GLOBAL WETLAND OUTLOOK 2025

Valuing, conserving, restoring and financing wetlands

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Acronyms and abbreviations

ADB	Asian Development Bank
BAU	Business as usual
CBD	Convention on Biological Diversity
CICES	Common International Classification of Ecosystem Services
COP	Meeting of the Conference of the Contracting Parties (here referring to the Convention on Wetlands)
DAC	Development Assistance Countries
EAAFP	East Asian-Australasian Flyway Partnership
ECSI	Ecological Character State Index
ESVD	Ecosystem Services Valuation Database
FERM	Framework for Ecosystem Restoration Monitoring
GBO	Global Biodiversity Outlook
GBF	Global Biodiversity Framework
GEF	Global Environment Facility
GIS	Geographical information system
GMA	Global Mangrove Alliance
GMW	Global Mangrove Watch
GWO	Global Wetland Outlook
DCs	Developed Countries
Ha	Hectares
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
Int$	International dollars
IUCN	International Union for Conservation of Nature
KM-GBF	Kunming-Montreal Global Biodiversity Framework
LDCs	Least developed countries
LICs	Lower income countries
LMICs	Lower middle-income countries
LPI	Living Planet Index
LULC	Land use and land cover
MPA	Marine protected area
MWO	Mediterranean Wetlands Observatory
NbS	Nature-based solutions
NBSAP	National Biodiversity Strategy and Action Plan
NCA	Natural capital accounting
NDC	Nationally Determined Contributions
NPV	Net present value
OECD	Organisation for Economic Cooperation and Development
OECM	Other effective area-based conservation measure
PES	Payment for ecosystem services
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RFI	Regional Flyways Initiative
SDG	Sustainable Development Goals
SEEA	System of Environmental-Economic Accounting
STRP	Scientific and Technical Review Panel of the Convention on Wetlands
TESSA	Toolkit for Ecosystem Service Assessment
TNC	The Nature Conservancy
UMICs	Upper middle-income countries
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WET Index	Wetland Extent Trends Index
WWS	World Wetlands Survey


Valuing, conserving, restoring and financing wetlands is no longer optional – it is essential to securing the foundations of life on Earth.
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Disclaimer

Foreword

Valuing, conserving, restoring and financing wetlands is no longer optional – it is essential to securing the foundations of life on Earth.

The Global Wetland Outlook Special Edition 2025 sets out a transformative agenda. It emphasises the urgent need to recognise wetlands as valuable natural resources that are crucial for ensuring water and food security, climate stability, biodiversity and community resilience. Despite their immense value, however, wetlands continue to be lost or degraded at an alarming rate, threatening our collective future.

The data presented in this Outlook are sobering. Wetland degradation is widespread across all regions. Millions of hectares have been lost. Many freshwater species remain at risk. The societal costs – from reduced access to clean water and increased vulnerability to disasters to rising emissions – are escalating. The economic value of the wetlands lost in the last 50 years exceeds $5.1 trillion, yet this figure does not fully reflect their intrinsic worth or cultural significance.

While restoration is essential, prevention is more cost-effective. Once degraded, wetlands are expensive and difficult to restore. This is why this Outlook calls for an immediate shift: from reactive responses to proactive policies, from siloed interventions to cross-sector solutions, and from underinvestment to the mobilisation of substantial financial resources.

The Outlook sets out a clear way forward – one that values nature in decision-making, secures wetlands as part of the global water cycle and incorporates innovative financial solutions to unlock a combination of public and private investment. These are not abstract ideas. They are practical and proven, with inspiring case studies from all regions demonstrating what can be achieved when ambition meets action.

As we gather for COP15 under the theme “Protecting Wetlands for Our Common Future”, our task is to conserve what remains, restore what has been lost and invest wisely in the future we want. Wetlands are not a niche concern. They are central to achieving the Kunming-Montreal Global Biodiversity Framework, the Sustainable Development Goals, and a net-zero, climate-resilient world.

The Global Wetland Outlook Special Edition 2025 does more than present the facts – it issues a call to action. A future with thriving wetlands is possible, but only if we act together now.

Musonda Mumba
Secretary General

Hugh Robertson
Chair, Scientific and Technical Review Panel (STRP)

EXECUTIVE SUMMARY

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Understanding the state and value of the world's wetlands

The *Global Wetland Outlook 2025* presents a synthesis of scientific information on the value of the world's wetlands, the costs to society due to wetland loss and degradation and the scale of investment needed to restore wetlands. It is based on the latest publications and data on the extent of inland, coastal and marine wetlands and global databases on the benefits that wetlands provide. Wetlands are vital to water and food security, and human well-being, so recognising the links between global biodiversity, climate, and water targets and wetland conservation and restoration is critical. This report recognizes the barriers to achieving this and describes four pathways to support nature-positive investment in wetland conservation and wise use.

Wetlands cover a significant area of the Earth. Recent global estimates indicate that inland freshwater, coastal, and marine wetland types as defined under the Convention on Wetlands extend over 1,800 million hectares; however, data uncertainty remains due to the gaps in the available data and the differences in the methods used to gather information and report on wetland extent. These challenges are acute when making historical estimates.

Wetlands provide society with up to $39 trillion in benefits each year—but we continue to lose them at a rate of 0.52% annually.

Eleven broad wetland types are evaluated in the Global Wetland Outlook 2025, encompassing: Seagrass, Kelp Forests, Coral Reefs, Estuarine Waters, Salt Marshes, Mangroves, Tidal Flats, Lakes, Rivers and Streams, Inland Marshes and Swamps, and Peatlands (Mires).

Wetland loss continues. Documented wetland loss has occurred for all natural wetland types since 1970. The average rate of wetland loss was -0.52% per annum (ranging from -1.80% to -0.01%, depending on wetland type). Millions of hectares (ha) of wetlands have been lost due to land use change. For example, an estimated 177 million ha of Inland marshes and swamps have been lost since 1970.

Wetland degradation is widespread. Both reporting by Contracting Parties to the Convention on Wetlands and the World Wetland Survey (WWS) indicate there is ongoing deterioration in the ecological character of wetlands in most regions and globally. Rates of degradation vary over time and by region as a function of factors such as development and land use change. Recently, wetland declines are notable in Latin America, the Caribbean, and Africa, however, the extent of degradation also increased in Europe, North America, and Oceania.

People gain substantial benefits from wetlands. They provide food for people, are integrated with and help regulate the global water cycle, remove water pollutants, protect local communities from natural disasters, and store carbon, supporting the world's climate system. This *Global Wetland Outlook* extracted more than 1,500 value estimates from the Ecosystem Services Valuation Database, synthesising published information on regulating, provisioning, and cultural services.

Wetlands are a high-value resource and an asset to society. When we degrade or destroy wetlands, we reduce the ecosystem services and benefits they provide to people. The 1,425 million ha of remaining wetlands (across the 11 wetland types assessed) give an estimated $7.98 trillion (median 2023 Int$) to $39.01 trillion (mean 2023 Int$) benefits to people, every year. If all remaining wetlands are effectively managed until 2050, they will provide a net present value (NPV) greater than $205.25 trillion (median 2023 Int$) over this time period.

Estimates of the values of wetlands remain limited; more research is needed. There are limitations in economic valuation due to a lack of data for some wetland types, limited information on wetland degradation, and inadequate consideration of the intrinsic values of wetlands to local communities and Indigenous peoples. The economic losses are huge, but they don't capture the profound intrinsic values of wetlands – their worth simply by existing as living systems. Even so, consolidating knowledge on wetland value helps policymakers understand nature's contributions to people.

The Convention's strategic goals align with the Kunming-Montreal Global Biodiversity Framework (KM-GBF) Targets to restore at least 30% of all degraded ecosystems (Target 2) and conserve at least 30% of land, waters, and seas (Target 3). Wetland restoration and conservation can contribute to all 23 targets of the KM-GBF and are equally important for the objectives of the UN Framework Convention on Climate Change (UNFCCC) to reduce and stabilise greenhouse gas emissions, and to meet many Sustainable Development Goals (SDGs) including Target 6.6 to protect and restore water-related ecosystems. These goals also contribute to the Freshwater Challenge and its targets for wetland restoration and protection of freshwater ecosystems.

We need to enable restoration of 123 million ha of wetlands to restore 30% of lost wetlands and achieve Target 2 of the KM-GBF based on the area of wetlands transformed to agriculture and other land uses since 1970, for the 11 wetland types evaluated. This is likely an underestimate since it excludes the efforts needed to restore degraded wetlands with a deteriorated ecological character (potentially bringing the target to >350 million ha).

To achieve Target 3 of the KM-GBF, **we need to effectively manage approximately 428 million ha of wetlands within protected areas or other effective area-based conservation measures (OECMs).** This will meet the goal of the KM-GBF to conserve at least 30% of the remaining wetlands, based on the extent of the 11 wetland types evaluated, while recognising that the wise use of all remaining wetlands is critical.

Conservation of healthy and functioning wetlands is cheaper than restoration. Less investment is required to conserve existing wetlands than to remediate and address adverse impacts that have altered the ecological character of wetlands. Average costs for restoring wetlands can range from $1,000 per hectare (per annum, Int$) to over $70,000 per hectare.

The global financing gap for wetlands is immense. Achieving effective conservation and restoration of the world's wetlands, covering at least 550 million ha (to restore at least 123 million ha, and conserve at least 428 million ha), will require significant resource mobilisation. Current estimates show that biodiversity conservation funding accounts for just 0.25% of global GDP, highlighting the significant underinvestment in nature, including wetlands.

To conserve and restore at least 550 million hectares of wetlands, resource mobilization must scale up dramatically.

Pathways for conservation and wise use of wetlands

Integrate natural capital valuation in decision-making (Pathway 1). Many wetland ecosystem services are public goods that markets typically overlook. This undervaluation contributes to degradation. However, scientific advances, including the IPBES values assessment, now offer a wide range of tools to capture nature's diverse values.

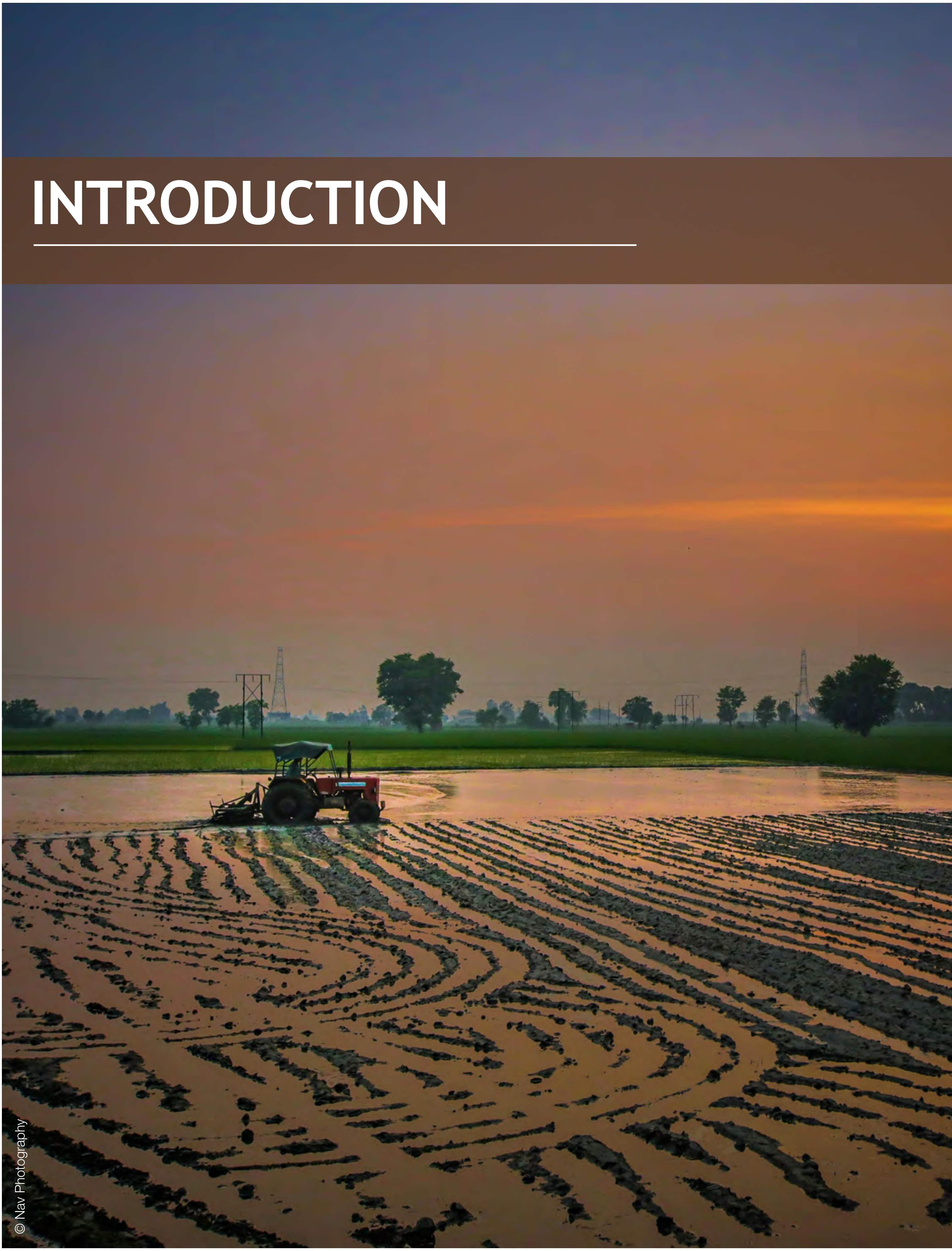
Recognise that wetlands are critical components of the global hydrological cycle for all people (Pathway 2). They are not just local ecosystems but are integral to the global water cycle, influencing how water flows across landscapes and supports nature and its contributions to people. We must recognise and appropriately value wetlands and their role in addressing the interlinked climate, biodiversity, and water crises.

Embed wetlands in innovative financial solutions for nature and people (Pathway 3). Meeting global biodiversity and wetland conservation targets will require innovative financial investments. Wetlands must be incorporated into financing mechanisms like those under the KM-GBF, which aims to mobilise billions annually. Various financial tools – green and blue bonds, biodiversity credits, results-based financing, and debt-for-nature swaps – can be leveraged to fund wetland protection and restoration.

Unlock a private and public mix of financing to invest in wetlands as nature-based solutions (Pathway 4). Wetlands face continued threats from unsustainable economic activities, yet they also present a significant opportunity for investment in nature-based solutions (NbS). A mix of financing can create demand for wetland-friendly investments. Support and encouragement to build capacity and establish long-term NbS strategies are critical to scale up investments that set wetlands into global environmental and financial systems.

The *Global Wetland Outlook* 2025 calls for immediate action from policymakers, businesses, and society. Wetland degradation costs governments, industries, and communities, and compromises global efforts to preserve biodiversity, address climate change, and ensure human well-being. Achieving this requires strong political will, public support, and will require significant resource mobilization. There is an urgent need to boost funding for nature.

INTRODUCTION



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Wetlands in a changing world

The scale of wetland loss and degradation remains a global concern. Wetland decline affects people's livelihoods and wellbeing, disrupts the climate system, reduces the availability of water resources, increases local communities' susceptibility to natural disasters, and causes the loss of species and ecosystems.

The Global Wetland Outlook 2018 set the scene, summarising knowledge of the state and trends of the world's wetland ecosystems. It confirmed that many indicators of wetland health were in decline for many regions. The Global Wetland Outlook 2021 Special Edition focused on a nexus of three critical issues: a climate emergency, a global ecological crisis including catastrophic biodiversity loss, and a need for transformative societal change.

Further global assessments have since been published, including the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report,[1] the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) assessment of Underlying Causes of Biodiversity Loss and the Determinants of Transformative Change and Options for Achieving the 2050 Vision for Biodiversity (Transformative Change)[2] and the IPBES assessment of Interlinkages among Biodiversity, Water, Food and Health (Nexus Assessment)[3]. Collectively, they present common messages of the linkages between nature, people, well-being, water and climate, and the need to recognise the multiple values of nature in decision-making.

The Kunming-Montreal Global Biodiversity Framework (KM-GBF) sets the targets necessary to support a sustainable future on Earth. Wetlands are integral to the KM-GBF, and its targets align with the mission of the Convention on Wetlands. However, better pathways are needed to effectively upscale action for wetlands. National Reports submitted by Contracting Parties indicate that only a few are implementing wetland restoration projects at scale (Box 1), indicating limited progress towards the 30% restoration target. The declaration of the UN Decade on Ecosystem Restoration and related initiatives such as the Freshwater Challenge, a country-led programme aiming to restore 350 million ha of wetlands and 300,000 km of degraded rivers by 2030, and Mangrove Breakthrough, which aims to secure 15 million hectares of mangroves globally by 2030, provide grounds for optimism. Fifty countries and the European Union have already joined the Freshwater Challenge.

