Convention on Wetlands

Ramsar

Small Wetlands: Their importance and strategies for effective conservation

Background

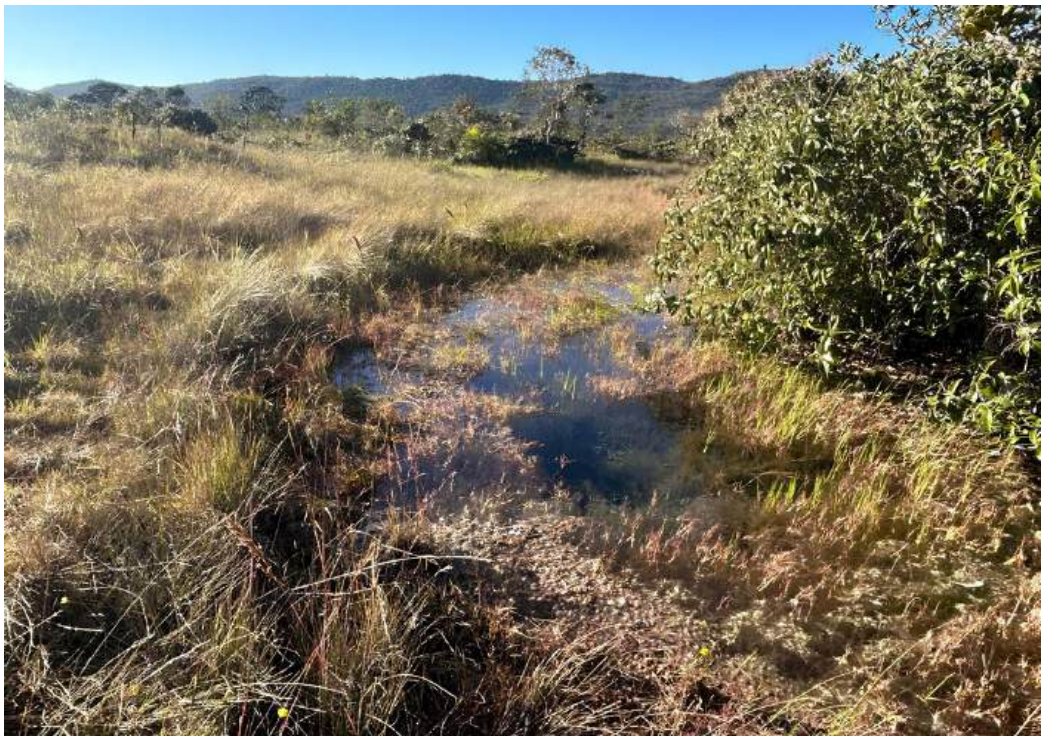
This policy brief has been prepared by the Scientific and Technical Review Panel (STRP) of the Convention on Wetlands in response to Resolution XIV.15 on Enhancing the Conservation and Management of Small Wetlands and Resolution XIII.21 on Conservation and Management of Small Wetlands. It outlines key actions for policymakers and wetland managers to protect, restore and wisely use the vital functions of small wetlands, defined as wetlands smaller than 8 ha.

Small wetlands are often underestimated in terms of their role in maintaining biodiversity, water quality, and ecosystem health. These wetlands, which are defined as wetlands smaller than 8 hectares (ha), support high levels of species diversity, abundance, and ecosystem productivity. While small wetlands are a key example of 'small natural features' (SNFs) – broader category that includes various ecosystems with significant ecological roles that is disproportionate to their abundance and extent in the landscape – their unique characteristics make them particularly sensitive to fluctuating hydrological, climatic, and ecological changes. SNFs, in general, provide resources that sustain critical ecosystem services across regions.

Species dependent on small wetlands have adapted to these conditions. Small wetlands provide ecological goods and services disproportionate to their physical size. They encompass various environments, including small lakes, marshes, oases, rice fields, vernal pools (temporary and permanent), small streams, natural ponds and human-made structures such as fishponds, reservoirs and small dams. Their characteristics vary widely, ranging from permanent to ephemeral, freshwater to hypersaline, and fed by rainwater, groundwater or river water.

