DESIGNING PROTECTED AND CONSERVED AREAS TO SUPPORT FREE-FLOWING RIVERS: ENVIRONMENTAL FLOWS, CONNECTIVITY AND COMMUNITIES

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ABSTRACT

Rivers are not isolated features, they are lifelines, and less than one third of the world's large rivers remain free-flowing. Protecting free-flowing rivers requires honouring the people who sustain them, and embracing conservation as a shared, relational practice rooted in connection, reciprocity and care. Free-flowing rivers support dynamic flow regimes, sediment transport, species diversity, migration, and the resilience of landscapes. They provide essential services such as clean water, food security, flood regulation, and cultural values for millions of people globally. Despite their importance, rivers remain highly threatened and under-protected. This paper builds on the recent IUCN World Commission on Protected Areas guidance on inland waters, detailing community-based river protections that secure environmental flows and connectivity. Innovative cases from the Ecuadorian Amazon, Gayini in Australia, the Puelo and Futaleufú Rivers in Chile, the Bita River in Colombia, and the San Pedro Mezquital and Usumacinta Rivers in Mexico, highlight how local communities have worked with partners and governments to establish protected and conserved areas that keep their waterways connected and flowing. The paper concludes with recommended approaches to elevate rivers and their stewards in implementation of the 30x30 protection target and beyond.

Keywords: freshwater ecosystems, protected areas, 30x30, community conservation, freshwater biodiversity

INTRODUCTION

Riverine ecosystems cover less than one per cent of the Earth yet support a disproportionately large fraction of its biodiversity and life sustaining services (Allen et al., 2018; Finlayson et al., 2017). They are distinguished by their water flows, dynamism and connectivity in multiple dimensions. Free-flowing rivers are increasingly rare, with more than two-thirds of the world's largest rivers existing in an altered state (Grill et al., 2019). A free-flowing river is defined as one that is functionally connected upstream to downstream (longitudinally), between its riverbed and the floodplain (laterally), between groundwater and surface water (vertically), has sustained seasonal and interannual patterns of flows over time (Poff &Ward, 1989; Ward & Stanford, 1995) and is not obstructed in the entirety of its length.

Rivers are lifelines for both people and nature, shaping cultures, sustaining livelihoods and anchoring biodiversity. They supply water to communities and support one-third of the global food resource, including major inland fisheries in the Mekong, Ganges, Amazon and Congo (Convention on Wetlands, 2025; WWF, 2021). Beyond provisioning, rivers serve as transportation corridors, sacred spaces, mental and physical health supports, tourism hubs and cultural anchors (Kumar et al., 2017; Verschuuren et al., 2021). In total, freshwater ecosystems contribute an estimated US$50 trillion annually through nutrient cycling, water purification, carbon sequestration, and floodplain storage and productivity (WWF, 2021).

Ecologically, rivers and their floodplains host the highest biodiversity density of any biome (Finlayson et al., 2017) and act as connectivity corridors for species, nutrients and sediments (Hilty et al., 2021). The loss of riverine habitats from dams and diversions has contributed to the staggering decline of monitored populations of

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Fisher communities in the Mekong River, Vientiane, Laos PDR © Emanuela Colombo / WWF-Laos

freshwater species by 85 per cent since 1975 (WWF, 2024). This decline is mirrored across species reliant on riverine ecosystems, with migratory fish populations down by 81 per cent, aquatic megafauna such as river dolphins and hippos reduced by 88 per cent, and mega-fishes experiencing a staggering 94 per cent loss (WWF, 2024). Free-flowing rivers are also vital for both terrestrial and marine ecosystems, supplying critical food and water resources, migratory corridors, shaping and maintaining deltas, and regulating temperature and water quality.

This paper builds on the recent IUCN World Commission on Protected Areas guidance on designing and managing protected and conserved areas for inland waters (Moberg et al., 2024) and highlights approaches to design and designate river conservation areas using detailed community-based river protection cases where connected and flowing rivers have been secured.

STARTING WITH COMMUNITIES

Unlike static landscapes, rivers are dynamic systems flowing across territories, cultures and governance regimes (Zhang et al., 2023). Their ecological health is inseparable from the well-being of those who live alongside and depend on them (Fromherz & Lyman, 2022). An approach rooted in communities, human rights, equity and inclusion is necessary from the beginning stages of planning (FAO, 2016; Franks et al., 2024; UNGA, 2010, 2019).

For many communities, rivers are sacred and central to identity, sustenance and cultural continuity (Cultural Survival & First Peoples Worldwide, 2023; FAO, 2016). Conservation efforts that overlook these relationships risk reinforcing historical injustices and undermining resilience (TNC, 2020; USAID, 2021). Rather than imposing exclusionary models that restrict access or prioritise ecological metrics alone, river conservation must elevate community-led stewardship and recognise diverse governance systems (Franks et al., 2024; Meinzen-Dick & Pradhan, 2002; WWF & IUCN WCPA, 2023).

This calls for inclusive, place-based frameworks that respect customary rights, Indigenous and traditional knowledge and local perspectives (Fromherz & Lyman, 2022), while confronting power imbalances to ensure voices of marginalised communities actively shape decision-making (Friedman et al., 2018; McDermott et al., 2013). This also includes considering how participatory processes can support sustainable use, intergenerational knowledge exchange, and adaptive capacity amid climate and hydrological change (Moberg et al., 2024; Zhang et al., 2023).

