products. Through this participatory process, participants acknowledged that stakeholders could identify conflicts and solve potential problems related to sustainable production that might previously have been overlooked by a single actor.

Controversy relating to local production practices

Results from the study indicated that there is some controversy associated with sustainable production among local cooperative members because they have different understandings of the meaning of nature parks. This has led to three production practices: ecological or quality; organic; and conventional.

The results show that ecological techniques do not equate to organic production. However, the method eliminates the use of some conventional practices and maintains specific sustainability standards. This production system is mainly used by cooperatives wishing to obtain nature park product labels. Guided by a list of specifications (cahier de charge), the nature park authorities monitor the application of pesticides and other harmful sprays in the production chain.

On the other hand, a few local producers are engaged in organic production. Organic producers rely more on the self-regulatory processes of the natural ecosystems avoiding conventional chemical inputs. They emphasise environmental and social sustainability as central ethical values in the local production chain. As in the case of ecological production methods, organic production is guided by a specific follow-up and monitoring process by the park authorities to ensure better quality products and reduce environmental impacts. From personal observation, local producers are aware of the disadvantages of conventional production practices in nature park areas. The problem is combining the ethical values towards natural resource management with the economic goal of profit maximisation.

The field observations revealed that conventional producers in park areas follow the business-as-usual model, applying synthetic chemical fertilisers and pesticides in their agricultural practices. According to the participants in this category, nature parks hinder their businesses, given that producers could remain above the breakeven point even without park labels. There is not sufficient motivation to adopt new practices due to the cost. A laissez-faire situation seems to exist in this situation. A question that arose during field observation was who has the authority to control the cooperatives' production practices in Luxembourg's nature parks if each producer is free to choose the method that best suits their ambitions?

The role of the nature parks in enhancing cooperative strategies

The central goal of nature parks in Luxembourg is to promote sustainable regional development through human–nature interaction. Consequently, the nature park administration has a significant role in enhancing cooperative strategies. In the parks investigated, all-year -round agricultural advice along with water and biodiversity protection is provided by the park authorities through experienced agrarian consultants. Cooperatives are guided, upon request, on environmentally friendly production techniques such as direct drilling. Non-inversion tillage improves soil organic content and biochemical activities (Melero et al., 2009) and is beneficial for soil quality and biodiversity (Olesen & Jacobsen, 2002). Again, cooperatives are also encouraged by the nature park authorities to delay mowing until later in the growing season as this has been found to positively affect species richness and biodiversity (Chaudron et al., 2016).

At the same time, some farmers are given financial incentives to conserve drinking water sources through appropriate animal husbandry and reducing the use of pesticides and fertilisers. A form of biodiversity contract is being promoted in the Upper Sûre park to encourage farmers to protect specific plant and animal species, as well as constructing fences and bridges over and along water courses in farmed areas to prevent the direct access of livestock to these water sources.

Through agri-environmental and biodiversity programmes, local cooperatives are encouraged to engage in organic production. Organic agriculture is particularly appropriate for nature parks because it is

less polluting and provides good habitat for wildlife (Grandi & Triantafyllidis, 2010). This is important, especially if cooperatives seek to improve consumer trust (Fiore et al., 2020; Mohammed & Lee, 2015) and position parks as instrumental for biodiversity conservation. Organic farming also offers a nature-based solution to restore the health of farmlands, given that it increases biodiversity, conserves traditional cultivars and breeds and achieves sustainability from a biophysical and socio-economic point of view (Keesstra et al., 2018). Therefore, it is essential to support the actions of institutions like the Institute for Organic Farming and Agriculture, Luxembourg, that are helping conventional farmers in park areas to convert to organic production.

Organic production is gaining ground among many local producers, given its comparative advantage in contributing to a less polluted environment (Pugliese, 2001) and supporting rural development (Caudle, 2006). Because Luxembourg has one of the highest per capita consumption rates of organic products in Europe (Helga et al., 2021), cooperatives can build on this to secure sustainable development in nature parks.