Close-Up Shot of Lily Pads.
© Anna Tarazevich

Despite their ecological value, small wetlands face numerous threats that can be more drastic than those faced by large wetlands. Their small size makes them vulnerable to changes in hydrology and ecology, making them more susceptible to invasive species and/or loss from the landscape. This policy brief highlights the importance of conserving and managing these small ecosystems. Drawing on recent scientific findings and international resolutions on small wetlands, it outlines their importance, highlights the threats they face and proposes strategies to ensure their protection for the benefit of associated biodiversity and ecosystem services.



Small wetland with permanent flooding (2 m^2) in the Brazilian savanna (Cerrado), situated in a Murundu Field in Alto Paraíso de Goiás, Goiás State.
© Suelma Ribeiro-Silva

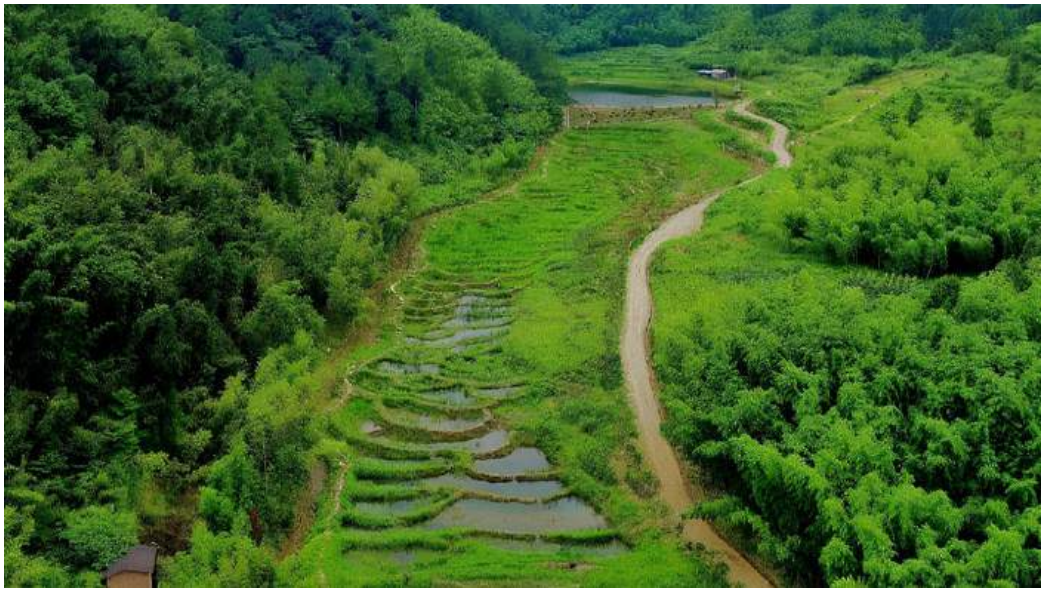
Policy recommendations

- Raise awareness of the critical importance of small wetlands in conserving biodiversity, supporting livelihoods and regulating water resources. Public perception that these wetlands are insignificant can hinder efforts to develop effective policy instruments as well as defining, resourcing and implementing effective management actions. A better understanding of their ecological, cultural and socio-economic importance can build support for their conservation among stakeholders at all levels.
- Improve National Wetland Inventories (NWIs) to capture the extent and condition of small wetlands, particularly in urban, agricultural, and forestry settings, and enhance the use of citizen science and traditional knowledge to monitor and manage these ecosystems effectively.
- Strengthen partnerships between wetland managers, local landowners, conservation organisations, indigenous communities and local government to implement conservation strategies and activities to improve the management of small wetlands.
- Integrate small wetlands into national and local conservation policies and plans and develop tailored restoration, creation and conservation plans. Recognising that small wetlands are often part of a larger watershed, a landscape-scale approach to policy development and conservation is needed that effectively integrates the protection and restoration of functionally linked small wetlands.
- Support the use of appropriate financial incentives, including providing grants or tax breaks to landowners who conserve small wetlands.
- Improve understanding of small wetlands' ecological and hydrological function and their importance for achieving national and global biodiversity, climate and sustainable development goals and targets.