The scale of wetland loss and degradation remains a global concern-with far-reaching consequences for people and nature.

Valuing nature, unlocking resources for conservation and restoration, and monitoring progress towards climate, biodiversity, and the Sustainable Development Goals (SDGs) is a priority for the Convention on Wetlands and other multilateral environmental processes at international, national and local levels. Including, for example, through the System of Environmental-Economic Accounting (SEEA) that enables countries to measure their natural capital and understand the immense contributions of wetlands to our prosperity.

BOX 1: **ASSESSMENT OF PROGRESS ON WETLAND RESTORATION**

The Secretariat of the Convention on Wetlands conducted the first global assessment of progress on wetland restoration. The assessment, prepared with input from the Scientific and Technical Review Panel of the Convention on Wetlands (STRP) and international partners, confirmed the urgent need for restoration.

Encouragingly, restoration activity is under way in most Contracting Parties. National reports to COP15 showed that 74% of countries are engaged in wetland restoration to some extent, 66% have national targets in place, and over 70% have identified priority sites. However, progress is uneven, and only a limited number of countries are implementing restoration at sufficient scale or with robust monitoring systems. For instance, since COP13, less than 10% of countries have implemented restoration projects.

Global commitments to wetland restoration are increasing. More than 44 million ha of wetlands have been pledged for restoration by 20 countries through the UN Environment Programmes' (UNEP) Framework for Ecosystem Restoration Monitoring. However, the total area committed remains well below the estimated area requiring restoration globally.

For more information, see the Convention on Wetlands assessment of progress on wetland restoration (information document COP15 Inf.3)[4].

Figure 1
Peat bog being restored in Scotland to create a more moisture rich blanket bog and remove invasive species.

This Global Wetland Outlook 2025 provides:

Synthesis of scientific and technical information on:
- the extent of wetland loss and degradation;
- the costs to society from the loss of wetlands and their ecosystems services; and
- the scale of investment required to restore wetlands, avoid further wetland loss and degradation, and sustainably manage existing wetlands.

Guidance and recommendations on:
- priorities for conservation and restoration; and
- pathways to bridge the financing gap, including innovative financial and policy mechanisms.

Section 1 of the Global Wetland Outlook 2025 provides updated information on wetlands' extent, loss and degradation. Section 2 describes wetlands' benefits to people, in terms of the economic value of the ecosystem services that they provide, and the economic costs arising from wetland loss and degradation over the past 50 years. Section 3 considers the global targets for wetland conservation and restoration, outlining the spatial scale of effort required and the financing gap. Section 4 turns to responses, describing pathways to bridge the financing gap, to enhance investment in conservation, restoration and wise use, and reduce activities that adversely impact nature and people. Lastly, Section 5 provides a synthesis of the 2025 GWO, outlining urgent actions for the Convention on Wetlands.

GWO 2025 provides a roadmap for action—linking data, economics, policy, and practice to restore the world's wetlands.

Similar to previous GWOs, it relies on published information and global databases to synthesise the most up-to-date information presently available. Supplementary information is presented in a series of Technical Notes, with background information on the data and information sources applied in Sections 1-3[5]. In each section of the Global Wetland Outlook 2025, it is noted where scientific uncertainty limits the conclusions that can be drawn. Data and information sources are often incomplete, and the limitations must be acknowledged while understanding the urgency of the biodiversity and climate crises and the need to use available knowledge to support effective decision-making and wetland management.

Case studies are presented from all regions of the world and for a broad range of wetland types. These summarise projects and initiatives to value wetlands, evaluate the wetland restoration financing challenge, implement cross-sector approaches to restore and conserve wetlands, and apply new technology, including Earth observation. Our thanks to all contributors who provided case studies and shared real-world examples for the benefit of others faced with the challenge of addressing wetland loss and degradation.

1. WETLAND LOSS AND DEGRADATION

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Extent of wetland loss and degradation

Wetland extent

The two previous Global Wetland Outlooks, in 2018 and 2021, reported respectively that global wetland extent was in excess of 1,210 million ha and between 1,500 to 1,600 million ha[8],[9]. It was also noted that although estimated areas of global wetland extent have increased, this is largely due to improvements in mapping methods and the inclusion of data on more types of wetlands and should not be viewed as a real increase in the area of wetlands[10].

Recent estimates of global wetland extent include those of Lehner et al.[11], which indicates the global wetland extent to be 1,819 million ha as a maximum, and Fluet-Chouinard et al.[6], which records 1,240 million ha as a minimum for the extent of global inland waters. Lehner et al.[11] reported that previous estimates determined from the literature are up to 3,050 million ha, indicating variation in international assessments. Despite gradual improvements, mapping and delineating wetlands using Earth observation remains challenging due to their inherently high spatio-temporal dynamics and sometimes elusive and spectrally ambiguous nature. Consequently, determining the extent of global wetlands remains incomplete. Complete global datasets are particularly lacking for many intertidal and submerged habitats, such as eelgrass. Similarly, forested wetlands are often difficult to delineate accurately as the overlying canopy cover masks inundation extent from optical sensors, necessitating the use of suitable radar data sources. While Earth observation progressively improves our understanding and provides near real-time mapping capabilities for some wetland types and increasingly smaller wetlands, current studies likely underestimate the true global wetland extent[12]..

Determining trends in wetland extent is also complicated, as comparisons among previous studies are complex. Habitat mapping often applies different Earth observation and mapping datasets and different wetland classifications, where wetland types overlap or are not clearly defined. Some have included human-made wetlands or concentrated solely on natural wetlands.

Despite the complexity in providing an estimate of global wetland extent, the most recent studies have been reviewed to produce current estimates for natural wetland types, where data are available (Table 1) as a basis for estimating the worth of their ecosystem services. Several wetland types in the detailed Convention on Wetlands' Classification System of Wetland Types were not included due to the absence of global data on their ecosystem services (see section 2). Wetland types absent from this analysis include permanent shallow marine waters, rocky marine shores, sand, shingle or

BOX 2: DEFINITIONS OF WETLAND LOSS AND DEGRADATION

Wetland loss is the reduction in the space where water is available and of sufficient quality for wetland species (and sub-species) to shelter, feed, rest, and reproduce, caused by human activities that significantly alter the ecological character of the wetland. Wetland loss is caused by converting natural wetlands to other land uses, for example, agriculture, aquaculture, forestry, urbanisation, industrialisation, and increasingly for recreational activities.[6]

Wetland degradation is the alteration of an existing or intact wetland resulting in a simplification or disruption in its ecological character and, in turn, a decline in wetland typical biodiversity, ecological processes, or ecosystem services[7].

It is noted that natural wetlands have sometimes been lost by being converted to artificial wetlands with controlled water levels (for example, for irrigated rice, salinas, cranberry production or aquaculture).

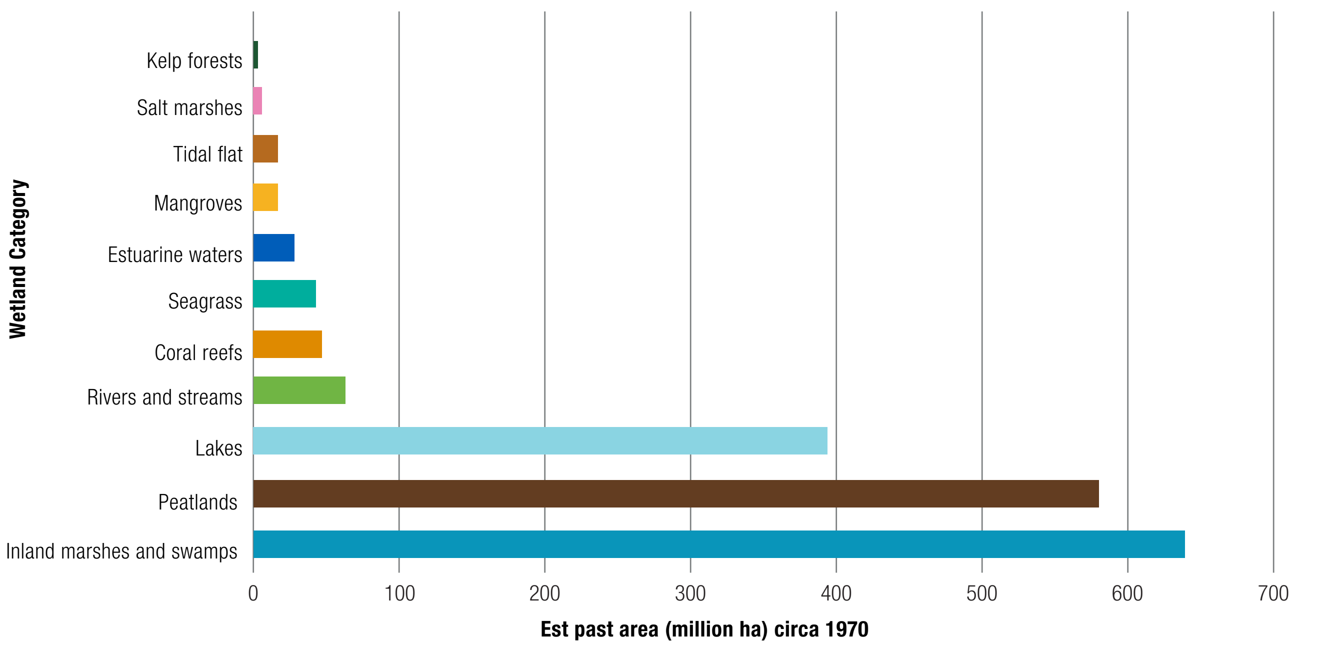
Wetland category	Area (million ha) estimate	Estimation method	Source
Seagrass	35.88	Compilation of existing spatial databases and satellite	UNEP-WCMC [13] (31.4 million ha) + newly found Bahamas seagrass extent (46.8 million ha) Blume et al [14]
Kelp Forests	1.71	Satellite	Mora-Soto et al [15]
Coral Reefs	34.84	Satellite	Allen Coral Atlas [16], Lyons et al [17]
Estuarine Waters	27.87	Compilation of existing spatial databases	Lehner et al [11]
Salt Marshes	5.29	Satellite	Worthington et al [18]
Mangroves	15.11	Satellite	Global Mangrove Watch v4 [19]
Tidal Flat	12.79	Satellite	Murray et al [20]
Lakes	271.53	Compilation of existing spatial databases	Lehner et al [11]
Rivers and Streams	58.93	Compilation of existing spatial databases	Lehner et al [11]
Inland marshes and swamps	461.65	Compilation of existing spatial databases	Lehner et al [11] (Mid-point of range presented: 205.30 – 718.00)
Peatlands	500.00	Compilation of existing spatial databases	Global Peatland Assessment 2022 [21]
Total (million ha)	**1,425.60**		

Table 1
Global extent of wetland types used to assess the worth of wetland ecosystem services.

pebble shores, groundwater systems, permanent inland deltas, alpine wetlands, and tundra wetlands. Given a lack of area data for some key habitats, the estimates of total global wetland area from these data are not possible, so the wetland extent of 1,425.60 million ha, stated in Table 1, should be considered an underestimate of the global area of all wetlands. It should also be noted that when the author has stated a range, mid-range values have been used for convenience, but it is recognised that mid-range values may be supporting an inaccurate or inappropriately included estimate from the published study.

It is anticipated that initiatives like the Global Wetland Watch[19], a new system for globally mapping and monitoring changes to wetland ecosystems, will generate near real-time Earth observation data, at national and ecosystem scales down to a 10-metre resolution, and fill many of the wetland extent data gaps. Existing initiatives like Global

Figure 2
Estimated historic wetland area of 11 wetland types circa 1970.



Mangrove Watch already demonstrate the value of focused monitoring for crucial wetland types. There is also a need for more detailed, region-specific data collection, particularly for underrepresented wetland types as part of the development of national wetland inventories. Earth observation data and national mapping for specific wetland types not included in the global datasets will support country commitments under the 2030 Agenda for Sustainable Development, the KM-GBF, and those for the Convention on Wetlands.

Trends in wetland loss and degradation

Historical trends in wetland area

A synthesis of published data was undertaken to provide an assessment of historical wetland area (Figure 2). Differences in loss estimates are observed due to the use of different data sources and poor spatial and temporal data coverage for some regions.[22] Only studies estimating change from approximately 1970 and later were considered for this analysis, to constrain data to a common time period, but more investigation is needed to provide a robust analysis of historical trend, including how the rate of change may have varied throughout this time period. Total percentage area changes were divided by the number of years to find annual rates of change (per cent per year). The current wetland area estimates were multiplied by these annual rates times 50 years to back-calculate the wetland area in 1970 (Table 2). It was assumed that the current wetland area estimates represented 2020, as most of the published imagery sources data were from no later than that year.

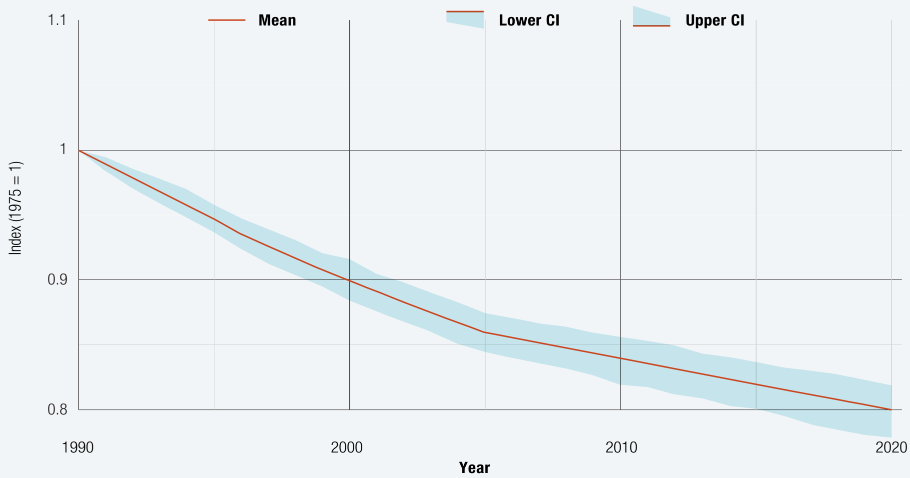
Table 2
Annual rates of wetland loss and estimated decline in natural wetland area since c. 1970.

Wetland Category	Average Change Rate (percentage per year)	Minimum past change rate (percentage per year)	Maximum past change rate (percentage per year)	Estimated change (million ha) since 1970	Estimated past area (million ha) circa 1970	Rate source
Seagrass	-0.39	-0.14	-0.63	-6.975	42.856	WET Index, Dunic et al. [23]
Kelp forests	-1.85	-1.40	-2.30	-1.584	3.293	Krumhansl et al. [24]
Coral reefs	-0.72	0.06	-1.50	-12.504	47.34	WET Index, Souter et al. [25]
Estuarine waters	-0.01	0.00	-0.01	-0.084	27.954	WET Index, Jung et al. [26]
Tidal flats	-0.60	-0.60	-0.60	-3.863	16.655	WET Index.
Salt marshes	-0.33	-0.14	-0.52	-0.862	6.150	WET Index, Cambpell et al. [27]
Mangroves	-0.27	-0.20	-0.41	-2.019	17.131	WET Index, Richards et al. [28], Bunting et al. [29].
Rivers and streams	-0.13	-0.13	-0.13	-3.726	62.656	WET Index.
Lakes	-0.90	-0.90	-0.90	-122.847	394.377	WET Index.
Inland marshes and swamps	-0.77	-0.61	-0.92	-177.001	638.651	WET Index, Davidson et al. [30]
Peatlands	-0.32	-0.05	-0.59	-80.037	580.037	WET Index, Joosten et al. [31]
Total				**-411.502**	**1,837.1**	

CASE STUDY 1. EVALUATING EFFORTS NEEDED FOR WETLAND RESTORATION IN THE MEDITERRANEAN REGION

A recent update to the WET Index, a method developed by the UNEP World Conservation Monitoring Centre and the Convention on Wetlands Secretariat that transposes the Living Planet Index (LPI) for biodiversity into wetland surface area trends, reveals a continued downward trend in natural wetland extent across the Mediterranean Basin. The WET Index represents the regional average rate of changes in wetland surface areas, combining changes from different wetland types and subregions using weighted averages, with the year 1990 or 1975 as the reference point. It requires at least two surface area measurements for the same sites at different dates and has the advantage of accommodating datasets of varying durations between sites, a common reality that complicates straightforward loss-rate calculations. To avoid overrepresentation of better-monitored subregions or wetland types, the method applies a weighting mechanism: the geometric mean of loss rates is calculated for all sites within each subregion and wetland type (e.g., Maghreb x Coastal lagoons), and then the average of these pairs is computed to produce the WET Index for the entire sample. It is important to note that the WET Index reflects the changes in the monitored wetlands but does not necessarily indicate the total change for each subregion. With the integration of data from over 40 new sites from the Mediterranean Wetlands Observatory (MWO) database and an extension of the series up to 2020, the assessment, which now covers more than 440 sites, estimates an average loss of natural wetlands between 1990 and 2020 at -20% (95% confidence interval: -22% to -17%). This decline highlights the growing pressures from urban expansion, agricultural development, water extraction, and climate change, leading to fragmentation and degradation of these crucial ecosystems. The findings emphasize the urgent need for stronger conservation measures, sustainable management practices, restoration and regional cooperation to protect wetlands that are vital for biodiversity, climate resilience, and water security in the Mediterranean basin.