CONCLUSION

This study highlights the context of local cooperatives in promoting a green economy in nature parks in Luxembourg. From a conservation perspective, it shows how the production strategies implemented by some cooperatives and promoted by their location in nature parks are less harmful to biodiversity protection than those commonly implemented outside. At the same time, from a socio-economic viewpoint, innovative production practices are increasing the competitive advantages of park areas.

The discussion introduces a broader problem related to organic production, which is still not fully exploited in the parks in Luxembourg, even though much could be gained from such a transition. The nature park authorities can help to address this issue by redirecting the focus on local agricultural production to conservation and sustainable use of biodiversity. Ongoing actions by the authorities, such as dedicated training courses, supporting conversion to organic methods, promoting organic food chains, organic trade fairs, and financial incentives for certification programmes, could serve as a platform for increasing the uptake of organic agriculture.

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RESUMEN

Este trabajo investiga el papel de las cooperativas locales en la promoción de una economía verde en los parques naturales de Luxemburgo. Basándose en un rico conjunto de datos, principalmente de cooperativas de agricultores, el estudio evalúa los resultados socioeconómicos, ecológicos y de gobernanza de las prácticas de producción de las cooperativas locales en dos parques naturales. Los resultados indican que las cooperativas locales modifican las estrategias agrícolas tradicionales para promover sistemas de producción que respeten los procesos ambientales naturales y mejoren la ventaja competitiva local. Sus acciones promueven una red intercomunitaria para conservar la biodiversidad terrestre y acuática, aunque la transición a la producción ecológica sigue siendo un reto para las cooperativas. El documento concluye que la adopción de la producción ecológica distinguiría a los parques naturales de otras zonas locales ricas en biodiversidad. Por ello, es necesario que las autoridades de los parques naturales lleven a cabo acciones políticas continuas y exhaustivas, como cursos de formación específicos e incentivos financieros, para aumentar la adopción de la producción ecológica.

RÉSUMÉ

Cet article étudie le rôle des coopératives locales dans la promotion d'une économie verte dans les parcs naturels du Luxembourg. S'appuyant sur un riche ensemble de données concernant principalement les coopératives d'agriculteurs, l'étude évalue les résultats socio-économiques, écologiques et de gouvernance des pratiques de production des coopératives locales dans deux parcs naturels. Les résultats indiquent que les coopératives locales modifient les stratégies agricoles traditionnelles pour promouvoir des systèmes de production qui respectent les processus environnementaux naturels et améliorent l'avantage concurrentiel local. Leurs actions favorisent un réseau intercommunautaire pour la conservation de la biodiversité terrestre et aquatique, même si la transition vers la production biologique reste un défi pour les coopératives. L'article conclut que l'adoption de la production biologique distinguerait les parcs naturels des autres zones locales riches en biodiversité. À ce titre, des actions politiques continues et complètes de la part des autorités des parcs naturels, telles que des cours de formation spécialisés et des incitations financières, sont nécessaires pour accroître l'adoption de la production biologique.

SHORT COMMUNICATION: RAJASTHAN'S THAR DESERT ORANS AS A COMMUNITY CONSERVATION STRATEGY UNDER THE POST-2020 GLOBAL BIODIVERSITY FRAMEWORK

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ABSTRACT

The Convention on Biological Diversity aims to bring 30 per cent of the Earth's land and sea under protection, including biodiversity-rich areas outside recognised protected areas. In India, many sacred groves could potentially be inscribed as such "Other Effective Area-based Conservation Measures". This study explores the potential for Rajasthan's sacred groves or Orans to contribute to this target. Although Rajasthan state has many Orans, their rich cultural heritage and traditional practices have been little documented. Orans are patches of community forests of religious and spiritual significance, often associated with a temple or a legend. By conservative estimates, Orans cover over 600,000 ha. of land in Rajasthan state. They serve as a reserve for grazing, forest products, water infiltration and as a coping mechanism for climate change in arid regions. This study is the first to combine grass-roots level data collection into a database enabling the mapping and analysis of Orans in Bikaner district in Rajasthan's Thar desert. It generates new insights into the distribution, differences and similarities among Orans and associated traditional values and practices vs. the challenges and threats they face due to a lack of legal protection. How might including Orans under India's efforts for meeting the 30 per cent target under the Global Biodiversity Framework benefit their conservation?