Resolution XIV.15: Enhancing the conservation and management of small wetlands

The small wetlands resolution addresses the need to improve the conservation and management of small wetlands. This resolution recognises their ecological role and advocates for

- **Recognising their importance**: Small wetlands' critical ecological functions, such as water filtration and support for biodiversity and well-being, are recognised in the urban landscape.
- **Developing management plans**: Develop comprehensive plans tailored to the needs of small wetlands.
- **Strengthening legal frameworks**: Integrating small wetlands into national and local policies and legal frameworks.
- **Promoting research**: Supporting participatory research to better understand and monitor small wetlands.
- **Engaging partners and stakeholders**: This includes indigenous peoples, local communities, the private sector, and other local stakeholders, as well as international partners.
- **Securing funding**: Identifying financial resources needed for conservation actions
- **Raising awareness**: Raising public awareness of the importance of small wetlands.



Terrace small wetlands for flood retention and pollution treatment in Liang Ping, Chongqing, Southwest China.
© Lyu Cai

Small wetlands

Why is it essential to preserve them?

Small ponds, marshes, and even artificial structures like fishponds and small dams could be crucial in combating biodiversity loss and climate change.

Less than 8 hectares in size and ecological importance that exceeds their dimensions.

Cost-Effective Solutions

1 hectare of wetland can generate up to **$100,000 per year in ecosystem services**

5-10% Increase in Productivity due to better soil moisture retention and pest control

Can **reduce stormwater runoff by 40%** and pollutants by 90%

50-70% Cheaper Restoration per hectare compared to large-scale projects, thanks to simpler logistics

Threats to Small Wetlands

- **Urbanisation and land conversion**
- **Pollution**
- **Fire**
- **Deforestation and climate change**
- **Lack of recognition in wetland inventories**

Strategies to Protect Small Wetlands

- Public awareness
- Community engagement
- Campaigns and citizen science initiatives
- Participation of local and Indigenous communities
- Promoting research
- Studying their functions and vulnerabilities
- Comprehensive monitoring programs
- Local and National Conservation Policies
- Linking efforts to SDGs and the Ramsar Convention

A Unique Conservation Opportunity

Small wetlands offer a scalable and cost-effective pathway for conservation. Their reduced size allows for localized protection, simplified management, and economical restoration.

