



# Executive summary

## Designing and managing protected and conserved areas to support inland water ecosystems and biodiversity

Tara Moberg, Robin Abell, Nigel Dudley, Ian Harrison, Shiteng Kang, Flavia Rocha Loures, Natalie Shahbol, Michele Thieme and Hannah Timmins



IUCN WCPA Technical Report Series No. 8





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IUCN is pleased to acknowledge the support of its Framework Partners who provide core funding: Ministry of Foreign Affairs, Denmark; Ministry for Foreign Affairs, Finland; Government of France and the French Development Agency (AFD); Ministry of Environment, Republic of Korea; Ministry of the Environment, Climate and Sustainable Development, Grand Duchy of Luxembourg; the Norwegian Agency for Development Cooperation (Norad); the Swedish International Development Cooperation Agency (Sida); the Swiss Agency for Development and Cooperation (SDC); and the United States Department of State.

Published by: IUCN, Gland, Switzerland

Produced by: IUCN World Commission on Protected Areas

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Citation: Moberg, T., Abell, R., Dudley, N., Harrison, I., Kang, S., Rocha Loures, F., Shahbol, N., Thieme, M., & Timmins, H. (2024). *Designing and managing protected and conserved areas to support inland water ecosystems and biodiversity*. IUCN WCPA Technical Guidance Series, No. 8. IUCN.

ISBN: 978-2-8317-2314-3 (PDF)

DOI: <https://doi.org/10.2305/ZOKC6253>

Cover photo: The Japanese stream toad (*Bufo torrenticola*), endemic to Japan, is the only species of toad in the country known to spawn in streams rather than lentic habitats. © David Herasimtschuk / Freshwaters Illustrated

Back cover: Kingfishers (*Alcedinidae*) are highly adept at catching fish and other prey below the water surface, Croatia © Petar Sabol/ TNC Photo Contest 2018

Layout: Miller Design

# Executive summary

**Inland water ecosystems – such as lakes, rivers and streams, marshes and peatlands – are among the most threatened on the planet. Since 1970, monitored populations of freshwater species have declined by 85 per cent on average, a much faster rate than marine and terrestrial realms, and almost one in three species is threatened with extinction.**

The well-being of inland water ecosystems is inextricably tied to ours. One third of the global food resource depends on rivers, and 40 per cent of the global fish protein consumed by humans comes from species dependent on inland waters. Recent research estimates inland waters contribute a value of US\$ 50 trillion annually through the provision of natural processes that support human well-being. And more locally, they serve as sacred spaces, supporting cultural and spiritual values as well as mental and physical health.

The world needs to prioritise reversing the curve of inland water biodiversity and ecosystem loss, and that means using the range of available tools in smart, deliberate and creative ways. Protected areas and other effective area-based conservation measures (OECMs) are among the most important conservation tools to halt and reverse the global decline in biodiversity and to sustain irreplaceable ecosystem services. However, to date, the intentional use of, and investment in, protected and conserved areas for safeguarding inland water biodiversity and values has been limited. The reasons for this under-investment are many:

- Inland water biodiversity is literally invisible to most people, and those who depend on it most directly are often unempowered.
- For generations, internationally dominant perspectives have often viewed water and inland water ecosystems as commodities to be diverted or drained to support economic growth, rather than as home to a disproportionately large fraction of Earth's biodiversity and life sustaining services.
- Land protection has been the dominant area-based conservation mechanism and confers some, but often limited, protection to inland water ecosystems. Typical notions of protected areas, in which external threats are kept at bay, are often misaligned with the connected and much-used nature of inland water systems.
- Measurement approaches designed for lands rather than waters, and lack of an indicator for assessing and tracking inland water protections, have kept these systems off the radar of the protection community.

It is true that conserving inland waters is complicated by their connectivity, dynamism and position in the landscape: in most cases, area-based conservation approaches will be insufficient on their own for safeguarding inland waters against the range of threats originating upland, upstream, and even downstream and underground. In fact, this is the reality for terrestrial and marine protections as well, but inland waters bring that reality to the forefront. Recognising this apparent limitation can ultimately catalyse more effective, inclusive, holistic and creative conservation solutions that will benefit all realms.