A leading example can be found in Ecuador's Sistema Fluvial Nushiño-Curaray-Villano. In response to threats in the watershed, Indigenous nations and The Nature Conservancy (TNC) worked together to scope opportunities to conserve the area, including the concept of a fluvial reserve. The proposal considered was establishment of a 'Community Conservation and Management Use Area', a category of conservation that is included in Ecuador's legal framework. This category promotes the protection of Indigenous peoples' rights to self-determination and guarantees the freedom to make decisions without pressure.

Representatives of the Indigenous nations asked TNC to facilitate a Free, Prior and Informed Consent (FPIC)

Workshop with representatives of the Kichwa Indigenous communities to define strategies to be included in the management plan for the Nushiño-Curaray-Villano Fluvial System, Puyo, March 2024. © Gabriela Celi/The Nature Conservancy

process with all 80 Waorani and Kichwa communities living in the area. An FPIC guide and report were created to define and document the consultation process including detailed information about the Indigenous nations, and the processes for discussion, decision-making and final consent. Each of the 80 communities voted on the potential proposal with the options of affirmative, affirmative with conditions, negative but open to future discussions, or negative. As of 2024, all 80 communities have voted to recognise the fluvial system as a community-led conservation area. They are leading development and implementation of the governance structure, management and monitoring plans with support from TNC (Moberg et al., 2024).

By starting with communities, conservation models are more just, resilient and ecologically effective (Convention on Wetlands, 2000; Perry et al., 2024). Additional resources and principles are included in detail in Chapter 3 of the IUCN WCPA inland waters report (Moberg et al., 2024).

STRENGTHENING PCA NETWORK DESIGN AND DESIGNATION FOR RIVERS

As part of the Kunming-Montreal Global Biodiversity Framework (GBF) many countries have pledged to conserve at least 30 per cent of the world's land, inland waters and ocean through an ecologically representative, well-connected and equitably governed network of protected and conserved areas by 2030 (hereafter, 30x30).

Globally, 17.6 per cent of rivers are included in, or border protected and conserved areas (PCAs), with free-flowing rivers receiving comparable coverage (Moberg et al., 2024; Opperman et al., 2021; UNEP WCMC, 2024). However, most

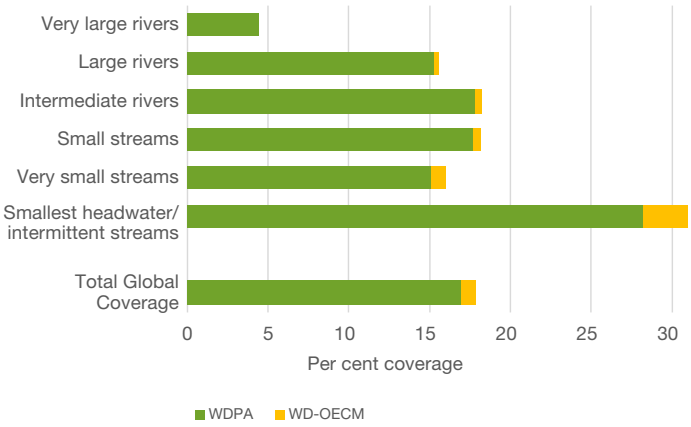


Figure 1. Extent of river length, by size class, covered by existing protected areas (WDPA) and other effective area-based conservation measures (WD-OECM) (UNEP-WCMC & IUCN 2024a; UNEP-WCMC & IUCN 2024b). Size classes are based on average annual discharge of cubic metres per second (cms); headwaters (<0.001), very small streams (0.001–0.1), small streams (0.1–10), intermediate rivers (10–1,000), large rivers (1,000–100,000), very large rivers (>100,000).

coverage focuses on headwaters and intermittent streams, with limited representation of large rivers (Figure 1). Moreover, inclusion in PCAs does not guarantee effective conservation as siting, design and management must align with freshwater ecosystem objectives (Abell et al., 2017; Higgins et al. 2021; Moberg et al., 2024).

Traditional area-based conservation models have long favoured terrestrial ecosystems, frequently overlooking freshwater systems despite their critical ecological roles and vulnerability. To safeguard rivers and their associated habitats, conservation strategies must evolve.