For further information, see https://medwet.org/observatory/



The Mediterranean region has lost 20% of its monitored natural wetlands since 1990.

Figure 3
Mediterranean WET Index 1990-2020.

The analysis indicates a loss of area for all natural wetland types since 1970. The average proportional change in area was -0.52% annually, ranging from -1.80% to -0.01% yr^{-1}, depending on wetland type (Table 2). The data suggest that estuaries had the slowest rates of change while kelp forests had the most rapid rates of decline.

Trends in wetland degradation

The 2021 GWO reported on three assessments describing the ecological character of remaining wetlands. The first examined the qualitative reporting from Contracting Parties to the Convention on Wetlands in National Reports submitted in 2011 to COP11, 2014 to COP12, and 2017 to COP13.[32] Two further assessments reported on the qualitative "citizen-science" state of wetlands surveys (World Wetlands Survey (WWS)) carried out in 2017 and 2020. Here, these assessments are updated with the inclusion of results from Contracting Parties' National Reports to COP14 (submitted in 2021) and results from a third "citizen-science" survey (WWS) conducted in 2024[33],[34].

Two measures of the ecological character of wetlands can be derived from these reports:

- **Current state of wetlands** (good, fair, poor) from the WWS only, and
- **Change in the state of wetlands** (improving, not changing, deteriorating) over a recent time period and trends in the reported change in state over more than one time period, from both National Reports and WWS.

These reports reinforced the picture of continuing global wetland decline, particularly in the condition of wetlands that are already in a poor state. The results from both analyses indicate that respondents report more widespread deterioration in the wetland state than improvements.

Current state of wetlands

More than 500 respondents reported on specific wetlands to the 2017 and 2020 WWS, and more than 400 respondents reported in the 2024 survey. The Ecological Character State Index (ECSI) measures the relative frequency of reports of positive and negative state or trends in the state of wetlands. The ECSI range is from +1 (all positive) to -1 (all negative) (see Technical Note).[1]

All WWS reported that more wetlands are in a "good" state than in a "poor" state, and that the percentage of wetlands in "good" state increased slightly from 2017 (30.2%), to 2020 (32.5%) and 2024 (37.3%) (Figure 4). The percentage of wetlands reported as being in "poor" state was similar over this period, at over one-fifth (22.6–24.2%) of reports.

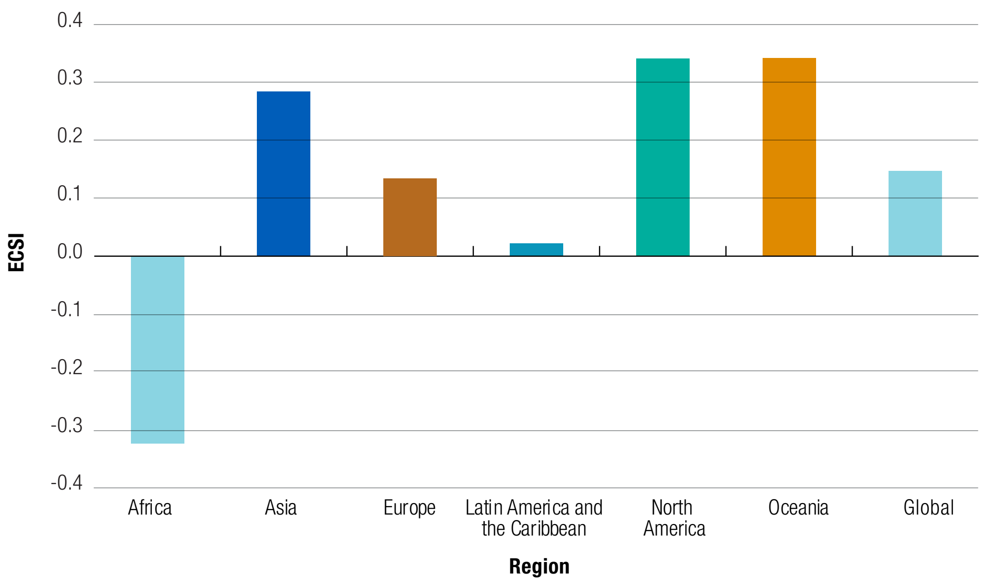


Figure 4
The current state of wetland ecological character in different regions as reported in 2024. Source: World Wetlands Survey 2024[35].

1 Technical Notes are available here: https://www.global-wetland-outlook.ramsar.org.

There are considerable differences in the current state of wetlands between the Convention on Wetlands regions (Figure 2). More wetlands are reported as being in "good" than "poor" states in Asia, Europe, North America, and Oceania. However, in Africa, considerably more wetlands are reported as being in "poor" than "good" states (Figure 4).

Globally, Contracting Parties have reported a similar pattern of ongoing and widespread deterioration in the ecological character state of wetlands between 2011 and 2021, as well as of Wetlands of International Importance. However, deterioration has generally continued to be more widespread in wetlands as a whole than in Wetlands of International Importance.

Wetland deterioration has increased in five of six regions since 2011.

Comprehensive national data on wetland degradation is limited but one such assessment from the United States, based on the single indicator of non-native plant communities, illustrated a similar pattern to the WWS global data in that 48% of wetland area was reported to be in good condition, while 24% was rated poor or very poor[30].

Change in the state of wetlands

Analysis of National Reports demonstrates the percentage of countries reporting deterioration in the state of wetlands increased from 2011 to 2021, from 31.8% of countries reporting a decline in 2011, to 41.5% in 2021. Conversely, the percentage of countries reporting improvement in the state of wetlands decreased from 2011 to 2021, from 22.7% of countries reporting in 2011 to 14.4% in 2021.

Similarly, the percentage of countries reporting deterioration in the state of Wetlands of International Importance increased slightly from 2011 to 2021, from 18.0% of countries reporting in 2011 to 19.5% in 2021. The percentage of countries reporting improvement in the state of their Wetlands of International Importance decreased from 2011 to 2021, from 31.2% of countries reporting in 2011, to 20.3% in 2021. This lack of progress represents a concerning trend and indicates a challenge ahead to meet the Goals of the Convention's Strategic Plan. It indicates that the wetlands reported as in poor current condition have continued to deteriorate over the national reporting period from 2011 to 2021.

Regionally, Contracting Parties from all six regions reported more wetland deterioration than improvement. On average, deterioration was most widespread in Africa (ECSI = -0.346) and Asia (ECSI = -0.247). There was also considerable deterioration reported for North America and Oceania, but the number of reports was small. Deterioration was less widespread in Europe (average ECSI = -0.177) and Latin America and the Caribbean (average ECSI = -0.217). There was increasingly widespread deterioration from 2011 to 2021 reported from five of the six regions, with only Asia reporting less widespread deterioration of their wetland ecosystems.

The condition of Wetlands of International Importance is similarly on a declining trajectory at a regional level. Five regions reported increasing deterioration of Wetlands of International Importance for 2011-2021, with little change reported for Asia.

The 2024 WWS reported increasingly widespread deterioration in wetland ecological character in most regions, and globally, since 2017 (Figure 5). Such increasing deterioration is particularly high in Latin America and the Caribbean, and Africa, but the extent of deterioration has also increased in Europe, North America and Oceania (Figure 5). In contrast, there was a slight reduction in the extent of wetland deterioration reported in Asia, with several countries increasing efforts to halt deterioration and restore wetlands[36].

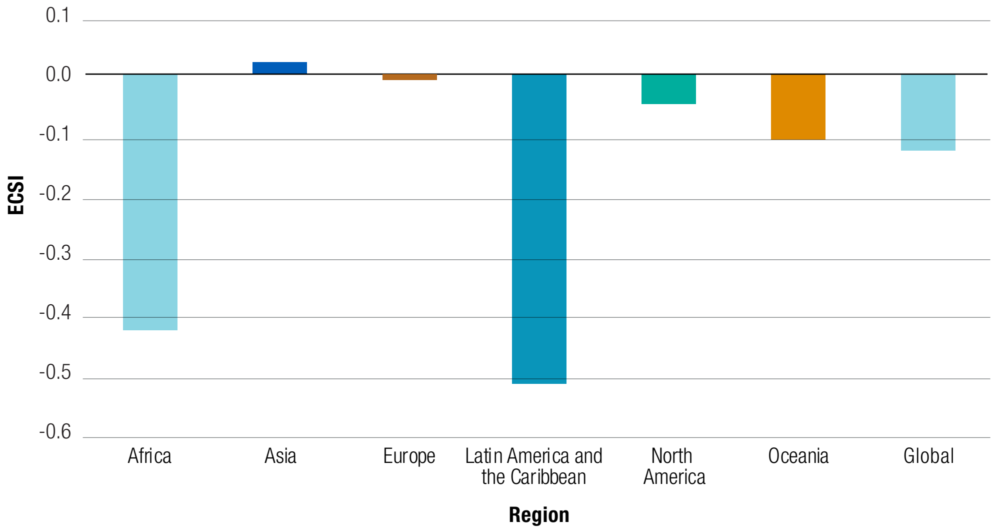


Figure 5
Trends in the ecological character state of all wetlands, using the ECSI Index, between 2018 and 2024.
Source: World Wetlands Survey 2024[35].

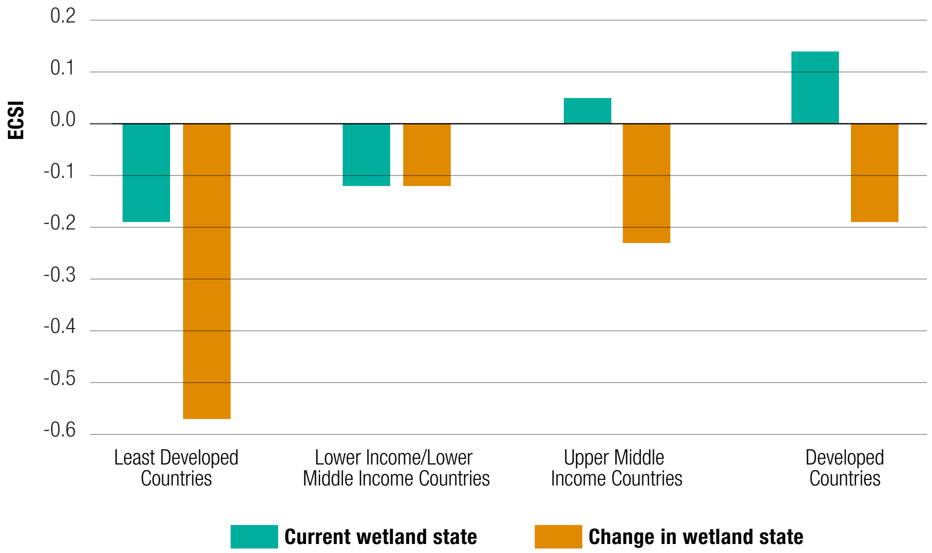


Figure 6
The current state of all wetlands (reported by WWS respondents in 2024) and the recent change in the state of wetlands generally.[1]

1 Reported in 2021 in COP14 National Reports for countries in different income categories (OECD Development Assistance Countries (DAC). OECD DAC List: https://webfs.oecd.org/oda/DAClists/DAC%20List%20of%20Aid%20Recipients%20-%202021%20flows.pdf.

The condition of the world's remaining wetlands is strongly related to the economic status of countries (Figure 6). Wetlands are in the worst current condition in least developed countries (LDCs), with considerably more wetlands reported as being in a poor state than in a good state. More wetlands are reported as being in poor condition for lower-income/lower-middle-income countries (LICs/LMICs). In contrast, more wetlands are reported as in good than poor state in upper-middle-income countries (UMICs) and particularly in developed countries (DCs). It should be noted, however, that in many UMICS and DCs, there has been a previous history of widespread wetland loss and degradation, which is not reflected in current condition assessments.

In 2021 (COP14 National Reports), Contracting Parties reported more widespread deterioration than improvement in countries of all OECD Development Assistance Countries (DAC) categories (Figure 6). However, considerably more widespread deterioration was reported by countries in the least developed countries (LDC) category (ECSI = -0.571) than by countries in higher income categories (ECSIs -0.238 - -0.125).

These assessments demonstrate a worsening outlook for the world's wetlands. Although there are regional differences, over a fifth of global wetlands reported on by respondents, remain in a poor state and many are deteriorating.

CASE STUDY 2. AUTOMATED NATIONAL ASSESSMENT OF WETLAND DEGRADATION, SOUTH AFRICA

Wetland type: Inland marshes

The National Wetland Map of South Africa attempts to map the “historical extent” of wetlands prior to extensive human modification, allowing assessment of condition against categories ranging from natural and near-natural through to critically modified or lost. To assess wetland status and trends, South Africa is piloting a geographic information system (GIS) automation of WET-Health 2.0, a widely used field assessment methodology[37]. The automated methodology allows broad assumptions on which driving component, namely hydrology, water quality, vegetation or geomorphology, is most impacted per wetland, based on a desktop assessment of land use within the wetland and the wetland catchment. The methodology weights impact differently according to the receiving hydrogeomorphic wetland type, namely, depression, seep, floodplain or unchanneled valley-bottom wetland. Given that certain, often significant, impacts on wetlands are not discernible without field-based assessment, wetlands are anticipated to be more degraded than could be estimated in the national assessment. In the face of increasing pressures, South African wetlands continue to degrade faster than investment in their rehabilitation.

For further information, see http://nba.sanbi.org.za/

South African wetlands are degrading faster than they can be restored.

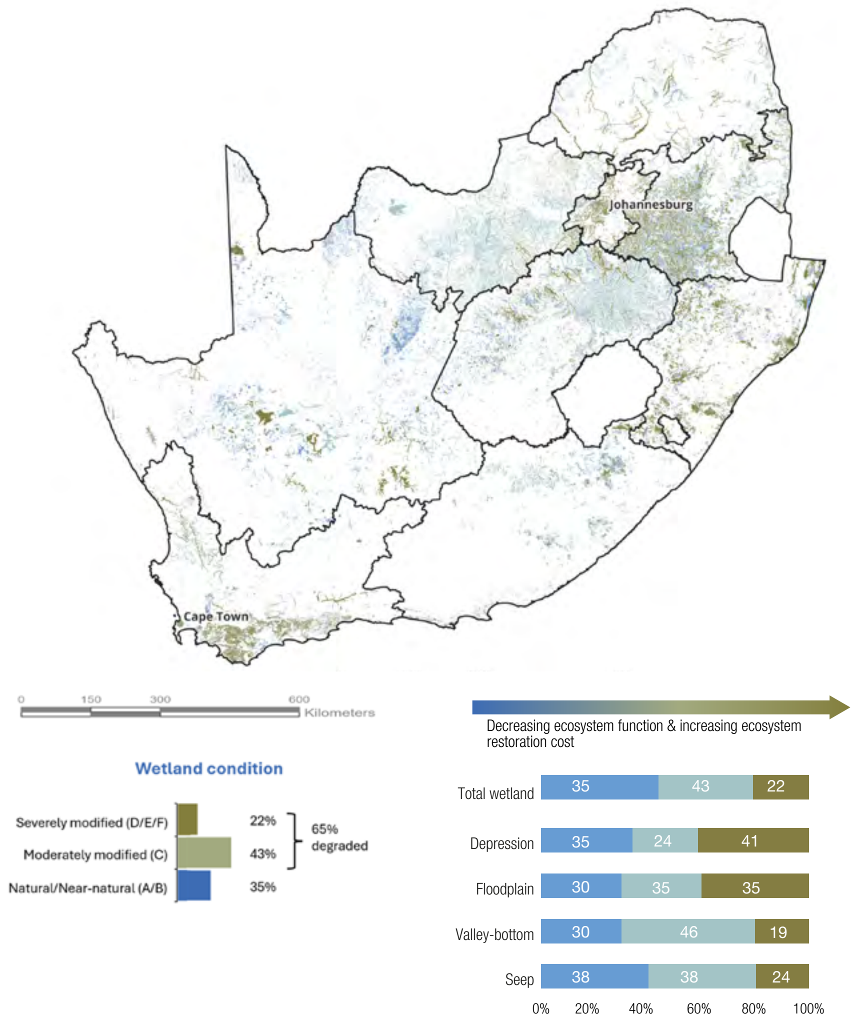


Figure 7
The National Wetland Map of South Africa shows the estimated historical extent and estimated current condition of dark blue (natural or unmodified) to dark brown (critically modified).
Source: South African National Biodiversity Institute[38].