This report summarises these challenges and showcases the diversity of solutions that are emerging around the world to address them, as led by Indigenous peoples, local communities, government and civil society. It is motivated by the Kunming-Montreal Global Biodiversity Framework's (KM-GBF) target of 30 per cent of inland waters conserved globally, and its primary objective is to facilitate achievement of that target by providing a consolidated resource for practitioners. Specifically, it provides guidance for parties with a vested interest in designing, designating and managing protected areas and OECMs, or protected and conserved areas (PCAs), for shorthand, and/or those with a vested interest in conserving inland water biodiversity and ecosystems. While the focus of the report is on the use of PCAs as a conservation tool, important complementary measures that can and often should be layered with area-based conservation – such as restoring aquatic connectivity, best management practices on working landscapes, and integrated water resources management across basins – are briefly introduced by suggesting approaches for their integration into PCA design, planning and management.

Four main questions guide the use of PCAs for inland waters:

1. What are the inland water values or conservation objectives, and who are the vested parties?
2. What key ecological attributes are critical to achieving inland water conservation objectives? And, of those, which are or will likely be under pressure or threat, and where do the threats originate in the basin?
3. Can the PCA design, designation and/or management be used, or adapted, to reduce those pressures to a functional degree, and if so, how?
4. Are there opportunities to work with stakeholders within the broader basin to reduce external threats that the PCA cannot address on its own?

The content of this report, including numerous case studies representing diverse contexts, is designed to provide readers with the resources to address these questions for their inland waters of interest. The report covers:

- the current state of inland water protections and key representation gaps,
- what makes protection of inland waters distinct,
- how and why human rights, equity and inclusion must feature prominently in inland water protections,
- key principles for spatial conservation planning and protected area design,
- setting legal environmental standards for protected areas,
- the application of IUCN management categories, OECMs, international designations, and emerging protection mechanisms in inland waters,
- the design of management and monitoring plans,
- budgeting for inland water protections, and
- potential sources of sustainable funding.

Mountain mullet (*Dajaus monticola*), Puerto Rico. © David Herasimtschuk / Freshwaters Illustrated



## Key messages

**To reverse the trends of nature and biodiversity loss, inland waters must be conserved and managed in a way that includes but goes beyond conventional land conservation, taking into account their unique characteristics and including them explicitly in conservation objectives, targets and indicators.**

- ✓ **The ecological integrity of inland waters is tied to their basin context, hydrologic regime, connectivity, water quality, physical habitat and biotic composition.**  
Designing area-based protections for inland waters must start with an understanding of key ecological attributes, and of current and future threats to them. Given the highly connected nature of inland waters, an individual protected or conserved area may be unable to deliver ecological integrity on its own, but layering well-designed and managed area-based protections with additional interventions in the broader basin landscape can produce effective and lasting results.
- ✓ **It is possible to measure and track the extent of inland water protection coverage now,** using available global datasets or, where they exist, better national-level data. Disaggregating tracking by inland water ecosystem type shines a light on gaps to be filled. Further work is needed to build from protection coverage to represent and track protection effectiveness. This includes consideration of aquatic connectivity and representation of areas important to inland water biodiversity.
- ✓ **Integrating inland waters explicitly into area-based conservation objectives and targets in National Biodiversity Strategy Action Plans,** large-scale spatial conservation planning, management plans, onsite and offsite activities, monitoring, and financing of existing and new PCAs is critical.
- ✓ **Inland water and terrestrial areas interact in a matrixed landscape and inland waters are directly connected to coastal and marine systems; as such their effective conservation is critical to all three realms.** The healthy functioning of inland waters underpins the productivity of other systems via water, nutrient and sediment processes and flows.