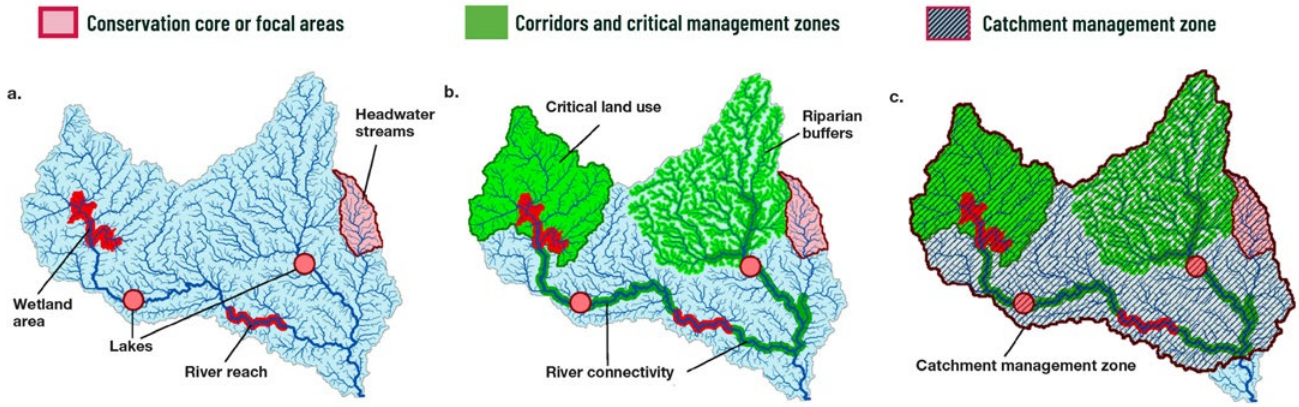


Figure 2. A basin/catchment protection approach tailored to river ecosystems including (a) cores or focal areas (b) corridors or critical management areas and, (c) catchment (basin) management zones (Adapted from Abell et al., 2007).

This includes adapting spatial planning, site design, and legal frameworks to reflect basin-scale dynamics, landscape connectivity, and integrated, function-driven approaches that are grounded in governance realities (Abell et al., 2017; Hilty et al., 2021; Moberg et al., 2024; Figure 2).

Spatial planning. Effective spatial planning requires treating freshwater, terrestrial, coastal and marine ecosystems as interconnected systems. Prioritisation should incorporate freshwater-specific data and tools to identify ecological gaps and guide protected area design that reflects hydrological processes. River protection must consider scale and context, recognising the nested nature of rivers within broader basins and the influence of upstream and downstream dynamics (Thieme et al., 2023). Connectivity, including longitudinal, lateral and vertical, is essential. Preserving functional integrity means safeguarding processes like natural flow regimes and sediment transport, which are vulnerable to both direct river impacts and basin-wide activities. Evidence shows that integrated planning across ecosystems can achieve conservation goals more efficiently than siloed approaches; in fact, integrating the needs of freshwater species into overall reserve planning increased freshwater benefits by 600 per cent while only decreasing terrestrial outcomes by 1 per cent (Leal et al., 2020).

Site design. Designing protected areas for rivers requires function-based site design. Using rivers as boundaries can fragment ecosystems and undermine conservation goals. Instead, geographic boundaries should encompass key habitats and processes tailored to specific riverine values and management objectives (Higgins et al., 2021). Protection does not need to be uniform across catchments, for example, spawning habitats such as deep pools may warrant strict protection, while migratory corridors could be shielded from disruptive barriers yet remain accessible for low-impact use. Basin-wide management practices can help reduce sedimentation and maintain water quality (Abell et al., 2007).

Site design must be anchored in clear objectives and measurable targets. For example, maintaining migratory routes for fish may involve targets like barrier-free reaches and continued species use. Environmental standards such as thresholds for flow, water quality, connectivity, and habitat (e.g. Peake et al., 2011), integrity, should be embedded in designation and management frameworks and be enforceable yet adaptable (Moberg et al., 2024). For example, a protected river might be required to maintain a Connectivity Status Index score of ≥95 per cent to ensure ecological function over time (Grill et al., 2019).

Legal mechanisms. Aligning area-based protection designations with the needs of free-flowing rivers remains challenging. Traditional designations like national parks, biosphere reserves and heritage sites are often not designed for freshwater conservation. Legal frameworks tend to focus on land use and vegetation, overlooking aquatic processes, water use, and habitat conditions. Consequently, activities like dam construction or industrial water withdrawals may be permitted within existing protected area laws. Globally, over 500 new hydropower dams are proposed in existing protected areas (Thieme et al., 2020), underscoring the persistent threats facing freshwater ecosystems even within zones intended for conservation.

To strengthen river conservation, a comprehensive assessment of legal and policy tools is essential. This includes evaluating protected area legislation, water management plans, energy, fisheries, and cultural preservation policies for their ability to support healthy freshwater ecosystems (Moberg et al., 2024). Enhancements may explicitly include rivers and riparian zones in legal designations, embedding enforceable standards, integrating land and water use conditions, prohibiting incompatible