Key words: forest, OECM, sacred grove,

HOW DEITIES HELP CONSERVE BIODIVERSITY IN RAJASTHAN'S ORANS

Orans have special religious, spiritual and socio-cultural importance mainly because they are recognised as the abodes of local deities or saints by rural Indigenous and traditional people. The word 'Oran' is a derivative of the Sanskrit word 'Aranya' meaning the undisturbed forest, but in different parts of the state they are referred to as Deora, Malvan, Deorai, Rakhat and Bani. Their existence can be traced back to the pre-agrarian hunter gatherer phase of human civilisation (Kosambi, 1962). Orans vary in size depending on their specific religious significance to a particular community. The community conserves Orans mainly by prohibitions against hunting and logging activities. The management rights of Orans are vested in the community which maintains traditional customs, practices and knowledge related to the conservation of Orans and their biodiversity (Malhotra, 1998).

Orans are the remnants of large ancient forestlands (Chandran & Hughes,1997) and cover a wide variety of habitats and exhibit high biodiversity. Orans have unique vegetation types and species composition based on local climatic and soil conditions (Gadi, 2016). Orans of the Indian Thar Desert traditionally harbour various endangered, threatened and endemic plant species, including several medicinal plants like Guggul (*Commiphora wightii*), Pimpa (*Caralluma edulis*) and Khiroli (*Glossonema varians*) (Gehlot et al., 2014; Khan et al., 2008). The collection of fuel wood, fodder and medicinal plants is allowed to some extent (Hughes & Chandran, 1998). Generally, only the ripe and fallen fruits or the dead and fallen timber are used by the local

communities. Orans not only conserve biodiversity, in the arid zone they provide food and fodder under harsh climatic conditions such as prolonged droughts (Rawat & Dookia, 2017). In the Thar desert where every single drop of rain matters, Orans contribute to groundwater recharge (Mukhopadhyay, 2008).

The Bikaner district has been selected as the pilot site for this study as it covers the less researched part of the Thar desert (Figure 1). Here, Orans have an ancient history and serve as meeting places for the community and contribute to the social economy and wellbeing of local communities in multiple ways (Parihar & Kumar, 2016). The history of state forest management in Bikaner district dates back to 1910 when the first state forest officer was appointed and afforestation projects were started. Several conservation or community reserves were also planned under the 1972 Wildlife Protection Act in the district thereafter. In this context, our study makes plain that local community-led management can be strengthened through increased support from and collaboration with government services and conservation researchers.

Size and scope of Orans as a network for conservation

The first-ever study on sacred groves reported their presence in most parts of India (Gadgil & Vartak, 1975). Gadgil (1985) recorded that ethnic cultural practices of sacred groves conservation have helped the nation to maintain a stable and sustainable ecology. While in 2005, Ghokale noted a shortage of detailed studies and documentation of sacred groves. Sharma and Kumar (2021) more recently analysed the ecological and socio-cultural significance of sacred groves in India including the strategies to conserve them. Initial nationwide