For more insights and practical examples, be sure to read our Policy Brief

Ramsar Convention on Wetlands

The issue

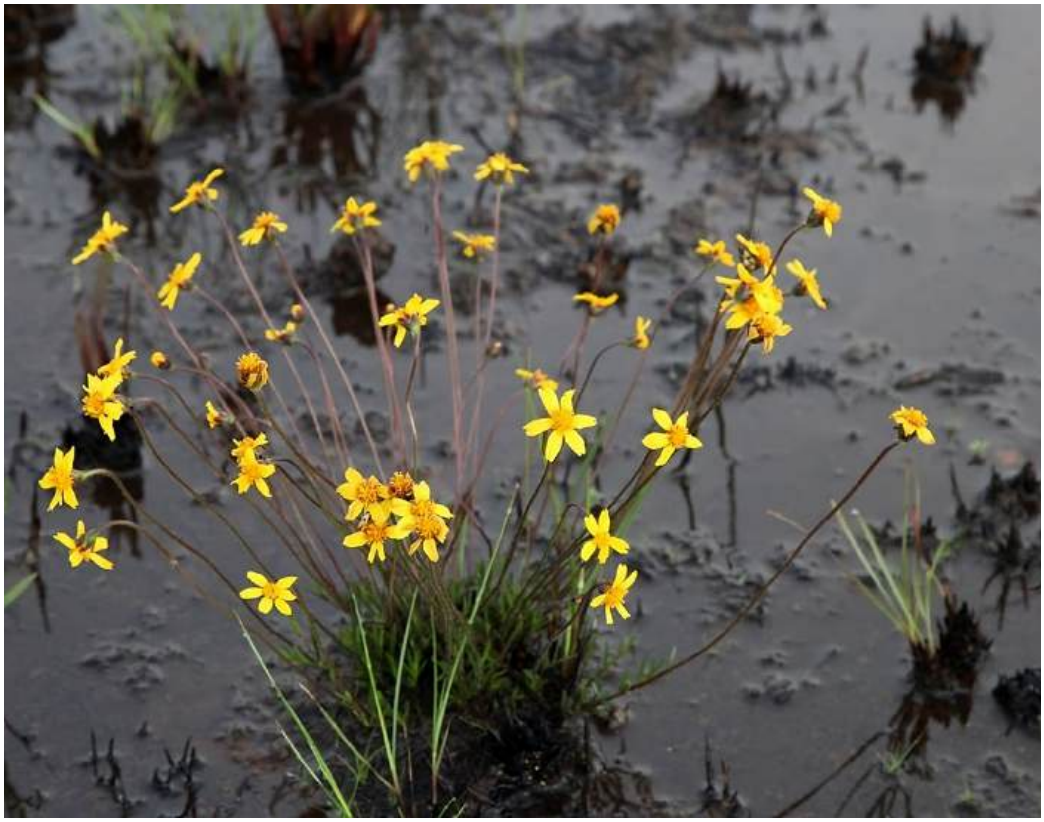
Small wetlands are important for improving well-being, supporting local biodiversity, and enhancing the ecological connectivity of natural areas

Small wetlands provide habitats for many species, including plants, invertebrates, amphibians, reptiles, birds and mammals. By supporting high species richness within a small area, they play a crucial role in global biodiversity, hosting rare and endemic species in all regions of the world, from the Cerrado wetlands of Latin America to the montane peatlands of Oceania. These wetlands, especially those with permanent groundwater systems, can act as refuges or water sources during droughts or periods of low rainfall, helping maintain aquatic and terrestrial biodiversity. Small wetlands also serve as important stopovers for migratory species, such as the potholes of the North American prairies.

Ecologically, small wetlands enhance connectivity by acting as stepping stones within habitat mosaics. They link larger ecosystems, facilitating wildlife movement, species dispersal and the maintenance of genetic diversity. In some contexts, numerous small wetlands form wetlandscapes that support additional emergent and dynamic ecosystem services that a single wetland cannot provide.

Despite their size, small wetlands often account for a significant proportion of the world's total wetland area. In some regions, such as China, national inventories have shown that small wetlands account for a significant proportion of wetland area. Their large numbers and contribution to regional biodiversity and ecosystem services are essential to maintaining the health of larger wetland ecosystems.

In urban areas, small wetlands provide valuable green spaces for recreation and leisure, benefiting residents' mental and physical health and promoting healthier lifestyles.



Endemic and endangered species, *Calea abbreviata* Pruski & Urbatsch (Asteraceae), inhabiting flooded Cerrado areas, Goias state, Brazil.

Small wetlands are essential for water regulation, purification, nutrient uptake, aquifer recharge and mitigation of saltwater intrusion

© Maria Orlova.

Small wetlands act as natural sponges, absorbing excess rainfall and reducing the risk of flooding. They help manage stormwater runoff and mitigate sudden flooding, which is important in local watersheds.

Small wetlands filter pollutants and excess nutrients, reducing eutrophication and improving water quality. Without these wetlands, nutrient-laden runoff could degrade adjacent water bodies and potentially cause toxic algal blooms.

Small wetlands effectively capture and retain nutrients and metals from surface waters. They convert these nutrients into biomass that helps maintain water quality. Species such as *Azolla pinnata* have been shown to be effective at removing nutrients and metals, highlighting the filtration role of wetlands. They also store carbon and can act as natural carbon sequestration sites depending on their hydrological function and carbon dynamics.