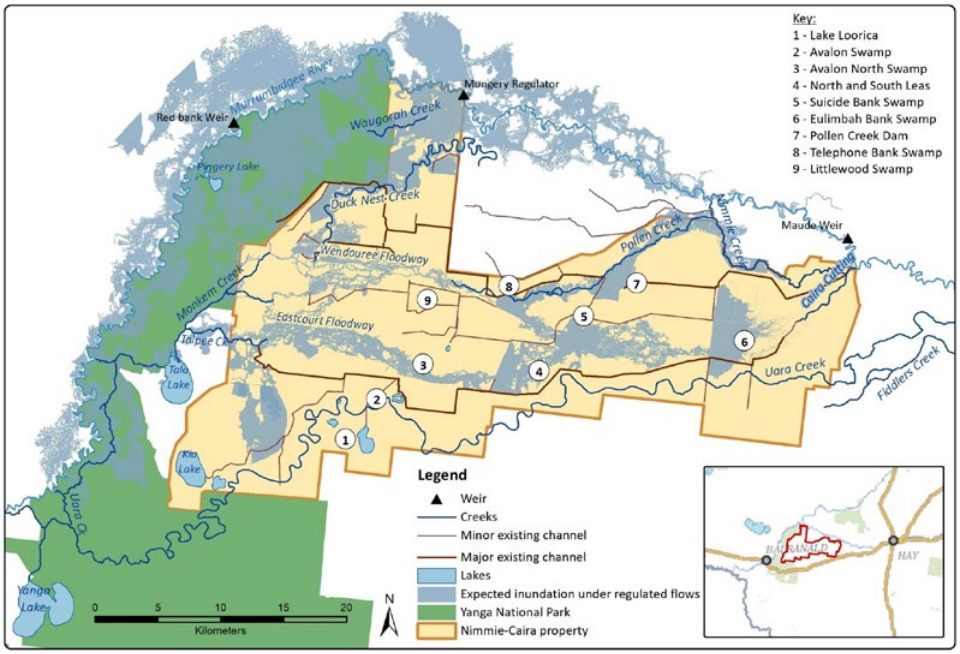


Figure 3. Map of Gayini (formerly Nimmie-Caira) boundaries, focal rivers and creeks, wetlands and floodways. Source: NSW Department of Industry (2018).

activities and subsidies incentivising these, and establishing governance structures with sustainable budgets.

Ultimately, a multi-layered approach is needed. Where gaps persist, advocacy for new laws and policies becomes imperative. Rethinking spatial planning through a freshwater lens can deliver lasting protection for rivers and the communities that depend on them.

COMMUNITY-LED PROTECTION OF FLOWS AND CONNECTIVITY

Gayini: Returning legal rights to Traditional Custodians

The Lowbidgee floodplain, with its fertile grounds and expansive network of rivers, creeks, oxbows and backchannels, has been home to First Nations people for over 50,000 years. Nested in the Murrumbidgee River Valley, it is one of the largest remaining wetland areas in Australia's Murray-Darling Basin.

The cultural health of the Nari Nari people, traditional custodians of this area, depends on flow patterns, flooding and connectivity (Woods et al., 2022). Annual and inter- annual floods spill over banks and move across the valley, filling a vast network of wetlands and floodways. These processes have sustained productive fishing and hunting grounds comparable to "supermarkets where food was plentiful and trade connections occurred" (Woods et al., 2022).

Beginning in the mid-1800s with European colonisation, Lowbidgee's lands and waters were sold or granted as private property. First Nations people, not considered citizens at the time, were excluded from ownership and lacked the resources to participate.

Over the next century, land and water rights were further subdivided. The area was used for grazing, then converted for irrigated crops. More than 2,000 km of levees, channels, diversions and reservoirs were built to manage flows for agriculture and domestic use, reducing connectivity and flow. This led to the loss of 76 per cent of floodplain habitat and its rich diversity of fish, aquatic invertebrates, amphibians and waterbirds (Kingsford, 2003; Kingsford & Thomas, 2004; NSW Department of Primary Industries, 2015).

In 2011–2012, the New South Wales (NSW) and Australian governments launched the AU$180 million Nimmie-Caira water-recovery project, acquiring 19 properties (84,417 ha) and associated water rights to restore environmental flows and protect cultural heritage (Woods et al., 2022). The area connects Yanga National Park to several creeks for most of their lengths, along with riparian zones and floodplain wetland complexes (Figure 3).

In 2019, land titles were formally returned to the Nari Nari Tribal Council (NNTC), marking the legal return of the Lowbidgee to its Traditional Custodians. Renamed 'Gayini', the Nari Nari word for water, the area reflects the restoration of cultural and ecological values (Woods et al., 2022). In 2023, the NNTC signed a historic Conservation Agreement with the NSW Biodiversity Conservation Trust (BCT), securing permanent protection and sustainable management of over 55,000 ha. Supported by a perpetual AU$1 million annual investment and a governance model embedding Indigenous leadership, it is the largest conservation covenant on Indigenous-owned land in NSW (Fitzsimons et al., 2025).

The Agreement used a three-tiered zoning approach: (1) ecologically important areas; (2) actively regenerating areas; and (3) areas with restoration potential. Innovations include restoring environmental flows and hydrology across the Lowbidgee floodplain via 23 regulators and over 650 irrigation and levee bank cuts (Woods et al., 2002). Land management includes conservation grazing to control non-native biomass and cultural burning to restore native vegetation. Additionally, over 1,200 cultural sites are protected and support traditional activities like canoe-making and medicinal plant collection. A Strategic Adaptive Management framework guides decisions, backed by 15 years of co-designed biodiversity and cultural monitoring.

Gayini exemplifies how Indigenous-led stewardship, restored rights, co-designed monitoring, and sustainable finance can protect ecological connectivity and cultural integrity. Understanding financial, policy and governance models that are successful is one of the highest priorities for research on privately protected areas (Fitzsimons & Mitchell 2024). As a model for 30x30 targets, it shows how conservation covenants can be adapted to Indigenous-owned lands, integrating cultural values with large-scale freshwater ecosystem management Fitzsimons et al., 2025).

Bita River: A basin-scale model for free-flowing river conservation

The Bita River, a 510 km tributary of the Orinoco River, originating in Colombia's Llanos high plains, exemplifies how basin-scale conservation can safeguard free-flowing rivers while integrating community priorities and national biodiversity goals. Draining an 825,000-ha basin, the Bita River supports rich biodiversity including Amazon River Dolphin (*Inia geoffrensis*), Jaguar (*Panthera onca*), migratory fish and birds, turtles, crocodiles, tapirs and otters and provides critical ecosystem services to local communities through tourism, fisheries and recreation (Romero et al., 2016).