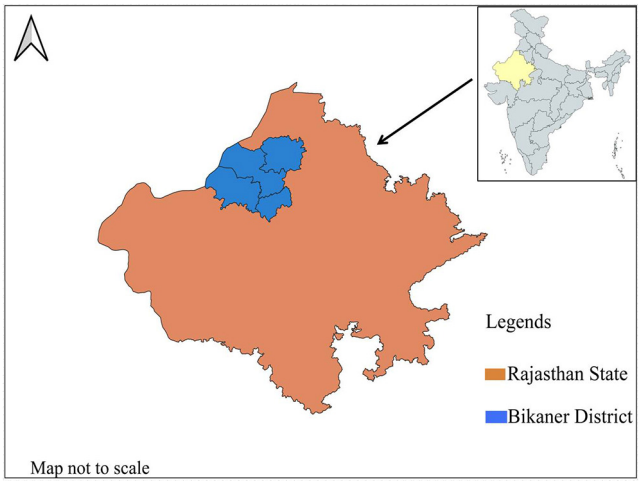

Figure 1. Location of the study area, Bikaner district of Rajasthan state, India

Undisturbed Thar desert © Monali Sen

studies estimated that there are 100,000 to 150,000 sacred groves in India (Malhotra et al., 2001). In contrast, the Environmental Education Centre has documented only a total of 10,377 pan Indian sacred groves (Amirthalingam, 2016). Tewari et al. (2013) identified nearly 25,000 Orans in Rajasthan covering approximately 600,000 ha. of which 537,000 ha. are located in the western Thar desert region (Singh, 2011, 2014). The Arid Forest Research Institute (AFRI) documented 123 Orans along with 131 tree species from 48 families, mostly in the non-desert districts of Rajasthan (AFRI, 2014) under an initiative of the Rajasthan Forest Department.

Our focus is on the Thar desert's Bikaner district, one of the 33 districts of the Rajasthan state (see Figure 1). Here we documented various types of community management practices in Orans and collected GPS coordinates, photographs, soil type, flora, fauna and threats to Orans. We stored this information on a database and created a map of Orans. The data were analysed to understand Oran distribution, area coverage and numbers per village and sub-district. The area covered by Orans varies between the six sub-districts: Bikaner sub-district 10,107 ha., Lunkaransar 8,861 ha., Nokha 3,603 ha., Kolayat 12,086 ha., Pugal 8,981 ha. and Khajuwala 1,328 ha. The results show that there are a much higher number of Orans in the desert zone of Rajasthan than has been reported in various studies to date.

The next level of analysis focused on a comparison between two Bikaner sub-districts, Kolayat and Nokha (see Supplementary Online Material Figure S1 a-d). The knowledge that Kolayat has larger Orans (>500 ha.) in comparison to Nokha enabled the planning of a site location for an afforestation programme. Kolayat also has a pilgrimage site connected with the Vedic sage, Kapil Muni who shed his mortal body under a Ficus tree. While Nokha is spiritually significant to the Bishnoi Community, its Orans have been more

Meeting with villagers © Monali Sen

fragmented under industrialisation than those in Kolayat. As a result, a significant number of remaining biodiversity-rich Orans remain under threat and require protection on the ground.

LIMITS TO LEGAL PROTECTION AND PROTECTED AREAS, THE PROMISE OF OECMS

The National Environment Policy of India (2006) stresses the importance of the conservation of Orans, because of their "incomparable values". Yet, Orans face multiple threats such as mining, pollution, uncontrolled development and encroachment by increasing human populations and livestock. Usually the state government regulates such threats under the Indian Forest Act, 1972 or the Wildlife Protection Act (1972). However, Orans are community-owned and protection under state conservation legislation does not apply. Khan et al. (2008) have pertinently suggested bringing important sacred groves under the Protected Area Network.

In India, protected areas form the foundation for national and international biodiversity conservation strategies and commitments. The International Union for Conservation of Nature (IUCN) has clear guidance on the various categories of protected areas and their governance and management criteria, and recognises sacred natural sites and sacred groves in each of these categories (Dudley, 2008). Outside the recognised protected area networks, biodiversity can also be effectively conserved in sacred groves, areas for drinking water or even military areas. These areas are grouped in the category of 'Other Effective Area-based Conservation Measures' (OECMs). In OECMs, biodiversity conservation is achieved as a by-product or secondary objective in areas outside the identified protected area networks (IUCN, 2019).

Together the protected and non-protected areas create an integrally connected conservation landscape, thus contributing to achieving the goal to conserve 30 per cent of the planet by 2030. This study brings attention to the potential of the Orans to conserve biodiversity under community ownership through traditional knowledge and cultural values. However, the government and local authorities are hampered in protecting and conserving Orans because these have not been appropriately defined or classified in government records. In Rajasthan, there is no relevant forest or environmental legislation which distinctly identifies Orans as a conservation category, they are generally referred to as 'Culturable Waste Land'. As a consequence, the Orans of Rajasthan are not legally protected areas. However, the 2010 Rajasthan State Forest Policy acknowledges the importance of Orans as examples of religious practices in conservation. The policy prescribes the inventory and database development of the Orans at the District level in Rajasthan state.