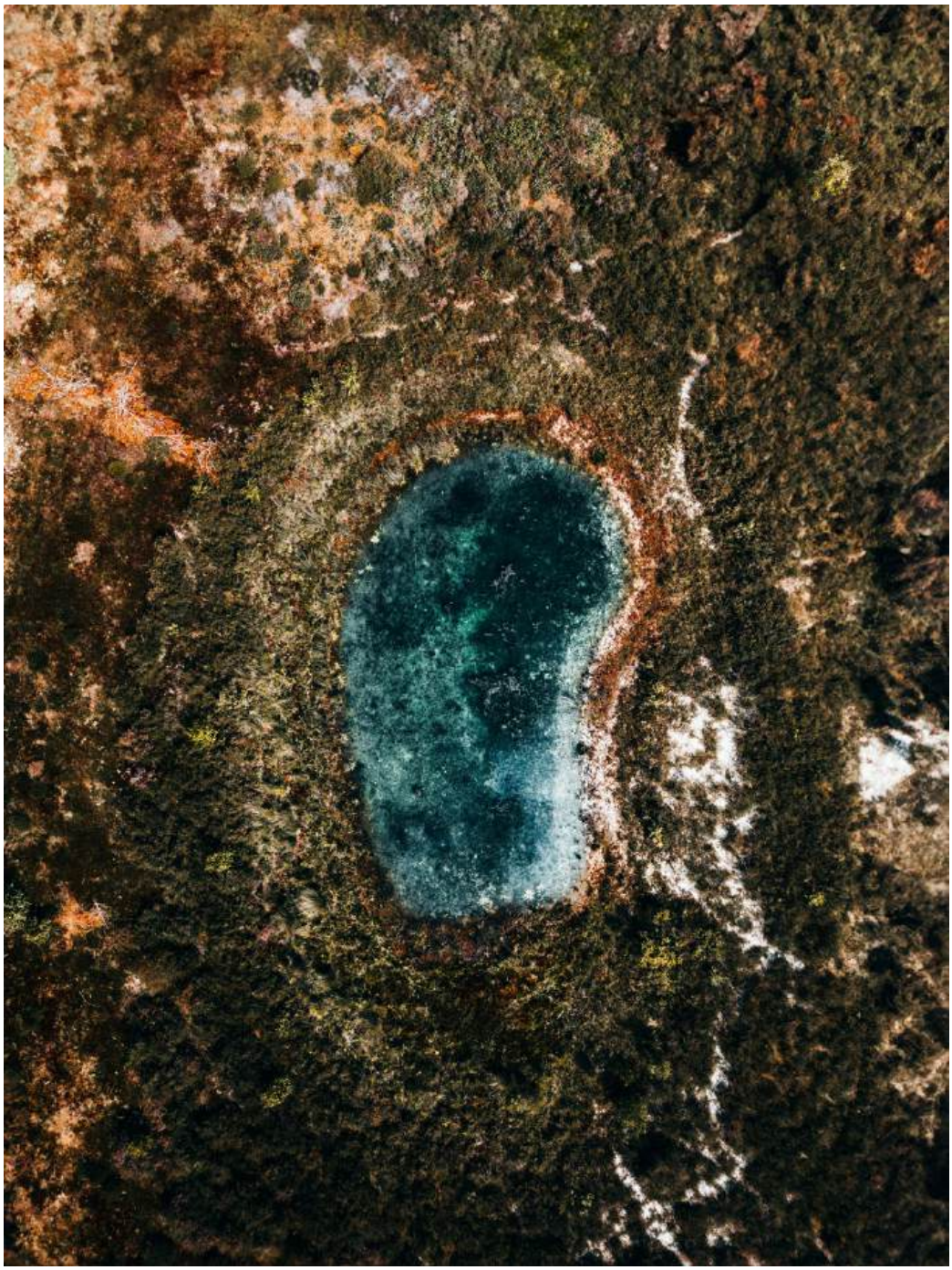
Water percolating through small wetlands contributes to aquifer recharge, supporting the availability of fresh groundwater essential for drinking, agricultural irrigation and healthy ecosystems. Small, permanent systems (such as groundwater discharge-dependent ecosystems) are often sites of high endemism and can preserve ancient species, especially in arid environments that have been disconnected from other wetlands for long periods of time. This process ensures a sustainable water supply for wells and supports the long-term availability of groundwater. By maintaining groundwater levels, small wetlands help mitigate the threat of saltwater intrusion, protecting both drinking water sources and wildlife, such as amphibians.