**Inland water ecosystems are intertwined with human lives, livelihoods and well-being. Understanding these relationships sets the foundation for durable conservation approaches that prioritise human rights, equity and diverse governance.**

- ✓ **Human rights, equity and local values are central to conserving inland waters.**  
It is critical to recognise the rights, knowledge and contributions of Indigenous peoples and local communities, including their role in stewarding lands, waters and biological heritage. Protecting and conserving inland waters is not about excluding people but about ensuring that values will be sustained for generations to come.
- ✓ **A range of actors will have a vested interest in the health of any given inland water ecosystem, providing opportunities to diversify governance and improve equity.**  
New models for Indigenous and community-led governance of inland water ecosystems through PCAs are expanding rapidly. Explore opportunities for community-led protections and/or management at the earliest stages.
- ✓ **Well-managed inland water areas that accommodate sustainable use, while making a significant contribution to the conservation of inland water biodiversity, may qualify as OECMs.** People rely on inland waters around the world for the benefits they provide, and a range of sustainably managed human uses can be compatible with inland waters' integrity. Emerging guidance can be used to assess when OECMs might be recognised for making significant contributions to inland water biodiversity.
- ✓ **Overlapping and complementary multilateral agreements should be optimised to co-deliver solutions for biodiversity, climate and sustainable development.** The UN Sustainable Development Goals, UN Framework Convention on Climate Change, the Convention on Wetlands, the Convention on Migratory Species, UN Convention to Combat Desertification and the UN Decade on Ecosystem Restoration, among others, can all complement the K-M GBF



**There is an unprecedented opportunity to strengthen and expand protected and conserved area networks to be effective, representative, well-connected and resilient to a changing climate through integrated planning and site-scale design.**

Sandhill crane (*Antigone canadensis*). © Roxana Walters/TNC Photo Contest 2019

- ✓ **Integrated spatial conservation planning across terrestrial, marine and inland water realms is both efficient and critical to ensure that new and existing protected areas and OECMs deliver effective conservation.** Such planning needs to be participatory, efficient, effective and covering an area of sufficient size and configuration to connect key elements of the basin, maintain biodiversity, and build climate resilience. It is essential that all such planning prioritises the maintenance of aquatic connectivity, ecological function and dynamism.
- ✓ **Improved representation of inland water ecosystem types, and improved effectiveness, can be achieved through the intentional expansion of protected and conserved networks** to capture and address inland water values. Globally, existing PCAs cover at least 16 per cent of inland water areas, but there is wide variation in protection coverage across inland water ecosystem types and among regions.
- ✓ **New and expanded PCAs should consider site-scale design principles for inland waters,** such as ensuring sufficient size and configurations to account for aquatic connectivity and basin influences, including full water bodies where possible and incorporating riparian and floodplain buffers. Consider the unique role rivers can play in building a well-connected PCA network and avoid using them as PCA boundaries.
- ✓ **Environmental standards defining the bounds within which protected inland waters should be functioning can and should be set.** Standards that are tied to the PCA are important for evaluating whether objectives are being met and can be useful for managing current and future threats external to the area. Standards can be written as a general articulation of conservation objectives or link explicitly to environmental flows, connectivity and water quality. Lack of full information at the time of designation should not preclude setting standards, which can be made more measurable over time.

**An array of legal and other effective mechanisms can provide the opportunity to align inland water conservation needs with suitable policy tools at the appropriate scales.**

- ✓ **Inland water protections can draw on a range of established and emerging mechanisms.** Conventional protected areas, sitting along the IUCN management category spectrum from I to VI, can and do provide protections for inland waters. Additionally, an array of emerging mechanisms like fluvial reserves, rights of rivers and wetlands, community fish reserves, source water and groundwater protection areas, migratory corridors or swimways, water flow reserves, climate adaptation corridors, carbon capture areas and transboundary reserves are being adapted to meet the conservation needs of inland water ecosystems.
- ✓ **The coverage of areas designated as Ramsar sites equates to almost 5 per cent of the global coverage of inland waters by PCAs, presenting a unique opportunity to strengthen inland waters' protection.** Where inland Ramsar sites neither overlap spatially with nationally recognised protected areas nor are managed as part of national protected area systems, they may lack legal protection, management mandates, plans and resources. National policies that clarify legal and management regimes for Ramsar sites and ensure that they are adequately managed and resourced, can substantially and meaningfully expand effective inland water protections. This includes clarifying geographic boundaries, management zones and alignment with IUCN protected area management categories, or as applicable, assessing whether sites qualify to be recognised as OECMs.
- ✓ **Within any given country, there will likely be numerous policies that can be leveraged, alone or together, to safeguard inland water systems.** Understanding the policy baseline and what durable protection mechanisms may be available for inland waters and their key ecological attributes is an important starting point, especially when objectives include safeguarding water flows, connectivity and water quality. Often PCA policies were developed for the terrestrial and/or marine context. It may be necessary to review the PCA legal framework, including category definitions and allowable and prohibited uses within them, to be inclusive of inland waters.