An inventory of Orans' biodiversity and socio-economic importance will help to populate the database and establish a baseline for the distribution and diverse

values of Orans. This will enable future studies on land use and land cover changes over time and the role of Orans in biodiversity conservation and climate change adaptation strategies. As our pilot study in Bikaner district shows, this information can be used in collaborations between local communities and the Forest Department to develop community level conservation management and policy recommendations for long-term goals. Therefore, Orans have the potential to contribute towards India meeting the 30 per cent target, especially if India can recognise Orans as valuable to biodiversity conservation and place them within an appropriate legislative framework.

BARRIERS OR BENEFITS FOR ORANS UNDER THE 30 PER CENT TARGET?

In 2020, the Government of India created a national-level committee led by the Wildlife Institute of India, which developed Criteria and Guidelines for identifying OECMs based on 12 categories of potential OECMs, including sacred groves (WII et al., 2020). Subsequently, a committee headed by the National Biodiversity Authority of India identified OECMs on the ground and prepared guidelines for identification and reporting. A final compendium of OECMs in India identified 14 OECMs as individual sites and documented their conservation practices (UNDP & NBA, 2022). Regrettably, sacred groves and Orans have been omitted from this compendium leaving their potential for the conservation of biological and cultural diversity under-recognised. Despite this missed opportunity to prioritise sacred groves and Orans, the National Biodiversity Authority, under the 2002 Indian Biodiversity Act, continues the inventory of biodiversity on community-owned land through the People's Biodiversity Register. This forms an important resource of Indigenous traditional knowledge, biodiversity checklists, and ethno-societal information which may be used in the assessment of Orans and thus direct attention to their role as socially protected areas that require legal recognition to secure their protection and contributions to global biodiversity commitments.

We highlight the ongoing race between Oran conversion (loss) and Oran conservation (protection). Unfortunately, much traditionally conserved Oran land is highly neglected and vulnerable to threats from outside the communities as well as to the changing value systems of local people themselves. Prioritising conservation funding should focus on a) database development and the documentation of fast-vanishing local knowledge as a basis for b) strengthening locally grounded community-led management of their green cultural heritage, and c) conferring legislative protection on Orans in order to reduce threats to their existence. Achieving these objectives would benefit from recognising Orans' contribution to the conservation of biological and cultural diversity under international biodiversity targets.

Orans are not limited to the Thar desert. To help prioritise conservation efforts, their assessment and protection could be up-scaled to the state of Rajasthan, to the rest of the country as well as other places across Asia. At a global scale but specifically in Asia, the importance of sacred forests for the conservation of biological and cultural diversity has been well researched and documented (Coggins & Chen, 2022; Dudley et al., 2010; Verschuuren & Furuta, 2016). These studies also signal trends of increasing conflicts between the conservation of biological and cultural diversity on the one hand and rapidly increasing development pressures and lack of proper legal protection, on the other hand. However, strengthening their local management and systematically supporting them through national conservation programmes and science appear as successful pathways for unlocking their full potential in contributing to broader conservation approaches.

SUPPLEMENTARY ONLINE MATERIAL

Figure S1

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RESUMEN

El Convenio sobre la Diversidad Biológica tiene como objetivo proteger el 30% de la superficie terrestre y marina de la Tierra, incluidas las zonas ricas en biodiversidad situadas fuera de las áreas protegidas reconocidas. En la India, muchas arboledas sagradas podrían inscribirse como "Otras medidas eficaces de conservación basadas en la zona". Este estudio explora el potencial de las arboledas sagradas de Rajastán o Orans para contribuir a este objetivo. Aunque el estado de Rajastán tiene muchos Orans, su rico patrimonio cultural y sus prácticas tradicionales están poco documentados. Los orans son parches de bosques comunitarios de importancia religiosa y espiritual, a menudo asociados a un templo o a una leyenda. Según estimaciones conservadoras, los oranes cubren más de 600.000 hectáreas de tierra en el estado de Rajastán. Sirven de reserva para el pastoreo, los productos forestales, la infiltración de agua y como mecanismo para hacer frente al cambio climático en las regiones áridas. Este estudio es el primero que combina la recogida de datos a nivel de base en una base de datos que permite cartografiar y analizar los oranes del distrito de Bikaner, en el desierto del Thar de Rajastán. Genera nuevos conocimientos sobre la distribución, las diferencias y las similitudes entre los oranes y los valores y prácticas tradicionales asociados a ellos, frente a los retos y las amenazas a los que se enfrentan debido a la falta de protección legal. ¿Cómo podría beneficiar a su conservación la inclusión de los oranes en los esfuerzos de la India por alcanzar el objetivo del 30% en el Marco Mundial de la Biodiversidad?