Drivers of wetland loss and degradation

Land-use change, through agriculture and urbanisation, has had the largest relative negative impact on nature, including wetlands[39]. Agricultural activities remain the largest driver of global wetland loss through conversion to cropland (Figure 9)[6] along with other industrial activities, and have resulted in stressed global water resources. Food and agricultural production accounts for 70% of water withdrawals globally, while other industries such as energy, mining and manufacturing account for another 19%[40]. Water abstraction and pollution from industrial activities directly contribute to wetland loss and degradation. Intensive use of water, from agriculture, urban areas and industry, has resulted in unprecedented water security risks that threaten nature, human well-being and livelihoods. Climate change is increasingly exacerbating the impact of other drivers on wetlands and human well-being through changes in the frequency and intensity of extreme weather events, associated fires, floods, and droughts, and through sea level rise[39].

As reported in previous Global Wetland Outlooks[8],[9], the key negative drivers causing wetland loss and degradation, identified by participants of previous WWSs, and confirmed in the 2024 "citizen science" WWS (Table 3), remain as:

- urban, agricultural and industrial pollution,
- urban expansion,
- industrial development,
- agricultural intensification,
- drainage, and
- non-native alien species introductions and invasions.

Negative drivers of wetland state vary from region to region (Table 3). In Africa and in Latin America and the Caribbean, respondents identified urbanisation and industrial/ infrastructure development as the three most important drivers of wetland degradation and loss. In North America and Oceania, invasive species were a larger concern, and in Europe, concerns regarding drought were highlighted.

Table 3
The top three negative drivers for wetlands were reported in different regions by respondents to the Strategic Plan Consultation Survey.

Global	Africa	Asia	Europe	Latin America and the Caribbean	North America	Oceania
Urban / industrial pollution	Urban / industrial pollution	Urban / industrial pollution	Urban / industrial pollution	Urban / industrial pollution	Introduced / invasive species	Introduced / invasive species
Industrial development / infrastructure	Industrial development / infrastructure	Climate change or climate variation	Drought / desertification	Industrial development / infrastructure	Industrial development / infrastructure	Agricultural runoff
Urban development / infrastructure	Urban development / infrastructure	Introduced / invasive species	Introduced / invasive species	Urban development / infrastructure	Urban development / infrastructure	Urban / industrial pollution

Source: RM Wetlands & Environment Ltd [41]

CASE STUDY 3. FINANCING THE FUTURE OF MANGROVES: MOBILISING $4 BILLION FOR CONSERVATION AND RESTORATION

Wetland type: Mangroves

Aiming to mobilise $4 billion by 2030, the Mangrove Breakthrough[42] has emerged as a global call to action backed by 95 government, non-profit, research, and finance stakeholders to secure the future of the 15 million hectares (ha) of mangroves estimated to remain worldwide. This investment will fund large-scale restoration of degraded mangrove areas and protect intact mangroves. By leveraging public, private, and philanthropic capital, the Mangrove Breakthrough seeks to fill the financing gap and safeguard the critical ecosystem services that mangroves provide.

The three primary goals of the Mangrove Breakthrough are to halt mangrove loss, restore half of the lost area, and double the area protected. The Global Mangrove Alliance provided the scientific foundation necessary to quantify and translate this global ambition into local-level interventions[43]. Leveraging their collective expertise and the datasets from the Global Mangrove Watch has enabled the translation of broad conservation goals into spatially explicit regional and national strategies with tangible financial estimates and a spatial dimension.

A key component of this process is access to detailed geospatial information about mangrove extent and changes over time, developed through the Global Mangrove Watch[44]. The latter provides free access to annual maps of mangrove areas, losses, and gains for all countries between 1990 and the present, generated using optical and radar satellite data. The datasets can, amongst other things, be used to support national wetland inventories and other national reporting commitments.

For the Mangrove Breakthrough, these data-driven insights provide a clear understanding of where mangrove loss occurs and highlight conservation priority areas. In addition to conservation, mapping the potential for mangrove restoration has been instrumental in prioritising areas where mangrove recovery efforts would yield the highest ecological and economic returns. To maximise the effectiveness of interventions, the Global Mangrove Alliance have developed and published Best Practice Guidelines for Mangrove Restoration[45].

Recognising that achieving these ambitious goals requires significant financial investment, a "Finance Roadmap[46]" has been developed to guide resource mobilisation. The estimated total funding needed to implement the Mangrove Breakthrough objectives is approximately $4 billion. This roadmap outlines key funding mechanisms, including public and private sector investments, carbon finance opportunities, and innovative financing models that can support large-scale mangrove conservation and restoration efforts.

The Mangrove Breakthrough is setting the stage for a transformational shift in how mangroves are protected and restored worldwide through the integration of cutting-edge scientific data, financial planning, and global collaboration. With the right funding supporting effective on-the-ground action, these critical ecosystems can continue to provide essential benefits, including coastal protection, biodiversity support, and carbon sequestration, for generations to come.

For further information, see https://www.mangrovebreakthrough.com/

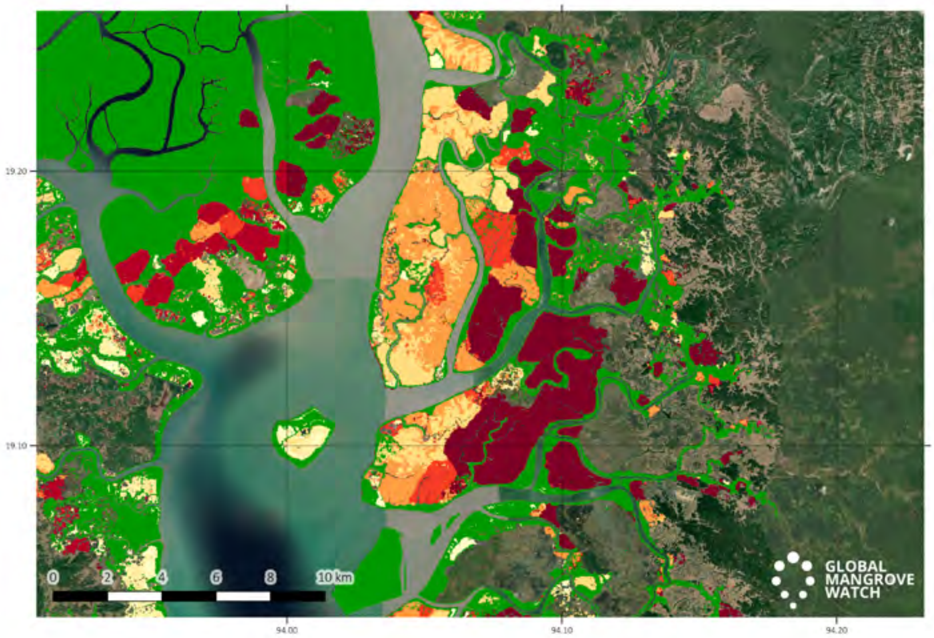


Figure 8
Rakhine, Myanmar. The Global Mangrove Watch map shows the mangrove extent in 2024 (green) and changes from 1990 to 2024 (other colours).

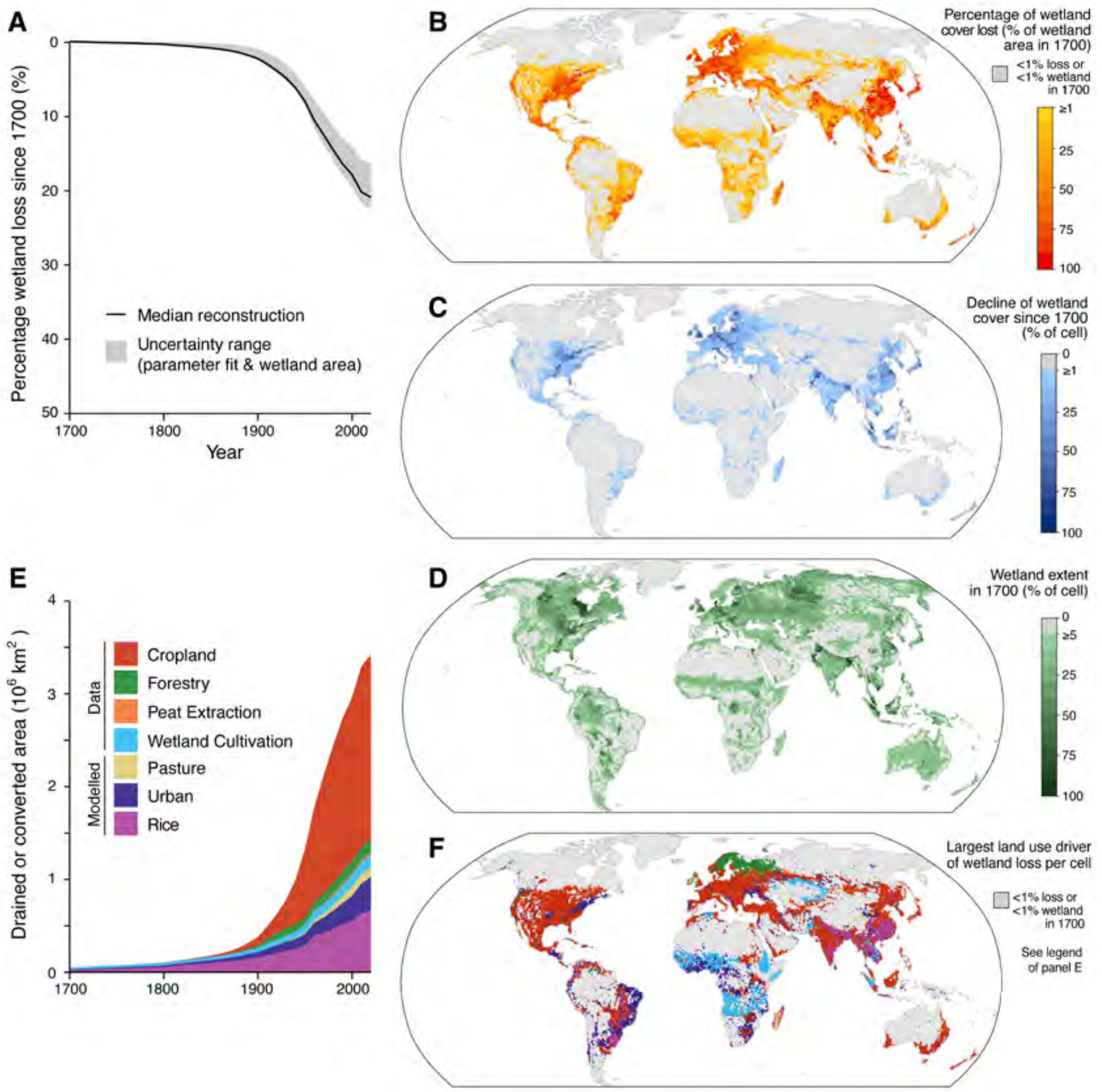
Mangrove forest loss

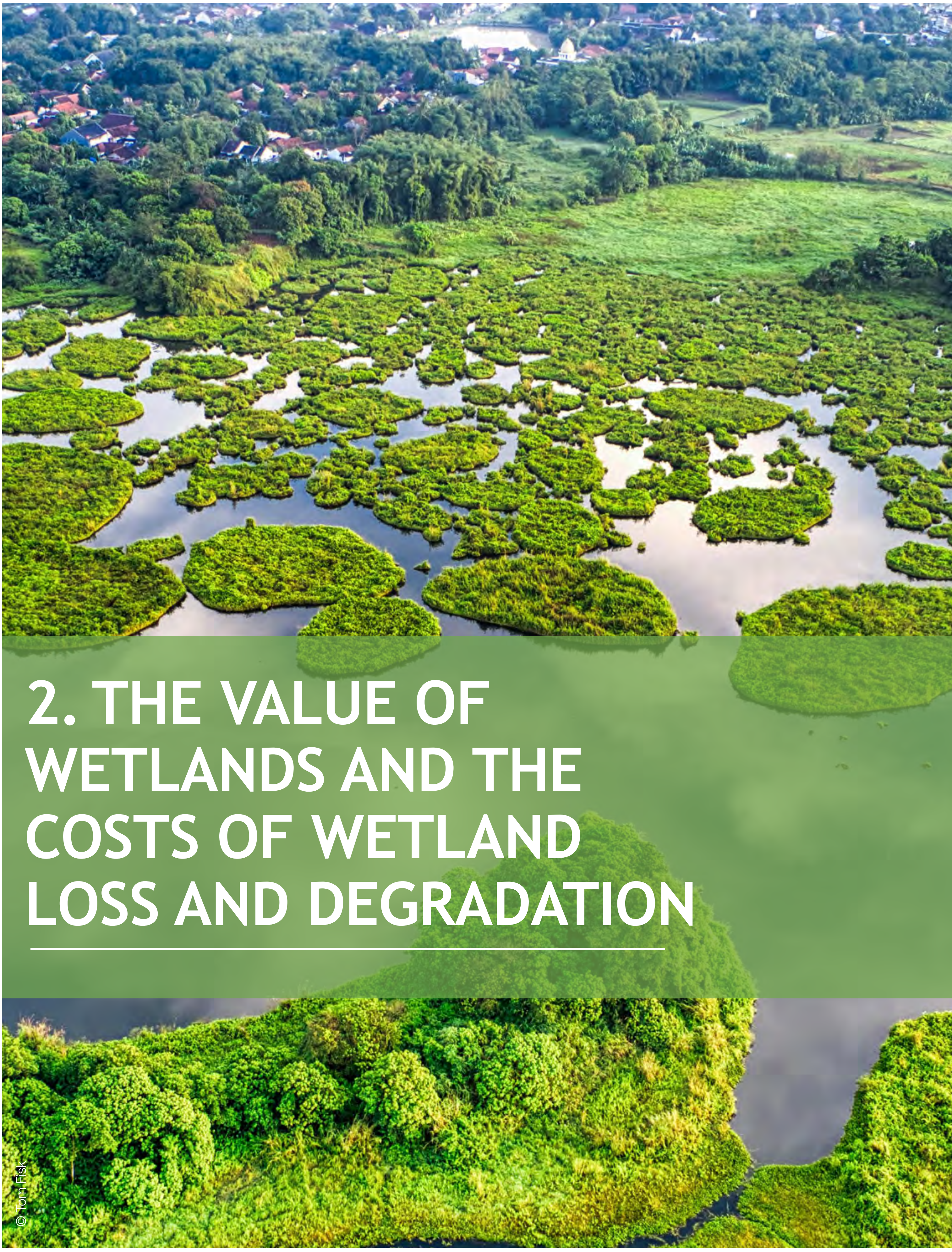
- Mangrove in 2024
- Loss since 2020
- Loss since 2015
- Loss since 2010
- Loss since 2005
- Loss since 2000
- Loss since 1995
- Loss since 1990

Other negative drivers of wetland loss and degradation reported include erosion, desertification and climate change. These contribute to the cumulative effect of negative drivers on wetlands. Cumulative impacts result from the combination of spatial (geographic) and temporal (time) features of multiple drivers that occur before a wetland ecosystem can fully recover from initial disruption[47]. Cumulative effects are often non-linear, and the science of understanding cumulative effects is complex[48]. However, multiple drivers acting together result in the degradation of critical processes and functions and accelerate wetland degradation and loss. The compounding effects of drivers such as climate change, land-use change, overexploitation of resources, pollution and invasive alien species are likely to exacerbate the negative impacts on wetlands[39].

Understanding the variation within the broad categories of drivers, individually and in combination, is important when determining their impact on wetlands. For example, van Dam et al.[49]. noted that agricultural activities are often the main driver of decline in wetlands, but in addressing their impact, the diversity of agricultural systems and their different impacts on catchment hydrology and water quality must be recognised. Determining a wetland's local and catchment context and assessing the impact of drivers specific to the location is key to wetland conservation and wise use. With threats to wetlands increasing, comprehensive action is required to remove and minimise the drivers of wetland loss and degradation.

Figure 9
Reconstructed global extent of drained, lost or converted wetlands between 1700 and 2020 globally.
Source: Fluet-Chouinard et al.[6].