**Effective conservation will require specific considerations in management planning, implementation and monitoring. The same aspects of inland waters that make them complex to conserve, enable diverse approaches to management and financing.**

- ✓ **Site-specific inland water objectives can and should be built into protected area management plans, and into the budgets for implementing them.** Many of the categories of management activities common to terrestrial protected areas will be the same for inland waters, but inland water management may require special training and equipment, along with adjustments to current practices and engagement with a broader set of stakeholders.
- ✓ **Collaboration is key to effective management of inland waters in PCAs.** Water is a shared resource. Cooperative agreements or cross-institutional management arrangements among local communities, protected area authorities, Ramsar site management authorities, water resource agencies, and water-based ecotourism sectors can build trust and collective knowledge while leveraging expertise, capacity, equipment and often scarce resources to deliver effective management.
- ✓ **Long-term financing for inland water management may tap into the many benefits that inland waters provide to people,** through payments for water-related ecosystem services like water provision and regulation, climate mitigation and adaptation, as well as tourism and recreation fees. For a sense of scale, a third of the world's hundred largest cities get a significant portion of their drinking water from protected areas.



Although complex, area-based conservation solutions for inland waters are possible and are actively being applied throughout the world, with rapid innovations over the last several years. The range of approaches is illustrated through 40 cases including six in-depth field studies. These messages add up to a positive outlook for new and strengthened protected and conserved areas.

The global community can meet its obligations, contribute to bending the curve of inland water biodiversity loss, and sustain delivery of services for generations to come by fully embracing and integrating area-based solutions for these critical ecosystems.

Camp for scientists monitoring peatland restoration in Sebangau National Park, Indonesia.  
© Markurius Sera/TNC Photo Contest 2022



## PROTECTED AREA AND OECM DEFINITIONS, 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), summarised 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:

**Type A.** Governance by government: Federal or national ministry/agency in charge; sub-national ministry or agency in charge (e.g. at regional, provincial, municipal level); government-delegated management (e.g. to NGO).

**Type B.** Shared governance: Transboundary governance (formal and informal arrangements between two or more countries); collaborative governance (through various ways in which diverse actors and institutions work together); joint governance (pluralist board or other multi-party governing body).

**Type C.** Private governance: Conserved areas established and run by individual landowners; non-profit organisations (e.g. NGOs, universities) and for-profit organisations (e.g. corporate landowners).

**Type D.** Governance by Indigenous peoples and local communities: Indigenous peoples' conserved areas and territories – established and run by Indigenous peoples; community conserved areas – established and run by local communities.

The Convention on Biological Diversity 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, socioeconomic, and other locally relevant values.**

This covers three main cases:

1. **Ancillary conservation** – areas delivering in-situ conservation as a by-product of management, even though biodiversity conservation is not an objective (e.g. some war grave sites).
2. **Secondary conservation** – active conservation of an area where biodiversity outcomes are only a secondary management objective (e.g. some conservation corridors).
3. **Primary conservation** – areas meeting the IUCN definition of a protected area, but where the governance authority (i.e. community, Indigenous peoples' group, religious group, private landowner or company) does not wish the area to be reported as a protected area.

For more information on the IUCN definition, categories and governance types, see Dudley (2008). *Guidelines for applying protected area management categories*, which can be downloaded at: <https://doi.org/10.2305/IUCN.CH.2008.PAPS.2.en>

For more on governance types, see Borrini-Feyerabend et al. (2013). *Governance of Protected Areas: From understanding to action*, which can be downloaded at <https://portals.iucn.org/library/node/29138>.

For more information on OECMs, see Jonas et al. (2023) *Site-level tool for identifying other effective area-based conservation measures (OECMs): first edition*, which can be downloaded at: <https://doi.org/10.2305/WZJH1425>



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WORLD HEADQUARTERS  
Rue Mauverney 28  
1196 Gland, Switzerland  
Tel: +41 22 999 0000  
Fax: +41 22 999 0002  
[www.iucn.org](http://www.iucn.org)  
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