In 2014, the Alliance for the Protection of the Bita River was formed by government entities and civil society to develop a collaborative conservation strategy. Using systems thinking and participatory decision-making frameworks, the Alliance engaged fishers, farmers, companies, scientists and citizens to identify conservation priorities and evaluate protection mechanisms. Analyses included biological surveys, gap analyses and scenario modelling, which led to a tiered conservation approach balancing conservation, restoration, and sustainable production zones (Figure 4; Suárez et al., 2021; WWF & UMCES, 2016).

In July 2018, the Bita River Basin Wetlands Complex became Colombia's largest Ramsar site and one of the world's first to safeguard an entire free-flowing river system under international protection. The designation aims to maintain the river's natural flow regime, biodiversity, and ecological connectivity, while addressing threats such as land conversion for cattle and forest plantations, agricultural runoff, overharvesting, infrastructure development, and climate change.

Following the designation, Colombia established a 228,457-ha ecological corridor along the river and floodplain to facilitate movement and migration of fish, Amazon River Dolphin, Jaguars and other wildlife, including conservation agreements with local landowners. The Bita River Ramsar site is also recognised as an Other Effective Area-based Conservation Measure (OECM) in Colombia under the category of a 'Complementary Conservation Strategy'

Royal Spoonbill (*Platalea regia*) nestlings at Gayini © Vince Bucello Midstate Video Productions

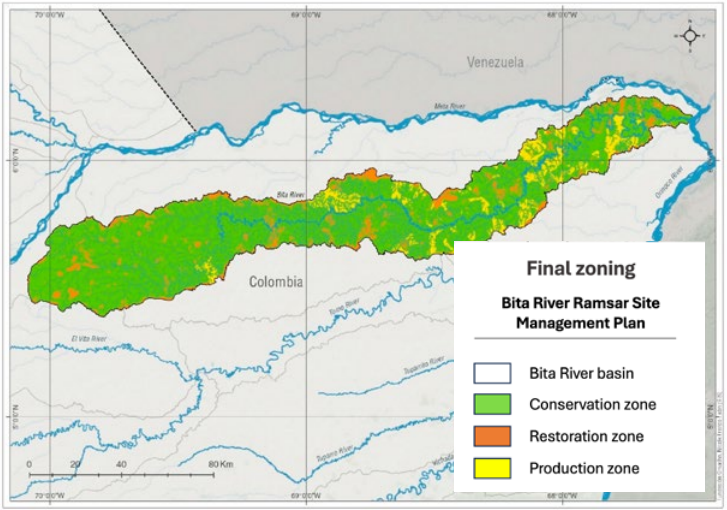


Figure 4. Basin-scale land and water use zoning for the Bita River Management Plan

The Bita River supports aquatic megafauna including the Giant River Otter (*Pteronura brasiliensis*) and Amazon River Dolphin. © R. Isotti, A. Cambone / Homo Ambiens / WWF

(CCS). CCSs contribute to the connectivity of the National System of Protected Areas (SINAP) and support diverse governance models, including Indigenous and local leadership. This designation allows for flexible, context-specific governance that respects and elevates Indigenous and local leadership, allowing communities to co-manage resources, uphold cultural values and contribute to long-term environmental stewardship. By linking environmental authorities, community organisations and scientific institutions, it allows decision-making to be transparent, equitable and grounded.

Mexico water reserves: Protection of the San Pedro Mezquital and Usumacinta Rivers

Mexico's Environmental Water Reserve system represents a pioneering national strategy to protect river connectivity. Formalised by a set of presidential decrees published between 2014 and 2018, the framework allocates flow volumes to nature across priority basins based on detailed environmental flow and cost-benefit assessments (Salinas-Rodríguez & Martínez Pacheco, 2024). The decree outlines three use segments, including domestic, hydropower and environmental, and mandates that any infrastructure must demonstrate non-interference with flow regimes, sediment transport, and Indigenous cultural sites (Barrios Ordóñez et al., 2015). At the national level, Mexico's water reserve framework is designed to maintain ecological processes by legally allocating from 10–30 per cent up to 80–95 per cent of mean annual runoff to environmental flows, depending on each river's targeted management objectives classes (Salinas-Rodríguez et al., 2021; Salinas-Rodríguez & Martínez Pacheco, 2024).

The San Pedro Mezquital River, the last free-flowing river in Mexico's western Sierra Madre Mountains, exemplifies how legal designation and community advocacy can safeguard riverine connectivity and environmental flows. Stretching 540 km to the Pacific Ocean, the river's seasonal hydrology sustains the Marismas Nacionales, a 200,000-ha mangrove wetland complex designated as both a Biosphere Reserve and Ramsar site. During the rainy season, high flows inundate the floodplain, depositing nutrient-rich sediment that supports agriculture, fisheries, and the livelihoods of 432 local communities (IUCN, 2022).

In response to the proposed Las Cruces Dam in 2008, local stakeholders mobilised to safeguard the river's ecological integrity. Their petition to the Ramsar Secretariat triggered closer scrutiny of the project's compliance with environmental flow standards. Though conditionally approved in 2014, experts warned the dam would disrupt flow connectivity and nutrient transport to wetlands. Construction was deferred pending proof of compliance with 18 conditions, including maintaining 84 per cent of mean annual runoff at the river's mouth (Barrios Ordóñez et al., 2015; Salinas-Rodríguez et al., 2021; SEMARNAT, 2014).