Small wetlands are overlooked in global conservation policies, leaving them vulnerable to multiple threats

Despite their importance, small wetlands face many threats and can be easily and rapidly drained or degraded by unsustainable land and water development. The main threats to small wetlands are

- Urbanisation and land conversion: The expansion of urban areas and agriculture leads to the destruction, siltation and fragmentation of small wetlands.
- Drainage and water diversion: Draining wetlands for development or water regulation can rapidly lead to the loss and degradation of small wetlands, affecting their ability to support endangered species, including smaller organisms, such as frogs and dragonflies.
- Lack of recognition in wetland inventories: Small wetlands often go unrecognised or unmapped due to the limitations of coarse-scale inventory methods. Many ephemeral wetlands, especially those within forests, are not visible in aerial photographs. This lack of visibility hampers conservation efforts and leaves these critical ecosystems vulnerable to neglect and degradation.
- Pollution: Runoff from agriculture, industry and mining introduces excess nutrients, metals and pollutants that degrade water quality. Because of their size, small wetlands can be severely affected by pollution.
- Climate change: Temperature, precipitation, and wind patterns affect wetland hydrology, groundwater recharge, discharge, and water quality. Small wetlands will be less resilient to climate change because their shallow depth makes them highly susceptible to shifts in surface water temperatures and levels.
- Fire: Fire can severely impact small wetlands by destroying vegetation, altering water quality, increasing soil erosion and disrupting habitats. The ability of these wetlands to recover from fire is often limited, and repeated fires can lead to long-term ecological changes.

- Invasive species: The spread of invasive species can be significant as they outcompete native flora and fauna across the wetland, leading to habitat and biodiversity loss.
- Deforestation: Deforestation in surrounding areas can alter water flow and increase sedimentation in small wetlands, leading to water quality and habitat structure changes. Forestry activities often use heavy machinery that damages the integrity of small wetlands, such as vernal pools.
- Saltwater intrusion: Saltwater intrusion into freshwater wetlands due to reduced freshwater flow degrades small wetlands. For example, the increase in agricultural dams upstream of coastal wetlands can remove a vital water source and contribute to saltwater intrusion.



Milheeze, the Netherlands. © Eline Spee.

Promoting the conservation of small wetlands

The conservation of small wetlands will help address critical ecological challenges, such as biodiversity loss, in cost-effective and practical ways. Small wetland ecosystems, defined as those less than 8 ha, are highly important for biodiversity conservation and the provision of ecosystem services.[1]

Opportunities for effective management of small wetlands include:

Small-scale protected areas and Other Effective Area-based Conservation Measures (OECMs): Small wetlands are inherently easier to protect and manage due to their limited size and localised nature. While conserving a 1-hectare wetland can provide significant ecosystem services – such as flood control and water purification – this value can vary significantly depending on factors such as the geographic location of the wetland, surrounding land use and ecosystem context. For example, in regions where wetlands play a critical role in flood regulation or water quality, protecting small wetlands could generate ecosystem service values of up to $100,000 per year. However, this value is not universally applicable and should be assessed on a case-by-case basis, taking into account the specific ecosystem services provided by the wetland and the challenges associated with protecting it. At the community or municipal level, protecting small wetlands can reduce some of the complexities typically associated with managing larger, multi-jurisdictional ecosystems.