2. THE VALUE OF WETLANDS AND THE COSTS OF WETLAND LOSS AND DEGRADATION

From ecosystem services to natural capital

Wetlands contribute to humanity's well-being in multiple ways. These contributions come directly, in the form of food and other raw materials, but also by less obvious means, such as flood regulation and the mitigation of climate change, and in spiritual and cultural ways. When wetlands are degraded or destroyed, the result is a reduction in ecosystem services and associated benefits that wetlands provide to people.

These benefits are undervalued in conventional economic accounts. Thus, wetlands have not been seen as valuable assets – natural capital – that can depreciate if not cared for.

In recent decades, environmental economists have begun to estimate the value of natural capital and ecosystem goods and services, largely as a means of bringing nature's contribution to people to the attention of policymakers. Previous studies have estimated wetland ecosystem service values, yielding wide ranges, both between different wetland types and between studies. For example, valuations have been in the range of $18,300 to $39,300 2023 Int$ ha^{-1} yr^{-1} for lakes and rivers and $99,100 to $517,800 2023 Int$ ha^{-1} yr^{-1} for coral reefs[50],[51] 300 studies, yielding over 9,400 value estimates in monetary units, has been collected and organised in the Ecosystem Services Valuation Database (ESVD).[1]

Ecosystem service valuation helps reveal the immense yet often overlooked benefits wetlands provide to people.

The value of nature should not be considered solely in monetary terms, with societies also placing intrinsic and relational values upon nature, recognising the potential for people to live in harmony with it. The Intergovernmental Science-Policy Platform on Biodiversity & Ecosystem Services (IPBES) coined the term "Nature's Contribution to People" to describe such benefits of nature, encompassing multiple ways of seeing the world. Some have argued that economic valuation of ecosystem services risks commodifying nature, which arguably is the cause of nature's decline, and that this approach ignores nature's intrinsic values[52],[53]. However, ecosystem service valuation helps to inform policy decisions in a changing world[54], so it is useful to demonstrate nature's contributions in this way, so long as it is not the only way.

Here, we present an up-to-date estimate of the global value of wetlands in economic terms and the value that has been lost due to the loss and degradation of wetland ecosystems. In doing so, we acknowledge the limitations of economic valuation approaches while also recognising the manner in which such approaches have helped policymakers understand nature's contributions to people.

Characterising wetlands' contributions to people

Wetlands make a wide range of contributions to people, and various approaches have been developed to describe wetland ecosystem services and benefits. The Millennium Ecosystem Assessment was influential[54], and the Global Assessment Report on Biodiversity and Ecosystem Services further emphasised the importance of a pluralistic and inclusive perspective on people's relationship to nature[55]. Three main classes of contributions are often recognised in ecosystem service valuations. **Provisioning services** are wetlands' material contributions to people, such as food, water, fuel, fibre and biochemical products that people can extract from wetlands to sustain human society. **Regulating services** derive from the structures and functions of wetlands that affect our environment and the provision of other services, such as regulating climate, flooding and erosion, and water purification. **Cultural services,** or non-material contributions, include the recreational, educational, spiritual and aesthetic contributions that wetlands make to people's quality of life. Non-material contributions also include the knowledge and assurance that ecosystems' integrity is maintained for future usage and for the benefit of future generations. Finally,

1 Int$ are International US Dollars, a hypothetical currency unit with the same purchasing power as the US dollar in the United States. They are used to allow meaningful economic comparisons of value between countries at different levels of development and USD exchange rates. They are usually standardised to a given point in time; hence, Int$ 2023 is the purchasing power of the USD in 2023.

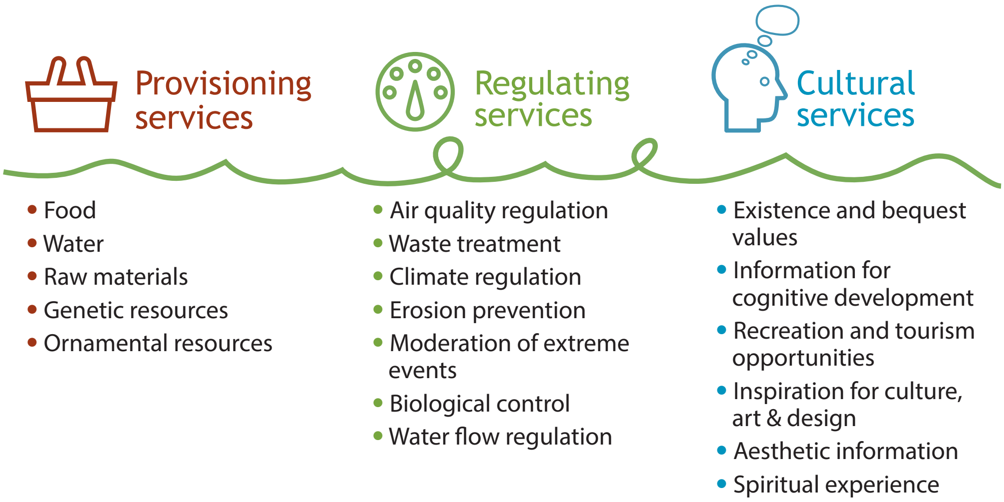


Figure 10
Ecosystem services, in three broad categories, were extracted from the Ecosystem Service Valuation Database to calculate the global benefits of wetlands.[1]

1 Three other services typically classed as "maintaining" or "supporting" services – maintenance of genetic diversity, maintenance of life cycles, and maintenance of soil fertility – were also extracted, and the values are shown in Table 4. However, the benefit-transfer approach to estimating global values did not include these values.

some classifications also refer to **supporting services;** these are the structures and processes of wetland ecosystems that underpin the provision of the other services, such as primary production, soil formation and provision of habitat; they are sometimes omitted from valuations as they are not considered to be services in themselves, and are sometimes incorporated within regulating and maintaining contributions (see Common International Classification of Ecosystem Services (CICES)[56] for Integrated Environmental and Economic Accounting).

The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) reviewed the diverse meanings of "value" itself, in terms of worldviews and knowledge systems, and the guiding principles and goals that reflect these, such as prosperity, belonging, stewardship and harmony with nature[57],[58]. This analysis and others like it give a richer understanding of the plurality of values and how they might be combined to lever more sustainable and just futures for people.

Estimating the value of wetland benefits

A global economic valuation of wetlands relies on synthesising and extrapolating site-specific assessments of ecosystem services across a range of wetland types. This GWO extracted 1,535 value estimates from hundreds of wetlands from the Ecosystem Services Valuation Database (ESVD)[59]. To date, the ESVD is the most extensive valuation database, with standardized values that enable comparisons between different scales and contexts. These estimates covered 21 individual ecosystem services among the three broad categories of regulating, provisioning and cultural (Figure 10), and were assigned to one of 11 wetland classes (see Section 1).

Table 4 and Table 5 summarise these individual valuations by wetland and service type, giving an overview of the available data. Significant data gaps remain (Table 4). For some wetland types, the value of some services has simply not been estimated (e.g., genetic resources, biological control and spiritual experiences). Due to the paucity of data, we could not include kelp forest and tidal flat in our analysis, and of the 21 ecosystem services in our dataset, only six have been estimated for seagrass and 10 for peatlands. Around two-thirds of all the value estimates derive from mangrove and coral reef habitats, with notably few estimates available for habitats with large extents, such as peatlands and lakes.

The most frequently estimated ecosystem services are food and opportunities for recreation/tourism, which comprise almost half of the estimates. These are directly traded services and therefore are more visible and more straightforward to estimate. Despite having rather high median values, there are few estimates for the maintenance services (maintenance of genetic diversity, maintenance of soil fertility and maintenance of life cycles) and also very few for some significant regulating services such as air quality regulation, biological control and regulation of water flows.

Median values per ha

	Ecosystem services / ecosystem types	Salt marshes	Coral reefs	Mangroves	Seagrass	Estuaries	Lakes	Inland marshes and swamps	Peatlands	Rivers and streams
Provisioning	Food	1,437	299	473	231	288	144	46	125	108
	Genetic resources	14	-	-	-	-	-	-	261	-
	Ornamental resources	-	40	-	-	-	-	-	-	-
	Raw materials	943	14,375	214	-	97	22	19	48	-
	Water	1,989	-	100	-	825	2,607	102	-	68
Regulating	Air quality regulation	35	-	1,514	-	6	-	2	-	-
	Biological control	-	-	-	-	-	401	-	-	-
	Climate regulation	132	1	372	82	5	892	89	238	47
	Erosion prevention	-	646	1,810	66	-	-	-	-	-
	Moderation of extreme events	6,130	1,211	494	-	-	33,221	192	-	8
	Regulation of water flows	-	-	2	-	-	71	306	-	521
	Waste treatment	1,509	6,019	2,183	142	226	548	62	257	2,965
Cultural	Aesthetic information	814	6,210	287	-	574	10,993	15	871	4,037
	Existence, bequest values	2	1,070	1,086	-	-	-	80,227	41	650
	Information for cognitive development	1,744	128	217	-	1,745	-	157	-	141
	Inspiration for culture, art and design	0	1,079	4,414	-	0	-	55	0	378
	Opportunities for recreation and tourism	2,801	1,035	318	6,378	1,485	1,035	1,547	24	132
	Spiritual experience	5	-	-	-	-	-	-	-	94
	Total	**17,556**	**32,113**	**13,485**	**6,900**	**5,251**	**49,934**	**82,820**	**1,864**	**9,150**

Table 4
Median ecosystem service value estimates extracted from ESVD, by ecosystem service and wetland type (2023 Int$ ha^{-1} yr^{-1}).

The type and magnitude of ecosystem services and benefits vary greatly between wetland types and locations. Considering the fully disaggregated data extracted from the database, inland marsh and swamp have the highest value per hectare in this analysis Table 4 shows the median $ values, and the next most valuable wetland type per unit area is lakes. However, it is very important not to overinterpret these apparent differences and to be aware of the limitations of the underlying data. For example, the exceptionally high total values for inland marsh and swamp are strongly influenced by outlying values from a small number of studies for moderation of extreme events, and similarly the value for lakes is disproportionately affected by high estimates for existence and bequest value, which in turn derive from a small number of studies (Table 5).

While the ESVD is the largest single data repository for ecosystem service valuations, it is inevitably not fully comprehensive. Further, many assessments of nature's contributions to people do not include economic valuations. For example, in recent years, extensive research has been done into the benefits of peatlands, and these are not well reflected in the dataset extracted in this GWO. There is strong evidence that peatlands can improve water quality by removing dissolved organic carbon[60] and regulating water flows, particularly by reducing flood peaks[61]. It is now well established that avoiding peatland degradation has a major role to play in climate regulation[21]. These benefits have resulted in substantial policy commitments towards peatland conservation and restoration in a number of countries[62].

No. of ESVD valuations

	Ecosystem services / ecosystem types	Salt marshes	Coral reefs	Mangroves	Seagrass	Estuaries	Lakes	Inland marshes and swamps	Peatlands	Rivers and streams
Provisioning	Food		73	222	11	22	12	8	2	7
	Genetic resources	1							4	
	Ornamental resources		2							
	Raw materials	8	4	116		5	7	8	4	
	Water	2		3		6	10	7		9
Regulating	Air quality regulation	7		2		1		5		
	Biological control						1			
	Climate regulation	6	4	44	13	4	1	9	14	1
	Erosion prevention		11	21	1					
	Moderation of extreme events	4	17	37			2	11		4
	Regulation of water flows			2			1	4		3
	Waste treatment	19	10	17	1	11	2	4	3	3
Cultural	Aesthetic information	12	13	1		7	4	4	2	1
	Existence, bequest values	1	108	17				5	15	4
	Information for cognitive development	8	12	6		4		4		1
	Inspiration for culture, art and design	5	1	1		3		17	1	2
	Opportunities for recreation and tourism	16	207	65	2	35	15	9	7	7
	Spiritual experience	1								1

Table 5
Number of ecosystem services valuations extracted from ESVD, by ecosystem service and wetland type.

Another challenge is the wide ranges of values, even within wetland types, and in the case of estimates for climate regulation benefits, many values extracted from the ESVD are surprisingly low. While much of this variation may represent real differences due to location and context, see Box 3 for reasons why they might be misleading underestimates in some cases.

Estimating global benefits of wetlands

The estimate of the global benefits people gain from wetlands addresses biases and gaps in the available data, such as the dominance of values from certain regions and countries, by applying a "benefit transfer" that integrates ESVD valuations with socio-economic data in the form of the Human Development Index, to estimate the values of wetlands in each country[63],[64]. Due to the limited number of valuation studies for some wetland types and ecosystem services, broad ecosystem service categories (provisioning, regulating and cultural) and wetland types are used to aggregate the data from published studies and to derive regional and global estimates of the value of wetlands. While this approach prevents a detailed comparison between different ecosystem services, it produces conservative and robust aggregate values.

The estimates of wetland benefits per unit area are combined here with estimates of recent rates of wetland loss, to create an estimate of the value to humanity that has been lost as a result of wetland destruction over the last 50 years.

As in any benefit transfer valuation, especially on a global scale, its accuracy and precision is dependent upon the number and spatial coverage of underlying studies[65]. Aggregating valuations across socio-economic tiers, ecosystem services, and wetland types helps to mitigate data uncertainty from the information in the ESVD. Most economic valuations of wetland benefits have been implemented in the past 30 years. As such, they give us an understanding of the importance society places on wetland nature over a relatively short period of time. Attempting to assess the loss of benefits arising from wetland loss before this period may change the valuation. Similarly, when estimating the net present value (NPV) of remaining wetlands, the 2025 GWO summarises information over the next 25 years, to 2050. This time preference is because the longer the time-horizon, the greater the uncertainty about future social preferences. Most societal policies and targets for wetland conservation and restoration extend to 2050 or closer, so this time horizon is policy-relevant.

Table 6 presents the derived annual values per unit area of the different wetland types, aggregated using the values from Lord[64]. In general, differences between wetland types within regions are not large. Values per unit area of wetlands in Africa tend to be lower than other regions, which could be explained by the lower Human Development Index (HDI).

Table 6
Annual median values per hectare of wetland ecosystem services (2023 Int$ ha^{-1} yr^{-1}), by broad wetland type and region (mean values in parentheses).

	Coastal wetlands*	Coral reefs	Inland wetlands (Inland marshes and swamps; peatlands)	Lakes, rivers, and streams
Africa	2,946 (7,007)	4,250 (9,682)	3,151 (17,418)	2,901 (6,940)
Asia	5,427 (18,854)	5,189 (18,883)	7,086 (42,416)	6,934 (20,652)
Europe	5,528 (20,786)	5,156 (21,414)	5,685 (24,205)	10,360 (32,874)
Latin America and the Caribbean	6,036 (22,613)	5,585 (22,684)	8,265 (45,405)	7,482 (22,496)
North America	4,187 (12,760)	3,363 (11,552)	3,878 (21,388)	8,810 (35,764)
Oceania	4,487 (12,362)	4,655 (12,287)	5,986 (34,519)	4,892 (13,842)
Global average	4,768 (15,731)	4,700 (16,084)	5,675 (30,892)	6,896 (22,095)

*Seagrass, kelp forests, estuarine waters, saltmarshes, mangroves, tidal flats

Wetlands are estimated to have a global extent of 1,425 million hectares (Section 1), and the total median annual value of the ecosystem services they provide is estimated at 7.98 trillion 2023 Int$, which equates to around 7.5% of global GDP[1] (Table 7). When using annual mean values, however, the total value of wetlands is estimated at 39.01 trillion 2023 Int$ (36.7% of global GDP)[2]. This difference can be attributed to the skewed distribution of ecosystem services valuations (i.e., a small number of valuations exhibit large value per unit area, thereby affecting the mean value of the global estimation). Inland wetlands comprise a significant share of the total value due to their large global extent.

This GWO also presents the net present value (NPV) of wetlands. This means considering them as "assets" that generate a flow of benefits (ecosystem services) over a defined period in the future; it represents society's current valuation of these future benefit flows using a social discount rate, which discounts them to their current worth (see Technical Note)[5]. The NPV is estimated between the present and 2050 (assuming a 3% discount rate) at 205.25 trillion 2023 Int$ (using median values, with average loss rate, as reported in Section 1).