The Usumacinta River showcases the scale and complexity of basin-wide conservation. As the largest river in Mesoamerica by discharge – nearly 20 times larger than the San Pedro Mezquital – the Usumacinta flows from Guatemala to the Selva Lacandona, one of Mexico's richest biodiversity hotspots, and discharges into the Gulf of Mexico. The basin hosts a variety of protected area types and designations. A proposed hydropower project in the region was rejected by the Ministry of the Environment due to its inability to meet the river's environmental flow standards, which requires 90 per cent mean annual runoff at the river's mouth to 99 per cent mean annual runoff in the Selva Lacandona, underscoring the power of legal safeguards and cultural resistance (Arthington et al., 2023; Salinas-Rodríguez et al., 2021). This case highlights the role of Indigenous governance and transboundary cooperation in maintaining connectivity. Sacred sites, traditional water use and community stewardship were central to the decision to not permit new infrastructure that threatened the river's integrity, highlighting cultural preservation in this case. Scientific analyses have reinforced the basin's ecological significance and the strategic value of environmental water reserves in protecting mega-basins (Salinas-Rodríguez, 2023).

Mexico's water reserve framework blends legal, scientific and cultural approaches to safeguard river connectivity.

Usumacinta River in Mexico bordering Guatemala.
© Sergio Salinas-Rodríguez

Beyond the San Pedro Mezquital and Usumacinta cases, reserves protect flow integrity across ~41,600 km of free-flowing rivers (31 per cent of the national network), linking 39 Ramsar wetlands, 54 federally protected areas, and supporting ~180 freshwater-dependent species (~80 protected; Salinas-Rodríguez & Martínez Pacheco, 2024). Mexico continues to improve monitoring of water reserves, for example, researchers have developed a low-cost remote sensing system to monitor flows in real time, with plans to expand across pilot basins.

Futaleufú and Puelo Rivers: Grassroots campaigns, permanent flow reserves and land conservation

The clear turquoise rivers of the Futaleufú and Puelo Rivers are emblematic of Chilean Patagonia. They serve as a backbone for local communities, supporting water supplies, farming and ranching, and vibrant ecotourism, such as horseback riding, whitewater rafting, kayaking, and fly-fishing—while being deeply woven into the region's cultural identity. Tied to the "cultura gaucha," the rivers tributaries have long provided drinking water, nourished animals, and offered cherished spaces for gathering and summer recreation– places where people have maintained a respectful relationship with the river and its seasonality for generations.

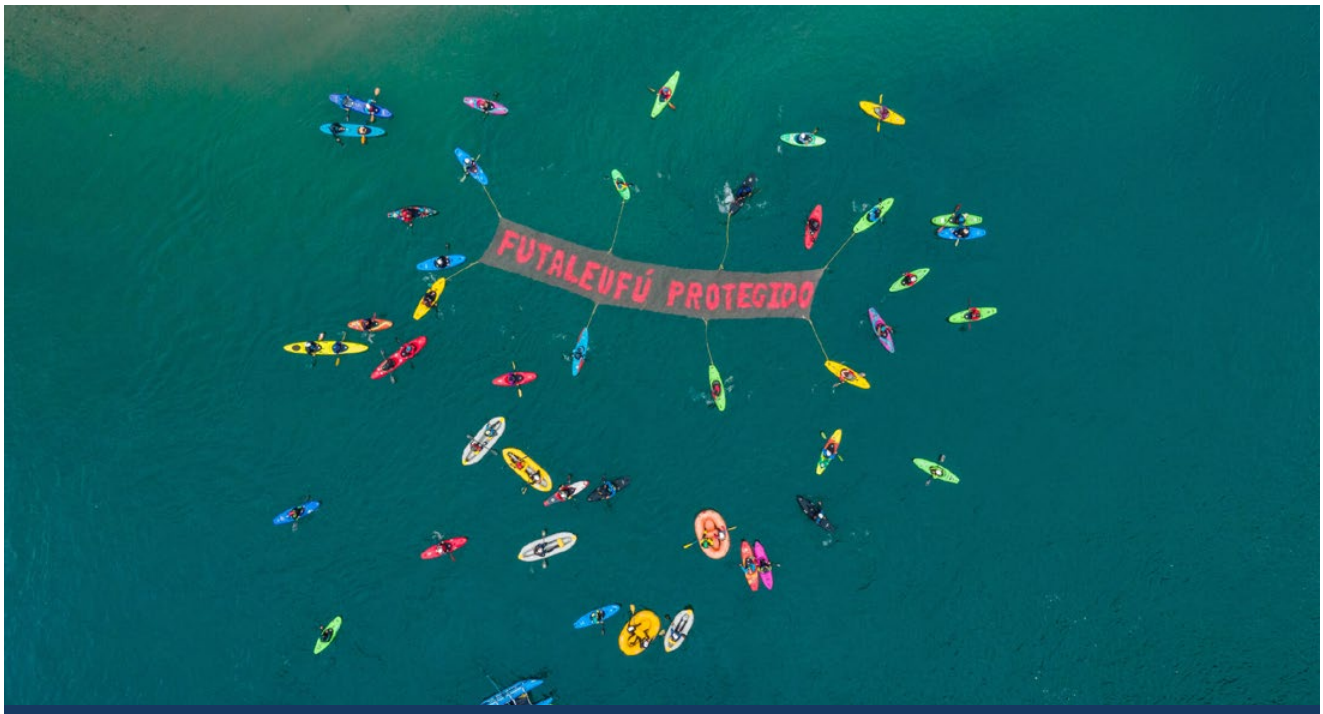
For decades, residents and community-led organisations such as Corporación Puelo Patagonia, Fundación Futaleufú Riverkeeper and NGO Bestias del Sur Salvaje, have mobilised to defend these rivers from large-scale hydropower projects and other extractive pressures that could irreversibly alter their flow, biodiversity, and the way of life they sustain. As part of the Patagonia Without Dams campaign, a movement emerged to raise awareness of the social and environmental costs of new hydropower dams, bringing the issue to communities, financiers and governments in Chile, Argentina and beyond (Blair et al., 2023). Following this regional campaign and coordinated local grassroots movement, in 2016, Endesa hydroelectric company relinquished its water rights and abandoned projects on the Puelo and Futaleufú Rivers. These efforts reflect environmental concern and a deep commitment to protecting the integrity of place, heritage and identity tied to free-flowing rivers.