RÉSUMÉ

La Convention sur la diversité biologique vise à mettre sous protection 30 % des terres et des mers de la planète, y compris les zones riches en biodiversité situées en dehors des zones protégées reconnues. En Inde, de nombreux bois sacrés pourraient potentiellement être inscrits au titre des "autres mesures efficaces de conservation par zone". Cette étude explore le potentiel des bois sacrés ou Orans du Rajasthan à contribuer à cet objectif. Bien que l'État du Rajasthan compte de nombreux Orans, leur riche patrimoine culturel et leurs pratiques traditionnelles ont été peu documentés. Les orangs sont des parcelles de forêts communautaires ayant une signification religieuse et spirituelle, souvent associées à un temple ou à une légende. Selon des estimations prudentes, les orangs couvrent plus de 600 000 hectares de terres dans l'État du Rajasthan. Ils servent de réserve pour le pâturage, les produits forestiers, l'infiltration de l'eau et comme mécanisme d'adaptation au changement climatique dans les régions arides. Cette étude est la première à combiner la collecte de données au niveau local dans une base de données permettant la cartographie et l'analyse des orangs dans le district de Bikaner, dans le désert de Thar au Rajasthan. Elle donne un nouvel aperçu de la répartition, des différences et des similitudes entre les orangs et les valeurs et pratiques traditionnelles associées, ainsi que des défis et des menaces auxquels ils sont confrontés en raison de l'absence de protection juridique. Comment l'inclusion des orangs dans les efforts déployés par l'Inde pour atteindre l'objectif de 30 % fixé par le Cadre mondial pour la biodiversité pourrait-elle être bénéfique pour leur conservation?

BOOK REVIEWS

National Parks Forever: Fifty Years of Fighting and a Case for Independence
By Jon and Destry Jarvis (2022) The University of Chicago Press, Chicago IL. 240pp., US$95.00 ISBN 9780226819099 Reviewed by Nikita Lopoukhine