1 Global GDP in 2023 is $106.17 trillion according to The World Bank: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?end=2023&start=2020

2 The valuation approach used in this report gives a different result than the 2021 GWO report. The 2021 report, relying on 2014 ESVD values (Costanza et al. 2014), estimated the value of global wetlands at 54.8 trillion 2020 Int$ (47.4 trillion 2011 Int$, originally), compared with 39.01 trillion in 2023 Int$ in the current report.
This difference can be attributed to: 1) addition of valuations to the ESVD over the years; 2) changes to valuation techniques; and 3) generalization of ecosystem services values across different regions (i.e. transferring values across different regions leading to overestimation). In this current report, the use of a socio-economic aggregation approach, coupled with outlier removal and calculation of central tendencies of the distribution of values, gives a more updated and robust estimation of wetland values.

	Africa	Asia	Europe	Latin America and the Caribbean	North America	Oceania	Global
Inland marshes and swamps	101.9 (553.0)	1,000.7 (8,655.6)	355.4 (1,967.6)	733.0 (3,005.6)	455.4 (2,511.6)	45.6 (252.1)	2,691.9 (16,945.4)
Lakes	51.9 (128.5)	252.9 (840.3)	375.3 (1,430.7)	94.7 (276.5)	1,051.9 (4,270.5)	47.2 (191.0)	1,873.9 (7,137.5)
Tidal flats	1.8 (3.8)	34.3 (114.1)	4.6 (14.7)	11.9 (49.5)	5.5 (16.7)	5.1 (14.9)	63.1 (213.7)
Mangroves	6.0 (12.6)	39.9 (121.3)	-	26.3 (91.3)	1.0 (3.0)	5.7 (16.4)	78.8 (244.5)
Saltmarsh	0.6 (1.5)	1.5 (6.3)	5.8 (26.8)	4.4 (19.1)	11.4 (34.7)	1.0 (3.0)	24.7 (91.4)
Estuarine waters	10.6 (28.1)	78.9 (271.3)	6.9 (30.8)	45.4 (153.8)	10.9 (33.1)	0.1 (0.4)	152.9 (517.5)
Coral reefs	9.0 (22.4)	52.7 (150.7)	-	86.8 (596.8)	0.9 (3.2)	21.0 (62.4)	170.6 (835.5)
Kelp forests	0.2 (0.4)	-	-	5.9 (19.5)	1.5 (4.4)	0.4 (1.1)	7.9 (25.5)
Rivers and streams	15.1 (36.6)	77.6 (238.2)	133.4 (500.3)	110.7 (305.6)	64.9 (263.5)	9.8 (38.6)	411.4 (1,382.8)
Seagrass	16.7 (38.8)	61.4 (184.1)	7.0 (18.4)	48.2 (242.8)	6.0 (18.4)	25.7 (75.2)	165.1 (577.8)
Peatland	-	-	-	-	-	-	2,340.7 (11,041.8)
Total	**213.8 (825.7)**	**1599.9 (10581.9)**	**888.4 (3989.3)**	**1167.3 (4760.5)**	**1609.4 (7159.1)**	**161.6 (655.1)**	**7,981.0 (39,013.4)**

Table 7
Total median value of ecosystem services (billions 2023 Int$), by wetland type and region given their estimated global extent (mean values in parentheses).

CASE STUDY 4. ECOSYSTEM SERVICE VALUATION OF PEATLAND RESTORATION IN THE UK

Wicken Fen is a species-rich alkaline fen, designated as a National Nature Reserve and Wetland of International Importance ("Ramsar Site"). The 170-ha wetland is a remnant of "Fenland" - a once enormous (ca.3,900 km^2) lowland wetland in eastern England that historically comprised a complex and dynamic mosaic of peatland, inland marshes, saltmarsh, lakes and rivers, more than 99% of which has been drained for agriculture over the last 400 years.

In 1999, the National Trust, a conservation NGO in the UK that owns the site, developed a "Wider Wicken Fen Vision"[66], which envisaged landscape-scale restoration of 5,300 ha of wetlands around the protected area, initially with the aim of conserving rare and specialised biodiversity. This Vision grew to encompass the restoration of ecosystem services, in particular flood protection, reduced greenhouse gas emissions and nature-based recreation. By 2014, the original site had been expanded to 770 ha, through re-wetting. This is a challenging and expensive process: the restored land lies on degraded peat, in a complex hydrological system whereby surrounding farmland depends on pumped drainage for its continued existence. The intensive farming in the wider region means that water quality is often poor.

The restoration of the landscape around Wicken Fen potentially delivers ecosystem services that are significant in the context of regional drivers. The region is subject to rapid population growth, creating pressure for opportunities for recreation in blue and green space, as well as pressure on water resources in one of the driest parts of the United Kingdom. The UK has ambitious targets for peatland restoration, driven in particular by climate mitigation (3% of all UK carbon emissions come from degraded lowland peatland) and nature restoration targets. For example, the England Peat Action Plan has a target of restoring 280,000 ha of peatland by 2050[67]. Notwithstanding these potential restoration benefits, Fenland farms are among the most productive agricultural areas in the UK, and so there are also likely costs in terms of reduced food production.

In order to understand the societal costs and benefits of restoring the wider Wicken Fen area, the Toolkit for Ecosystem Service Site-based Assessment (TESSA)[68] was used to estimate the values of the service provided by the two potential land uses: arable farming and restored peatland. TESSA was designed to provide a relatively simple and low-cost approach to site-based valuations, in order to make such valuations accessible to a wider range of stakeholders. It primarily uses existing published data and focuses on a relatively narrow range of services. It is also a participatory system. In the Wicken Fen case, the assessment was created in consultation with local and national stakeholders, including landowners and managers, government regulators, scientists and local residents.

The valuation exercise indicated that wetland restoration delivered a net benefit to society of around \$199 ha^{-1} yr^{-1} relative to the counter-factual of continued arable farming[69]. The restored wetland provided increased climate mitigation, flood regulation, livestock grazing and recreational value, but there was a large loss of arable food production. A reduction in management costs resulting from the wetland restoration had a very large influence on the overall valuation outcome.

Comparing the expected flow of benefits against ongoing management costs and costs associated with greenhouse gas (GHG) emissions under the two land-use options yields a clearer picture. In relative terms, adopting the

Despite loss of arable production, restored wetlands offer greater benefits in flood regulation, climate mitigation, and recreation.

CS4 **cont.**

restoration scenario translates into a 4.4 benefit-cost ratio, compared with 1.3 ratio of arable farming (Figure 11). When factoring in the assumed initial restoration costs, achieving a break-even benefit-cost ratio for restored wetland is obtained after 4.5 years.

The valuation certainly did not provide a complete answer to a complex debate about the merits of the restoration; such debates involve a wider range of issues than an economic approach can encompass. Nevertheless, it did illuminate important features of the debate for stakeholders. The estimates were subject to substantial uncertainty. For example, the results were very sensitive to the price of carbon that was adopted (see Box 3), with published values for 2011 (when the valuation was conducted) ranging from \$6.2 to \$94.9 t^{-1}, resulting in emission reductions valued in the range \$20-\$300 ha^{-1} yr^{-1}. Further, several ecosystem services were not measured, including positive impacts of restored wetlands on water quality compared to negative impacts of arable farming and associated sediment, fertiliser and pesticide run-off. While the benefit of the arable production from the site was outweighed by the other benefits delivered after wetland restoration, that production is likely to be displaced elsewhere to meet societal food requirements. The valuation highlighted not just a change in the type and magnitude of the services provided by the site after restoration, but also a shift in the beneficiaries. The economic benefits from the food provision service provided by the arable farming largely accrued to a small number of local farmers. Conversely, the recreational value of the restored wetland accrued to a much larger number of more distantly located and urban residents, while the climate mitigation value was a global benefit.

The valuation of the relative benefits that were delivered by wetland restoration at Wicken Fen illustrates the power of such exercises to inform societal debates about the merits of alternative land-uses. It also shows that we cannot expect economic valuations of this type to deliver unequivocal and comprehensive answers: they are valuable tools but have their limitations.

For further information, see https://www.nationaltrust.org.uk/

Restoring Wicken Fen delivers a 4.4 benefit–cost ratio — more than three times higher than arable farming.

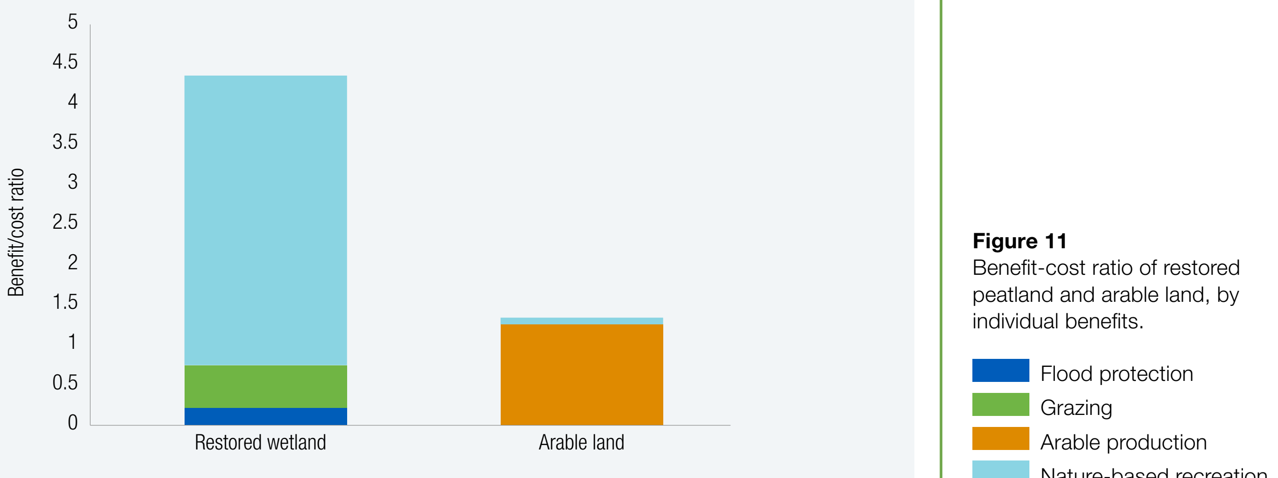


Figure 11
Benefit-cost ratio of restored peatland and arable land, by individual benefits.

BOX 3: THE CHALLENGE OF VALUING CLIMATE REGULATION SERVICES

The value ascribed to carbon in ecosystem service valuations varies dramatically, according to how this value is conceptualised and measured. The mitigation cost of carbon is the cost of reducing emissions in line with agreed emissions targets. Current estimates of the 2030 mitigation cost of carbon to reach the Paris Agreement 1.5°c target are $226-385 per tonne of carbon dioxide equivalent (t CO_2-eq). However, the current average market cost of carbon from nature-based projects is around $2-10 t CO_2-eq^{-1}[70]. Clearly, the valuation of climate regulation services delivered by a wetland depends enormously upon which value is used for carbon, which varies between studies.

For example, an average drained peatland may emit ~50 t CO_2-eq ha^{-1} yr^{-1}, whereas an intact peatland may emit ~10 t CO_2-eq ha^{-1} yr^{-1}[71], meaning that the destruction of a healthy peatland results in a net increase in emissions of ~40 t CO_2-eq ha^{-1} yr^{-1}. Habitat protection in this case has a mitigation cost to society in the order of $9,000-15,000 ha^{-1} yr^{-1}, but may have a market cost of only $80-400 ha^{-1} yr^{-1}. The table above shows that the value of peatland climate regulation extracted from the ESVD database is far less than these mitigation costs. Similarly, estimates of carbon burial by some coastal wetland types (so-called "blue carbon") such as mangroves, seagrass and saltmarsh are extremely large[72],[73], and while there remain debates about how much of this carbon burial represents an additional and permanent contribution[74], the figures imply very high value if estimated on mitigation cost, and these do not emerge from the database values. One recent analysis[75] suggested that successfully conserving the world's blue carbon ecosystems would avoid 304 (141–466) million t CO_2-eq yr^{-1} losses. Taking the central estimate, this translates to a value of between $69 and $117 billion per year at mitigation costs. Likewise, ambitious restoration rates would result in 841 (621–1,064) million t CO_2-eq per year of additional mitigation by 2030, with a mitigation value of $190-239 billion annually.

The impact of natural wetlands on climate is complex and highly variable; some can be net sources of greenhouse gases (principally because of methane emissions) [76]. Despite this complexity, conservation of wetlands is almost always beneficial for climate relative to destruction, because wetland drainage very often results in rapid oxidation and release into the atmosphere of the large amounts of organic carbon stored in wetland sediments[77]. Restoration of degraded freshwater wetlands, including peatlands, can result in spikes in methane emissions immediately after re-wetting. However, restoration of lost wetlands by re-wetting is almost always favourable for climate mitigation overall and in the longer term: methane is short-lived in the atmosphere, and its release is more than offset by the prevention of further oxidation of organic carbon stores[77]. Blue carbon systems typically have low methane emissions[78]. In all cases, the climate mitigation value of conserving or restoring wetlands needs to be calculated relative to the counterfactual, which is the alternative trajectory of the site: destruction or continued degradation, and conservation is almost always more favourable for climate than the latter.

	Climate regulation value (Int$/ha^{-1}/yr^{-1})		
Habitat type	**Mean**	**Median**	**Number of studies**
Saltmarsh	114	112	6
Mangrove	1,376	316	44
Seagrass	130	70	13
Peatland	1,608	202	14

Table 8
Values for climate regulation services of intact peatland and blue carbon habitats extracted from the ESVD in this report.

Ecosystem service valuations indicate that humans derive greater value from wetlands than other natural ecosystems

Previous global estimates found that wetlands deliver greater ecosystem services per unit area than other natural ecosystems. For example, research[51], estimated average annual per hectare values between $860 (Int 2023$) and $18,830 for different forest and woodland habitat types, and $6,750 for grassland ecosystems but $102,400 for coral reefs, $42,370 for coastal ecosystems, $91,800 for mangroves, $40,000 for inland wetlands and $38,840 for rivers. Other studies[50] showed a similar pattern, with forest and grassland systems being valued between $4,550 and $7,940 (Int 2023$ ha^{-1} yr^{-1}), while coastal wetland types were valued at between $42,630 and $514,500, with lakes/rivers at $19,100 and swamp/floodplain at $38,200 Int 2023$ ha^{-1} yr^{-1}.

The data synthesis presented here supports the pattern of relatively large per unit area benefits from wetlands (Table 7), with inland systems somewhat higher than coastal wetlands. Despite substantial variations between published studies, it remains very clear that wetland ecosystems tend to contribute significantly more to people's lives compared to other natural habitats.

The implications of wetland loss for the benefits that wetlands provide

Recent historic loss of wetlands has resulted in a substantial reduction in wetland ecosystem services

Since 1970, on average, wetlands have been lost at a rate of 0.52% per year (Section 1). Applying the wetland loss rates for each wetland type provides insight into the reduction that has occurred globally in the benefits flowing from wetlands. By aggregating the benefits lost annually due to wetland reduction (~380 million ha for the analyzed countries), from 1975 to the present, a cumulative loss of benefits to humanity of $5,140.9 billion 2023 Int$ over the last 50 years is estimated (Table 9). Most of this loss has been due to the destruction of inland wetlands (lakes, peatlands and marshes/swamps).

Wetland type	Value (billions 2023 Int$)
Coral reefs	142.7
Seagrass	74.8
Kelp forest	16.5
Estuarine waters	7.1
Tidal flat	44.0
Salt marshes	9.5
Mangroves	24.7
Rivers and streams	62.1
Lakes	1,959.4
Inland marshes and swamp	1,929.8
Peatlands	870.2
Total	**5,140.9**

Table 9
Cumulative total reduction in value (billions 2023 Int$) resulting from loss of wetlands 1975-2025. Values are derived using median values per unit area.