Following the decision to abandon the hydropower plan, stakeholders mobilised to secure the river as free-flowing. Grassroots campaigns for the Puelo and Futaleufú Rivers emerged, leveraging the reformed Chilean Water Code to establish water flow reserves under a new 'ecosystem preservation' category. These efforts were built in partnership with mayors, regional authorities and public services, with technical support from research centres, civil society and NGOs.

In 2023, under the revised Water Code, the Ministry of Public Works and the National Water Authority issued decrees creating water flow reserves to protect the rivers for their ecological and community value, including ecotourism. A supporting technical report defines monthly water volumes to be reserved (Ministerio de Obras Públicas, Dirección General de Aguas, 2023). To uphold river values, the reserves will maintain approximately 80 per cent of unaltered flows, aligned with the presumptive standard for moderate ecosystem protection, allowing no more than 11–20 per cent daily flow alterations (Richter et al., 2011). The technical process is expected to conclude in 2025, with the reserves maintained as long as the decrees remain in force.

While some river sections overlap with protected areas (biosphere reserves, national reserves and other designations), Chile's decreed water flow reserves are the first to safeguard actual flow – its magnitude and seasonality (Ministry of Public Works, 2023). Conservation efforts continue, including a recent campaign by Puelo Patagonia to acquire and protect Hacienda Puchegüín, a 132,995-hectare parcel spanning a large portion of the Puelo River watershed.

Under Chile's Water Code and the Biodiversity and Protected Areas Service law, three mechanisms can be used to complement land protection by securing instream flows: (1) water flow reserves; (2) converting requested or purchased water rights to in situ or non-extractive rights; and (3) integrating rivers and wetlands into enforceable protected area management plans with clear objectives, standards, indicators and monitoring systems.



Communities and NGOs gather to support protection of the Futaleufú River. © Enoc Mansilla

This case underscores the power of community-led campaigns, paired with legal tools addressing both land and water rights. Protected Rivers, a national coalition, is now working to scale these efforts for rivers prioritised by local communities and ecological needs.

CONCLUSION AND RECOMMENDATIONS

River conservation requires a paradigm shift from conventional area-based land protection to include mechanisms that support ecological processes including flow regimes, sediment transport and aquatic connectivity. Rivers flow through communities and communities depend on them. Inclusive governance, community leadership, intergenerational equity and co-management are key elements for sustaining ecological and social outcomes.

Case studies consistently show that community-led efforts yield powerful, lasting results rooted in local ownership. In Gayini, Indigenous leadership was central, with the return of land rights enabling Traditional Custodians to restore environmental flows and cultural practices. Colombia's Bita River took a multi-stakeholder route, blending scientific input with community voices to secure Ramsar protection through participatory zoning, followed by recognition as an OECM. Mexico's water reserves leaned on legal frameworks to embed traditional values and halt harmful infrastructure, while Chile's grassroots movements leveraged cultural identity and legal reform to protect iconic rivers from hydropower threats. Though the methods varied from co-management and legal advocacy to basin-scale planning, the outcomes converged: enduring ecological resilience rooted in community ownership, cultural continuity and inclusive governance.

Through the summarised technical guidance and cases presented here, six key recommendations emerge to support practitioners and policymakers in closing the gap for river protection:

1. Provide focused conservation attention on rivers. Their condition is central to halting biodiversity loss, ensuring food and water security, and adapting to climate change. Practitioners must work with communities to identify rivers too critical to lose, assess values, threats, and evaluate protections within and beyond PCAs. Land conservation alone is insufficient; integrated land and river protections are essential and a diverse set of models exist.

2. Take direction from, and support, local communities who are already stewarding the rivers they depend on. This includes restoring land, water and resource rights to Traditional Custodians. As in the Gayini case, this should also include opportunities to provide direct and sustainable funding to local communities, which is often a major barrier to effective, equitable and durable protection. The co-development process and FPIC consultation to design, recognise and manage the Nushiño-Curaray-Villano Fluvial System also provides a model. Both this case and the Bita also highlight legal mechanisms for community governance of PCAs.