> In the Prairie Pothole Region (USA), a network of small wetlands supports 50% of the continent's migratory waterfowl. Local conservation efforts in this region have effectively balanced land-use pressures with biodiversity conservation, demonstrating how targeted management can deliver large-scale benefits.

Simplified ownership and management: Small wetlands often have clearer ownership structures, which can simplify the implementation of conservation programmes. In the European Union, 70% of wetlands are privately owned, and small wetlands are often managed directly by landowners or local community groups. Programmes such as agri-environmental schemes in countries, such as the Netherlands, have incentivised private landowners to manage small wetlands, restoring over 1,500 ha of wetland habitat since 2000.

> In Uganda, integrating small wetlands into local agricultural policy led to a 20% reduction in wetland encroachment over five years. This was achieved through community involvement and financial incentives to promote sustainable practices.

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1 The Convention on Wetlands sets the upper limit for ponds, a type of small wetland, at 8 ha. However, the definition of "small wetlands" varies significantly across studies. For instance, Blackwell and Pilgrim (2011) consider small wetlands to be typically less than 1 ha in area. Similarly, Semlitsch and Bodie (1998) argued that the ecological significance of wetlands is as small as 0.2 ha.

Integration with other land uses: Small wetlands can coexist with and enhance other land uses, such as agriculture, urban areas and forestry. For example, wetlands in agricultural landscapes have been shown to increase crop yields by 5-10% through improved soil moisture and pest control. In addition, small urban wetlands serve as green infrastructure and can reduce stormwater runoff by 40% and pollutants by 90% in some situations.

> In India, small wetlands, such as rice paddies, have demonstrated dual benefits: they support fish populations while improving water retention for irrigation. This integration supports livelihoods and biodiversity and is an example of a cost-effective management model.
>
> In Kenya, small wetlands in agricultural areas reduce sediment loads in rivers by up to 60%, protecting downstream water resources.

Cost-effective restoration: Small wetlands' smaller size and reduced complexity make restoration more feasible. Due to reduced logistical and technical challenges, restoring small wetlands can cost 50-70% less per hectare than larger wetland projects. For example, restoring a 2-hectare wetland in Canada costs approximately $20,000, whereas restoring a 50-hectare wetland in the same region costs over $1 million, highlighting the financial benefits of smaller-scale wetland restoration projects.

> Small wetlands in the Mediterranean basin support 30% of the region's amphibian species despite covering less than 1% of the land area.

Limitations and further research

The conservation of small wetlands faces several limitations that require further research. Their small size and geographical isolation make it difficult to consider their overall impact on biodiversity, sustainable development and water management. These wetlands are often under-researched compared to larger wetlands, resulting in a significant lack of data. Comprehensive inventories, including mapping, biodiversity and traditional ecological assessments, as well as assessments of ecosystem services, such as carbon sequestration (e.g. CO_2 and CH_4 emissions), are essential to understanding their ecological role and contribution to climate regulation. Innovative technologies, such as remote sensing, are needed to improve the monitoring of small wetlands and provide more accurate data.

The effects of climate change on small wetlands through changing precipitation patterns, rising temperatures and hydrological shifts are still poorly understood. Research on how these changes will affect small wetlands under future climate scenarios is critical to predicting their resilience and potential for adaptation, including impacts from invasive species.

The isolation of small wetlands also limits our understanding of their role in supporting ecosystem connectivity. Small wetlands often serve as important wildlife corridors and contribute to genetic diversity, but their contribution to wider landscape functions is usually unknown.

This policy brief provides recommendations for policymakers on how to include small wetlands in local and national policies and how to increase public awareness and engagement. Further information is needed at local and regional scales to describe the values of small wetlands, including their cultural, educational and socio-economic benefits. Addressing these limitations will help protect these critical ecosystems and support improved policies, conservation programmes and sustainable management.

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Declaration of Interest
The authors declare that they have no conflict of interest regarding the content of this Policy Brief. No financial or personal relationships with other organisations or individuals have influenced the work presented in this Policy Brief.

Further reading

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The Convention on Wetlands

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