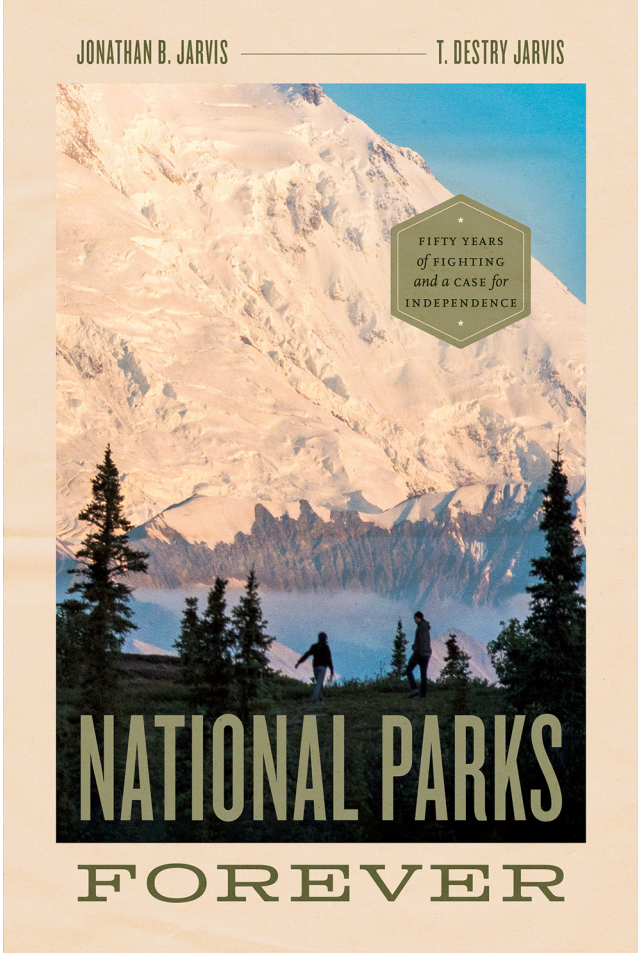
NATIONAL PARKS FOREVER: FIFTY YEARS OF FIGHTING AND A CASE FOR INDEPENDENCE

by Jon and Destry Jarvis.

Two brothers, Jon and Destry Jarvis, are co-authors of the book entitled "National Parks Forever". In parallel entries they draw on their over 100 years of combined experiences and knowledge to make the case that political influences over the USA National Parks Service (USNPS) is detrimental to conservation.

Jon Jarvis, in Chapter 6, relates that as the newly appointed Director of the USNPS he opened his address at the 2009 Wilderness Congress in Merida, Mexico, with the statement "We're back". He repeated the same words at that year's annual meeting of the World Protected Area Leadership Forum in Victoria, British Columbia. As the Chair of the IUCN World Commission on Protected Areas (WCPA) at the time, I witnessed both declarations. Both were greeted with great enthusiasm and relief, but it also underlined the reality of how much the USNPS is subject to political whims, such as prohibiting personnel from participating at international events.

Yet, the USNPS has led the world on many fronts, from establishing the first National Park to providing and supporting training and professional development opportunities throughout the world. The budget of the USNPS supersedes that of a number of countries. This, simply to say, is that the USNPS has clout and the world stage needs to hear its loud conservation voice. American politics is such that, at times, it excludes itself from world stages, particularly when conservative governments get elected.



I worked alongside Jon Jarvis from 2009 for three years until my tenure as WCPA Chair ended in 2012 at the World Conservation Congress. His encouragement and support were of instrumental importance to both me

and the Commission. Afterwards, we each contributed to the Chapter on Leadership and Executive Management in the publication "Protected Area and Management". We both were recipients of the Brandwein Medal in recognition of our commitment to education, life-long learning, nature, and community. All this to say, Jon Jarvis, in my view, is the perfect advocate for the betterment of the USNPS.

I have never met Jon's brother Destry Jarvis, the coauthor. It was a revelation to read about the breadth of his influence, vision and actions taken in advancing conservation in the USA. What a perfect combination for giving us a window through which we are exposed to the challenges faced by the USA National Parks Service. Destry gives us his views as a lobbyist and, for a brief time, a political appointee, which complements Jon's views from the inside, from Ranger to Regional Director to Director. Based on over a hundred years of experience, they conclude that political interference must stop. The solution offered is that the USNP must become an independent agency, with the Smithsonian Institution as a possible model.

From a Canadian perspective, it is difficult to assess what is best for the USNPS. However, we in Canada were on the verge of facing the demise of the federal park agency, Parks Canada. In 1998 a separate but not fully independent Parks Canada Agency was established. With new budgetary authorities to retain and rollover revenues, the ability to receive direct donations, and independent hiring practices, Parks Canada was transformed into a now thriving, nimble and prouder-than-ever organization. Canada's experiences match those of many other countries, where politics, short sighted economic opportunism and lack of conservation ethics come into conflict with the purpose of setting aside and managing a protected area for future generations. Many senior managers have left their positions rather than agree to draconian directions professed by politicians.

The multiple chapters in the book "National Parks Forever" are organized to provide the inside and outside perspectives on the challenges and accomplishments in establishing and managing the American system of national parks over the past 50 years. While very informative, the details and history will resonate mostly with an American reader. One can fall down the rabbit hole in trying to keep track of specific laws and policies described by both authors.

However, both authors draw a compelling argument. The purpose of a protected area - to present and protect - is subverted when political views, rather than science, are the basis of decisions.

Nikita Lopoukhine, IUCN World Commission on Protected Areas, Canada