3. Assess and use the full spectrum of protection mechanisms. Begin with protected area policy to understand whether and how mechanisms provide opportunities for equitable governance, sustain connectivity, flows, water quality and habitat health. Where legal gaps exist, layered policy approaches or advocacy for new legislation may be needed over time. The cases of Gayini, Bita, Puelo and Futaleufú provide strong examples of layering conservation mechanisms with land protection tools, while the Mexico water reserve provides a standalone mechanism for conserving flow, sediment transport and cultural values.

4. In line with 30x30, set national targets for river protection. Globally, 17 per cent of river length flows through, or borders, existing PCAs. Assess the baseline within existing PCAs, and build outwards to set a target that supports effective well-connected networks. Mexico's water reserve framework provides a model for developing a national ambition tailored to rivers and the services they sustain. Rivers are nature's connectors – policy ambitions must reflect their role in linking ecosystems and communities.

5. Use a watershed lens in PCA network, site and connectivity corridor design. Integrated spatial planning across terrestrial, freshwater and marine ecosystems is vital for effective conservation. Site design should reflect ecological processes rather than administrative boundaries, ideally at basin scale and across borders. Freshwater-specific standards must guide management and remain adaptable to changing conditions and improved monitoring. The Bita and Gayini cases provide clear examples of watershed scale planning and site design, both leveraging the tool of zoning within watersheds to support a mosaic of needs ranging from strict conservation to sustainable use. The Bita also innovates on the concept of a connectivity corridor, establishing a management category that applies to both terrestrial and aquatic species.

6. For rivers within PCAs, integrate freshwater objectives into management plans and budgets. Review whether freshwater goals are embedded in management plans. Work with communities to understand their use and values for the rivers within and flowing through the area. The Puelo case highlights how protected area management plans, especially where legally binding, can be used to improve effective management of rivers in PCAs. Updating and resourcing these plans is a strategic entry point and can catalyse partnerships with upstream and downstream actors.

Conserving free-flowing rivers requires dedicated effort and investment, but the ecological returns are profound for freshwater biodiversity, the health of terrestrial and marine ecosystems and the services they provide. Proven models show river conservation is achievable. If the 196 signatories to the Convention on Biological Diversity (CBD) are serious about addressing biodiversity and nature loss, rivers and their stewards must be elevated in the implementation of the 30x30 target and beyond. This can start at the IUCN World Conservation Congress 2025 with the adoption of Motion 018 to advance river conservation globally.

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RESUMEN

Los ríos no son elementos aislados, sino fuentes de vida, y menos de un tercio de los grandes ríos del mundo siguen fluyendo libremente. Proteger los ríos que fluyen libremente requiere honrar a las personas que los sostienen y adoptar la conservación como una práctica compartida y relacional basada en la conexión, la reciprocidad y el cuidado. Los ríos que fluyen libremente favorecen los regímenes de caudal dinámicos, el transporte de sedimentos, la diversidad de especies, la migración y la resiliencia de los paisajes. Proporcionan servicios esenciales como agua limpia, seguridad alimentaria, regulación de inundaciones y valores culturales a millones de personas en todo el mundo. A pesar de su importancia, los ríos siguen estando muy amenazados y poco protegidos. Este documento se basa en las recientes directrices de la Comisión Mundial de Áreas Protegidas de la UICN sobre aguas continentales, en las que se detallan las medidas de protección de los ríos basadas en la comunidad que garantizan los caudales ambientales y la conectividad. Casos innovadores de la Amazonía ecuatoriana, Gayini en Australia, los ríos Puelo y Futaleufú en Chile, el río Bita en Colombia y los ríos San Pedro Mezquital y Usumacinta en México, destacan cómo las comunidades locales han trabajado con socios y gobiernos para establecer áreas protegidas y conservadas que mantienen sus cursos de agua conectados y fluyendo. El documento concluye con enfoques recomendados para elevar el estatus de los ríos y sus administradores en la implementación del objetivo de protección 30x30 y más allá.

RÉSUMÉ

Les rivières ne sont pas des éléments isolés, elles sont des artères vitales, et moins d'un tiers des grands fleuves du monde coulent encore librement. Protéger les rivières à écoulement libre nécessite de rendre hommage aux personnes qui les entretiennent et d'adopter la conservation comme une pratique relationnelle partagée, fondée sur la connexion, la réciprocité et l'attention. Les rivières à écoulement libre favorisent des régimes d'écoulement dynamiques, le transport des sédiments, la diversité des espèces, la migration et la résilience des paysages. Elles fournissent des services essentiels tels que l'eau potable, la sécurité alimentaire, la régulation des crues et des valeurs culturelles à des millions de personnes dans le monde. Malgré leur importance, les rivières restent très menacées et insuffisamment protégées. Cet article s'appuie sur les récentes recommandations de la Commission mondiale des aires protégées de l'UICN concernant les eaux intérieures, qui détaillent les mesures de protection des rivières mises en place par les communautés locales pour garantir les débits environnementaux et la connectivité. Des exemples innovants provenant de l'Amazonie équatorienne, de Gayini en Australie, des fleuves Puelo et Futaleufú au Chili, du fleuve Bita en Colombie et des fleuves San Pedro Mezquital et Usumacinta au Mexique, mettent en évidence la manière dont les communautés locales ont collaboré avec des partenaires et des gouvernements pour établir des zones protégées et conservées qui maintiennent la connectivité et le débit de leurs cours d'eau. Le document se termine par des recommandations d'approches visant à valoriser les rivières et leurs gestionnaires dans la mise en œuvre de l'objectif de protection 30x30 et au-delà.