CASE STUDY 5. **REGIONAL FLYWAY INITIATIVE, EAST ASIA**

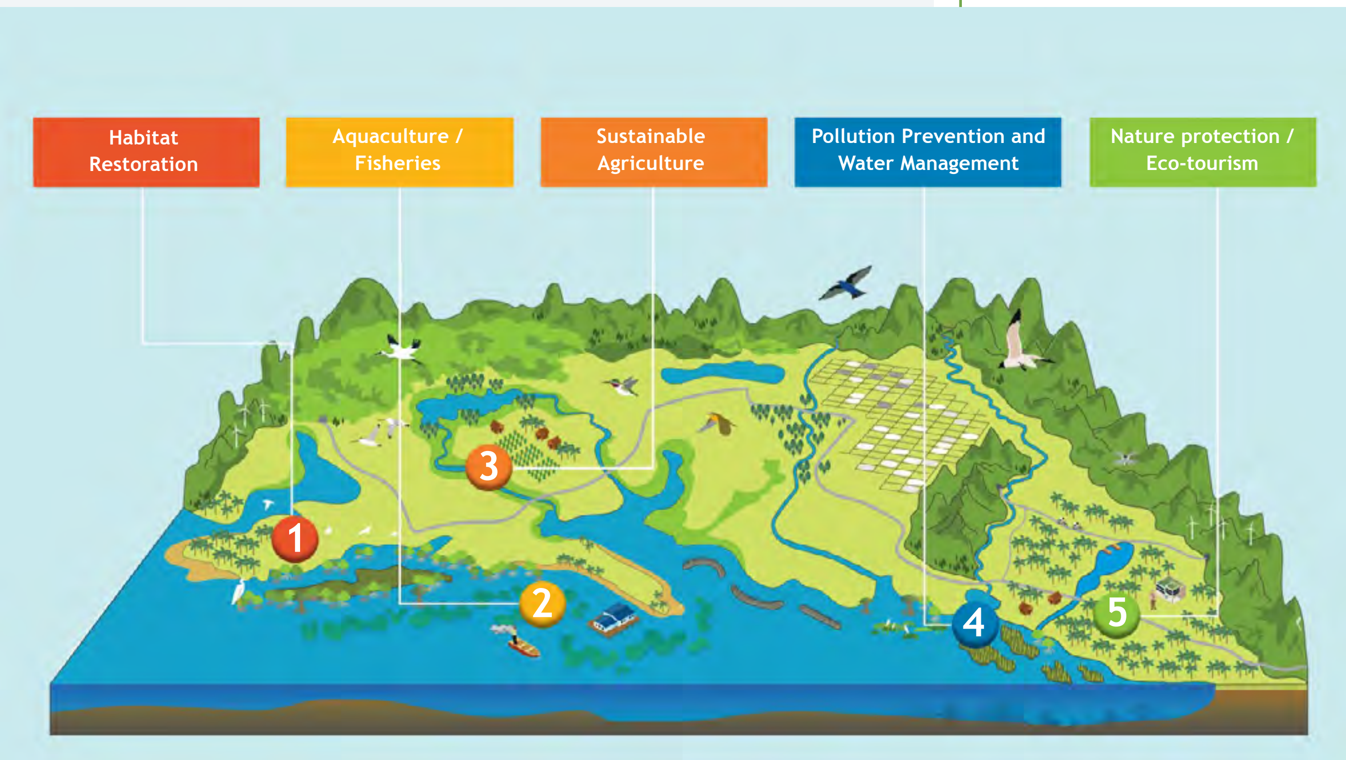
The Regional Flyway Initiative (RFI) was launched in 2021 with the aim to mobilize $3 billion in innovative and blended financing over ten years to protect, restore, and manage a network of priority wetland ecosystems along the East Asian-Australasian Flyway. By taking this regional approach the RFI can deliver impact at a flyway scale, a model that if successful could set a new and replicable precedent in conservation.

The East Asian-Australasian migratory waterbird flyway is of exceptional biodiversity importance. It supports 50 million migratory waterbirds from over 250 different populations. Its wetlands are also extremely important to the lives and livelihoods of around 200 million people, who use the ecosystem services provided for food, water, recreational/tourism opportunities, water purification and flood defence. However, these wetlands are threatened; for example around 65% of intertidal flats in the Yellow Sea were lost to reclamation over the last five decades[80]. As a consequence, 36 of the migratory waterbird species are now globally threatened. For humans consequences can also be severe: the loss of over 70% of wetlands in the Sanjiang Plain, north-east China, was estimated to reduce delivery of ecosystem services by $57.46 billion over six decades[81]. Conversely, conservation and restoration of these wetlands offers countries the opportunity to meet their targets under various multilateral agreements such as Nationally Determined Contributions under the Paris Agreement, National Development Plan objectives, and commitments to the Convention on Biological Diversity, Convention on Wetlands, and Sendai Framework on Disaster Risk Reduction.

The RFI was created in partnership between the Asian Development Bank (ADB), the East Asian-Australasian Flyway Partnership (EAAFP), and Birdlife International (BLI). The initiative is grounded in science and followed a rigorous site selection process which has identified the 147 highest priority sites for migratory birds within participating countries[82]. Having identified these sites, the

The East Asian-Australasian migratory waterbird flyway is of exceptional biodiversity importance. It supports 50 million migratory waterbirds from over 250 different populations.

Figure 12
Regional Flyway Initiative, East Asia.



CS5 cont.

Figure 13
Tundra Swans in South Dongting Lake Wetland (photo by the Hunan Government).

RFI has consulted with participating governments to further refine the list of sites so that a minimum of 50 early projects can be developed.

A particular innovation of the RFI has been the ecosystem services assessment work that has been led by the University of Southampton. Through this process built from the Toolkit for Ecosystem Services Assessment (TESSA)[68], participatory workshops, scenario planning, and innovative assessment methods were used to document and quantify the benefits provided by these key wetland sites. This provides critical information to support evidence-based decision-making regarding potential investments in conservation and restoration, and alignment with broader climate, social and conservation goals. It also raised awareness among stakeholders of the benefits of natural wetlands and economic valuation methods. Ultimately, this process has demonstrated that the proposed projects can deliver for nature, people and climate, and that investments in habitat restoration, sustainable agriculture, pollution control, water management, and ecotourism can be viable.

The RFI is now starting to show tangible results, with the first investments announced for wetland sites including Ramsar Sites in Cambodia at Koh Kapik in 2023 and at South Dongting Lake in China in 2024. Further projects are scheduled for approval in 2025, including an ADB loan project focused towards Minjiang and Zhangjiang Estuary Ramsar Sites in Fujian Province and a Global Environment Facility financed project in the Philippines which will support investments in three wetlands including Sibugay Wetland Ramsar Site.

For further information, see https://eaaflyway.net/regional-flyway-initiative/.

The proposed projects can deliver for nature, people and climate, and that investments in habitat restoration, sustainable agriculture, pollution control, water management, and ecotourism can be viable.

Wetland degradation has very large impacts in addition to wetland loss.

The estimates in this report of the decline of wetlands' contributions to people derive solely from estimates of wetland loss, that is, the conversion of natural wetland types to non-wetland, whether directly through human interventions such as drainage and reclamation, or indirectly through impacts such as sedimentation, or the effects of climate change.

However, the contribution of wetlands to people is also declining as a consequence of ecosystem degradation, and this is likely to represent a further cost to humanity. Wetland degradation comes in many forms, including chemical pollution, unsustainable harvesting of species and raw materials, and physical changes such as dams, which affect hydrology and reduce the connectivity of river ecosystems. Unlike wetland loss, degradation occurs in various degrees, from minor perturbations to a natural system, to the almost complete loss of natural communities, processes and functions.

There is an urgent need for global data on wetland degradation and its impact on ecosystem service delivery.

There are numerous examples of how degradation can reduce wetlands' contributions to people. For example, eutrophication, sedimentation and organic pollution of wetlands can severely reduce fish populations, and hence food provisioning services. Decreases in groundwater levels in peatlands greatly increase their carbon emissions[79].

There is an urgent need for data on global wetland degradation, models that describe the loss of ecosystem services as a function of the extent of degradation, and models that predict the outcome for ecosystem service delivery of measures to reduce and reverse wetland degradation.

The costs and benefits of wetland loss are not equitably distributed

This GWO shows that natural wetlands make large contributions to the well-being of human society, and that the loss of wetlands results in a loss of those contributions. Against this, converting wetlands to alternative land uses can result in the delivery of different, but very substantial contributions to people, such as the food provided by intensive agriculture[51].

Disadvantaged communities must have a voice in decisions about wetlands and their benefits.

However, the benefits and costs of wetlands and alternative land uses do not fall equally across human society: there are winners and losers. If wetland conservation is to be part of the delivery of wider social goals, then legitimacy and equity are vital considerations. Further, the success of wetland conservation depends upon it being seen as legitimate and equitable by decision-makers, whether they be international policymakers seeking to deliver on a broad social agenda, or local communities[55],[83],[84].

In many cases, vulnerable and disadvantaged groups in society receive fewer of the benefits of wetlands than those with greater assets (such as property rights, financial capital and social status), but are also more dependent upon the goods and services provided by natural wetlands[85]. Similarly, when wetlands are converted to other land uses, notably intensive agriculture or built infrastructure, ownership of the benefits tends to be held privately and by those with greater assets, while the cost of losing the wetland ecosystem services tends to fall on the disadvantaged[86],[87]. This disproportionate cost can arise because the provisioning services of natural wetlands, such as fisheries, are often held in common and hence are available to disadvantaged groups[88],[89]. Additionally, disadvantaged groups tend to be more reliant upon regulating services provided by wetlands, such as flood protection and clean water, because they tend to live in more vulnerable areas and have less access to alternative (engineered) options[85].

There are also wide geographic variations in who benefits from wetlands and suffers from wetland loss and degradation. Some wetland goods and services are provided to people living in or adjacent to wetlands; others, such as cleaner water and flood regulation, tend to be felt downstream of wetlands. Other services, in particular climate regulation, are benefits to all of humanity (though again, their loss due to wetland loss falls more heavily on the disadvantaged). Reduction in climate regulation is also an example of costs being unequally distributed among generations, with future generations incurring the cost of increased carbon emissions from wetlands while the current generation might reap the benefits of cheaper food that arises from the conversion of wetlands to intensive agriculture.

The need to consider the multiple dimensions of social equity and justice in valuing ecosystems, as well as in devising policies that aim to address the loss of ecosystem services, is an increasing focus of policymakers[55], and is a very important consideration in respect of the valuations we present here. Specifically, priority should be given to ensuring that disadvantaged communities are included in decision-making about wetlands and achieving equitable access to the benefits that flow from wetlands.

Despite limited data, this analysis shows that wetlands are immensely important in their own right and, relative to other ecosystems, deliver enormous benefits to humanity. The total median annual value of the ecosystem services provided by wetlands is estimated at $7.98 trillion 2023 Int$. There has been an accumulated loss of $5.1 trillion 2023 Int$ in wetland services over the last 50 years. This reflects the intimate link between wetlands and human societies. It also highlights that recent and current wetland loss and degradation have diminished these benefits substantially, and there is a high risk of further losses under expected future scenarios. Based on the preliminary valuation presented here, benefits to humanity of arresting and reversing wetland loss are abundantly clear.

3. CONSERVING AND RESTORING THE WORLD'S WETLANDS

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Global targets for wetland conservation and restoration

Conservation and restoration of wetlands is recognised as an urgent global priority[91]. Wetlands are some of the world's most threatened ecosystems[92],[93] and their protection, restoration and wise use are vital to achieve biodiversity[94], climate[95] and sustainable development goals[94].

The Convention on Wetlands 4th Strategic Plan (2016-2024) presented a vision where "Wetlands are conserved, wisely used, restored and their benefits are recognised and valued by all". Wetland management actions are occurring in all regions, creating positive outcomes, including, for example, the collective efforts of the Global Mangrove Alliance to halt loss and restore mangrove ecosystems[96]. However, the lack of measurable, time-bound targets under the Convention has been an impediment to effective implementation. For example, although national commitments for land restoration under the UN Convention to Combat Desertification (UNCCD) currently cover around 1 billion hectares (ha), this includes only a small area of wetlands, with most commitments focused on forest and cropland restoration[97]. More needs to be done to conserve and restore wetlands.

A pivotal moment for global ecosystem restoration and conservation was the adoption of the Kunming-Montreal Global Biodiversity Framework (KM-GBF) in December 2022[98]. The agreement contained four goals and 23 targets to halt and reverse biodiversity loss by 2030 across terrestrial, inland water, coastal and marine ecosystems, focusing on areas important for biodiversity and ecosystem services, including wetlands[99].

The KM-GBF aligns with the strategic goals of the Convention on Wetlands[94] and provides ambitious targets for restoration and conservation of inland water, coastal and marine ecosystems, which apply to wetlands[1], including:

- **restore at least 30% of all degraded ecosystems (Target 2)[2],**
- **conserve at least 30% of land, waters and seas in protected areas and OECMs (Target 3), and**
- **restore, maintain and enhance nature's contributions to people (Target 11)**

BOX 4: WETLAND CONSERVATION AND RESTORATION DEFINITIONS

Wetland conservation is defined as the maintenance of wetlands' ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development. This definition emphasises that wetland conservation is not just about protection, but also about sustainable management that ensures wetland biodiversity, ecological processes, and functions are maintained while meeting the needs of current and future human populations.

Wetland restoration is the process of assisting the recovery of a wetland that has been degraded, damaged or destroyed. It encompasses a broad range of activities that promote a return to original wetland conditions or that improve wetland ecological character without necessarily promoting a return to pre-disturbance conditions. Restoration activities often involve re-establishing native vegetation, restoring hydrological dynamics, removing pollutants, and controlling invasive species to reinstate natural wetland functions.

For further information, see Handbook 19 of the Convention on Wetlands[90].

1 Wetlands as defined under the Convention are equivalent to Inland waters and as part of coastal areas and marine areas under the KM-GBF
2 Target 2 relates to the area of degraded wetlands that are under effective restoration.

Table 10
The scale of conservation and restoration required to meet Target 2 and Target 3 of the KM-GBF.

	Target 2		Target 3	
Wetland category	**Wetland area lost since c.1970 (million ha)**	**30% restoration target (area, million ha) ***	**Remaining wetland area (million ha)**	**30% conservation target (area, million ha)****
Seagrass	6.98	2.09	35.88	10.76
Kelp forests	1.58	0.48	1.71	0.51
Coral reefs	12.50	3.75	34.84	10.45
Estuaries	0.08	0.03	27.87	8.36
Salt marshes	0.86	0.26	5.29	1.59
Mangroves	2.02	0.61	15.11	4.53
Tidal flats	3.86	1.16	12.79	3.84
Lakes	122.85	36.85	271.53	81.46
Rivers and streams	3.73	1.12	58.93	17.68
Inland marshes and swamps	177.00	53.10	461.65	138.50
Peatlands	80.04	24.01	500.00	150.00
Total (ha)	**411.50**	**123.45***	**1,425.60**	**427.68**

* Calculation is based on 30% of wetland area lost (destroyed/converted to other land use) since c.1970 (see section 1). The target is conservative because it does not include degraded/damaged wetland ecosystems, i.e. wetlands that remain but have modified ecological character. The World Wetland Survey (2024) reported that 22.6% of remaining wetlands are in a poor state, i.e. degraded.

** Calculation is based on 30% of the remaining wetland area (see section 1)

Achieving the 2030 targets for wetlands is equally important for the UN Framework Convention on Climate Change (UNFCCC) objectives to reduce greenhouse gas emissions[95], SDG Target 6.6 to protect and restore water-related ecosystems[99], as well as SDGs to conserve marine resources (SDG 14) and life on land (SDG 15). This highlights the importance of implementing harmonized reporting to track progress of Contracting Parties towards targets under the Convention on Wetlands, the KM-GBF and for SDG Indicator 6.6.1[100]. Further, it is critical for countries to include wetland conservation and restoration in their Nationally Determined Contributions (NDCs) to manage and reduce carbon emissions.

Recognising the urgency of the issue, the UN Decade on Ecosystem Restoration (2021-2030) was proclaimed by the UN General Assembly to revive ecosystems worldwide for the benefit of people and nature[101]. In response, global and regional initiatives for wetland restoration have advanced, including the Freshwater Challenge launched in March 2023 at the UN Water Conference, which aims to restore 300,000 kilometres of degraded rivers and 350 million ha of degraded wetlands by 2030, as well as securing the protection of freshwater ecosystems[102].

Restoring wetlands is essential for achieving the SDGs, the Paris Agreement, and the Kunming-Montreal Global Biodiversity Framework.

The Global Wetland Outlook 2025 summarises data on the remaining extent of wetlands and the extent of wetland loss since c.1970 (see section 1), across 11 inland freshwater and coastal/marine wetland types. The baseline period 1970 is applied since it corresponds to information on wetland loss rates contained in the WET Index[103], the most comprehensive information on wetland extent trends currently available. Based on this information, it is possible to estimate the area of wetlands (in millions of ha) required to meet the 30% restoration and 30% conservation targets under the KM-GBF (Table 10) for these 11 wetland types, focused on the area of wetlands lost or converted to another land use.

Action to restore at least 123 million ha of wetlands is required to achieve Target 2 of the KM-GBF, for the 11 wetland types evaluated, based on the area of wetlands transformed to agriculture and other land uses since c.1970 (Table 10). The targets for restoration includes ~37 million ha of lake ecosystems, ~53 million ha of inland marshes and swamps and ~24 million ha of peatlands. However, the total extent is an underestimate since it excludes degraded wetlands that have declined in ecological character. The 2024 World Wetland Survey reported a continued decline in wetland condition in most regions since 2017, with approximately 23% of remaining wetlands in a degraded state. Considering this, the 30% target for wetland restoration is anticipated to be >350 million ha, in alignment with the restoration target estimated by the Freshwater Challenge.[1] For example, the 30% target estimated for estuaries is relatively low (6,077 ha), which may reflect inadequacies in mapping or a reflection that estuaries are not as easily transformed to other land uses.

The global effort to achieve Target 3 of the KM-GBF will also be substantial. Action to conserve approximately 428 million ha of wetlands in protected areas and OECMs is required for the 11 wetland types assessed, based on the extent of remaining wetlands (Table 10). This includes approximately 150 million ha of peatlands and 139 million ha of inland marshes and swamps. Critically, the 30% target for conserving wetlands does not mean other wetlands are not valuable. The wise use of all wetlands remains a core pillar of the Convention, particularly given the need to safeguard wetlands worldwide to achieve global climate and sustainable development goals, including avoiding greenhouse gas emissions from drained peatlands.

Achieving the 30% restoration target will likely require restoring more than 350 million hectares of wetlands.

While mobilisation of resources necessary for large-scale restoration is gaining momentum in some regions[104] and many wetlands already occur within protected areas and OECMs, and recognizing Indigenous-managed lands, where applicable,[105], there is a persistent gap between commitments and implementation. Further, past global assessments have indicated that only 15-16% of inland waters are currently covered by protected areas, suggesting wetlands are still far from reaching the global target[106]. A substantial increase in on-ground management, improved policy development, and catchment-scale spatial planning will be necessary to respond to the drivers of wetland degradation for inland, coastal and marine environments.

BOX 5: TARGETS OF THE KUNMING-MONTREAL GLOBAL BIODIVERSITY FRAMEWORK

Target 2. Restore 30% of all Degraded Ecosystems

Ensure that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and coastal and marine ecosystems are **under effective restoration**, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity

Target 3. Conserve 30% of Land, Waters and Seas

Ensure and enable that by 2030 at least 30 per cent of terrestrial, inland water, and of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are **effectively conserved and managed** through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognising Indigenous and traditional territories where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognising and respecting the rights of Indigenous peoples and local communities, including over their traditional territories.

Target 11. Restore, Maintain and Enhance Nature's Contributions to People

Restore, maintain and enhance nature's contributions to people, including ecosystem functions and services, such as regulation of air, water, and climate, soil health, pollination and reduction of disease risk, as well as protection from natural hazards and disasters, through nature-based solutions and/or ecosystem-based approaches for the benefit of all people and nature.

For further information, see https://www.cbd.int/gbf/targets.

1 See https://www.freshwaterchallenge.org.

Achieving multiple outcomes: wetlands for biodiversity, climate and sustainable development

Globally, many thousands of wetland restoration projects are underway, with nearly three-quarters of countries involved in restoration activities at some level[104]. To guide conservation action to where it is needed, policymakers, funding organisations, industry and wetland managers are encouraged to: (1) understand the scale of wetland loss and degradation (see to section 1), (2) increase awareness of the costs to society of wetland loss (see section 2), (3) determine the priority actions to restore and conserve wetlands, and, (4) consider the financing gap faced by different regions and Contracting Parties to achieve the goals and targets of the Convention on Wetlands, and related agreements such as the KM-GBF.

In many river basins, cross-sectoral partnerships and transformational change will be required to mitigate and remediate pollution, habitat loss and over-exploitation of water resources. Transboundary collaboration, such as for the Mekong River[107] and through the UNECE Water Convention[108], is also necessary given the connectivity and fragility of inland freshwater and coastal wetlands. Responses need to be future-focused, as highlighted by the IPBES Nexus Assessment adopted in December 2024[109]. with investment in land and water resource management considering the five nexus elements of biodiversity, water, food, health and climate. In the past, where actions were too climate or food production focused, investment to sustain wetland resources may have benefited one sector but caused impacts elsewhere. Subsequently, integrated and inclusive spatial planning is called for to deliver multiple outcomes through wetland management.

Integrated, inclusive spatial planning is needed to deliver multiple benefits from wetland conservation.

Awareness of multiple objectives for conservation and restoration will enhance synergies and leverage additional resources to support the wise use of wetlands, in contrast to wetland initiatives with a narrow focus (e.g., focus only on species enhancement, or water quality regulation). For example, the close interactions between environmental, social, and economic sectors need to be considered to achieve long-term and sustainable outcomes for lake ecosystems.[110]


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CASE STUDY 6. **PRIVATE SECTOR SUPPORTING PEATLAND RESTORATION, CANADA**

Wetland type: Peatlands (boreal and temperate)

The Canadian horticultural peat industry has a relatively small footprint, contributing to disturbance of circa 36,000 hectares of peatlands in Canada, equivalent to 0.03% of the peatlands extent, but they are playing a significant role in facilitating the advancement of scientific research to support ecological restoration. The peat industry has supported research for more than 30 years to enhance peatland restoration techniques and establish a long-term monitoring programme to evaluate restoration outcomes. Monitoring of 150+ restoration sites across Canada has produced a nationally and globally significant database to increase knowledge of the effectiveness of management interventions.

The science-industry partnership is having a far-reaching impact. The horticultural peat industry has since restored over 8,000 hectares of peatlands and adopted a National Peatland Restoration Initiative to achieve 100% restoration of the historical footprint. The programme also benefits climate mitigation activities, demonstrating that active restoration with moss reintroduction enables recovery of carbon sequestration to an average level of 75 grams of carbon per square meter per year within a period of 9 to 12 years. The Canadian horticultural peat industry continues to invest in research on responsible and sustainable practices to decrease the impact of peat extraction. Partnerships between the private sector and academia continue to be winning combination to enhance the extent and success of restoration.

For further information, see Allan et al.[111].

Figure 14
Ecosystem-scale bog restoration using the Moss-layer-transfer-technique in partnership between private sector-academia.

Note. The three brown peat fields are the unrestored part abandoned 42 years ago, and the 8 left peat fields were restored 25 years ago. Now a new peat moss layer of 30 cm thick has developed, making the ecosystem a C sink again.

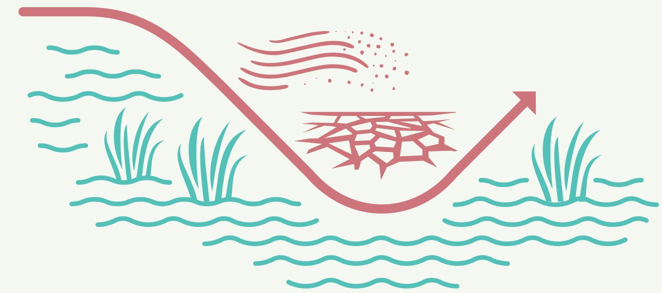
The science-industry partnership is having a far-reaching impact. The horticultural peat industry has since restored over 8,000 hectares of peatlands and adopted a National Peatland Restoration Initiative to achieve 100% restoration of the historical footprint.

The recent assessment of the Convention on Wetlands progress on wetland restoration noted that due to financial and practical limitations, prioritisation is necessary to identify the wetland areas most in need of investment[104]. Considering the Strategic Goals of the Convention, and the findings of the GWOs (2018, 2021 and 2025).

Recommended priorities for wetland conservation and restoration for the next decade

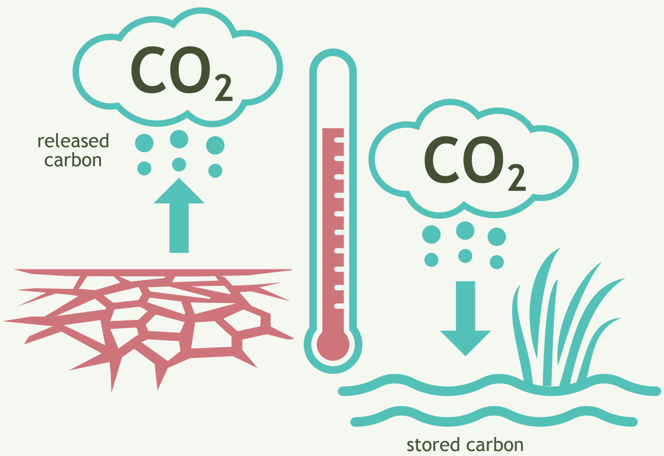
Reverse the trend of wetland loss and degradation in regions most at-risk

The loss of wetlands and decline in their ecological character is continuing. Some areas have been more impacted by land use change and water resource development than others. Policymakers should prioritise conservation of existing wetlands to prevent further losses and at the same time invest in restoration of degraded wetlands, focusing on areas with the highest potential for recovery. Addressing the key drivers of wetland loss and degradation will vary between countries, but often include unsustainable agriculture and infrastructure, land use change, pollution or overexploitation.



Respond to climate change

As global warming changes the Earth's atmosphere and biosphere, affecting weather patterns, nature and people[1], conserving and restoring wetlands, particularly peatlands and blue carbon ecosystems, is essential as part of the global response to reduce anthropogenic greenhouse gas (GHG) emissions. An estimated 50 million ha of peatlands have been drained and converted into grazing land, forestry land and cropland, contributing approximately 4% (2 Gt CO2-eq/year) of GHG[112] and up to 5% when considering peat fires[21]. Similarly, blue carbon ecosystems (mangroves, seagrass, saltmarsh) also sequester and store significant amounts of carbon [113]. It remains critical for countries to include wetland conservation and restoration in their Nationally Determined Contributions (NDCs) to reduce global carbon emissions.



Enhance the ecosystem services that wetlands provide to people

The wise use of wetlands and their services and resources supports people and their livelihoods[114]. Wetlands contribute to global food security by supporting agriculture and providing livelihoods, as a water source for crops and livestock, and as a habitat for rice production and aquaculture, helping to meet the world's Sustainable Development Goals[115]. A meta-analysis of 70 restored wetlands[116] demonstrated 36% higher levels of provisioning, regulating and supporting ecosystem services than degraded wetlands, with restored wetlands showing levels of provisioning and cultural ecosystem services similar to natural wetlands. Even small-scale wetland restoration demonstrates improved wetland health and ecosystem services, and can effectively use marginal land[117].

Protect wetland biodiversity under threat of extinction

Effective management of critical habitats for wetland-dependent threatened species is necessary to protect the world's biodiversity. The Living Planet Report 2024[118] reported that wildlife populations in freshwater ecosystems have suffered an 85% decline on average in the Living Planet Index, based on an assessment of over 1,400 freshwater species. Innovative approaches to recover threatened species should be implemented, in addition to best-practice wetland actions. For example, amphibian species richness or abundance at restored and created wetlands tended to be similar to or greater than at natural wetlands[119].

Increase the resilience of urban and rural communities to natural disasters

Degradation of wetlands reduces the resilience of human society to water-related hazards such as floods, droughts and storm surges. Integrating wetlands as natural infrastructure for disaster risk reduction (DRR) can mitigate hazards and increase the resilience of local communities and those living across entire river basins or coastal zones[120].

Applying best-practice wetland management and policy will be paramount for the success and sustainability of global conservation efforts, thereby avoiding costly failures and the need for repeated interventions. Best-practice methods, including standards-based approaches in respect of the KM-GBF[121], ensure that restoration activities effectively re-establish and protect the complex hydrological and ecological functions necessary to maximise the delivery of ecosystem services, such as biodiversity support, carbon sequestration, water quality improvement and coastal protection. Resolution VIII.16 of the Convention on Wetlands provided overarching guidance on wetland restoration[122], while detailed technical knowledge is captured in resources such as the global guidelines for peatland rewetting and restoration[123] and the Global Mangrove Alliance's guidelines for mangrove restoration[124]. The integration of ecosystem-specific technical, local community and Indigenous knowledge is equally critical to provide the greatest possible return on investment in improving ecological character and increasing societal benefits.

BOX 6: UPSCALING WETLAND CONSERVATION, RESTORATION AND WISE USE THROUGH NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLANS

Wetlands can contribute to the delivery of all 23 KM-GBF targets. However, as a priority, wetlands need to feature strongly in National Biodiversity Strategies and Action Plans (NBSAPs) in the following ways:

- **Target 1 on spatial planning**: NBSAPs should identify wetlands that count as "areas of high biodiversity importance, including ecosystems of high ecological integrity", and set out how biodiversity-inclusive spatial planning will ensure better protection of wetlands.
- **Target 2 on restoration**: NBSAPs should include ambitious national targets (in hectares, and kilometres for rivers) and plans for wetland restoration, contributing to the restoration of at least 30% of areas of degraded terrestrial, inland water, and coastal and marine ecosystems globally by 2030.
- **Target 3 on conservation**: NBSAPs should include specific targets and plans for increasing the area of inland, as well as marine and coastal, wetlands in protected areas and other effective area-based conservation measures (OECMs), including Wetlands of International Importance and their effective management, contributing to the conservation of at least 30% of terrestrial, inland water, and of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services. National targets here should be in hectares for wetlands and kilometres for rivers, including management plans.

For further information, see the STRP Technical Report 12 of the Convention on Wetlands[94].

Investing in nature: the cost to conserve and restore wetlands

The scale of investment to meet the 2030 KM-GBF targets for biodiversity depends on multiple factors. Some wetlands remain largely unmodified by human-induced disturbance, and their ecological character is not degraded, requiring minimal direct management. However, many wetlands have been subject to prolonged and extensive disturbance that necessitates wetland- or river-basin scale interventions to address major water diversions or land use transformation.

A synthesis of wetland restoration and conservation cost estimates from 42 published studies covering inland freshwater and marine/coastal wetland types (185 data points) is presented in Table 11. The estimates of wetland management costs (in Int$/ha/yr) can inform resource mobilisation across environment, water, energy, urban and agricultural sectors, and raise awareness of the economic reality of addressing the historical loss and degradation of natural ecosystems and the benefits of conserving the world's remaining wetlands.

The collated information, however, provided limited insights on opportunity costs that correspond to restoring wetlands in different socio-economic situations. Opportunity costs can be the most significant barrier to wetland conservation and wise use, especially where land values and other financial drivers have a strong influence. These costs, including the costs associated with reverting land use from intensive agriculture to more diverse farming systems, are also often highest in areas where wetland ecosystems are most depleted and threatened.

Table 11
Average restoration and conservation costs for different wetland types (2023 Int$/ha/yr)

Wetland type	Average restoration cost (2023 Int$/ha/yr)	Average conservation cost (2023 Int$/ha/yr)	Ratio (Rest:Cons)
Seagrass	18,402	*	*
Kelp forests	27,198	*	*
Coral reefs	37,343	304	123:1
Estuaries	*	*	*
Salt marshes	28,952	3,880	7.5:1
Mangroves	2,332	*	*
Tidal flats	5,069	*	*
Lakes	*	*	*
Rivers and streams	71,346	*	*
Inland marshes and swamps	24,308	64	379:1
Peatlands	1,094	610	1.8:1

Estimates from the database on restoration and conservation costs from 42 published studies (185 data points) collated by Conservation Strategy Fund (GWO 2025 Technical Note).

* Insufficient data estimates for wetland type.

The costs for restoring wetlands ranged from $1,094 (peatlands) to $71,346 (rivers and streams) per hectare annually, with variation between wetland types. For example, costs to restore inland marshes and swamps appear higher ($24,308/ha/yr) than peatlands ($1,094/ha/yr). This illustrates the potential to increase the extent of peatlands under restoration with simple and cost-effective interventions (e.g., rewetting[125]) to reduce carbon emissions from drained organic soils, attenuate fire risk and enhance peatland biodiversity. In contrast, the modification to land and water use on floodplains means the costs to restore inland swamps and marshes are often significant. Wetland restoration costs also vary in the duration they need to be applied, with some pressures (e.g., invasive species) requiring prolonged management interventions, while physical changes to wetlands (e.g., drainage) may be effectively restored over short-term time periods.

In some regions (e.g., Asia), human population density, intense land competition, and the cultural and socioeconomic reliance on wetlands for productive activities like agriculture and aquaculture can elevate the opportunity costs associated with restoring wetlands. In other regions (e.g., North America), the lower population pressures, less economically intensive land uses, and compensation mechanisms for landowners contribute to comparatively lower costs.

Restoration costs vary widely—from $1,094/ha/yr for peatlands to over $71,000/ha/yr for rivers and streams.

Based on the data available, far less investment is required to conserve existing wetlands than to restore wetlands (Table 11), emphasising the importance of preventive measures to avoid their loss and degradation. Further, while restoration measures can be put in place, the time required for a wetland to recover, combined with the uncertainty of restoration outcomes, puts even more importance on prioritising conservation. Conservation costs were lower than restoration for all wetland types where data were available (coral reefs, peatlands, salt marshes, inland swamps and marshes). Inadequate recognition of the values and services provided by wetlands will increase the burden on government, environmental non-governmental organisations, industry, local communities and other sectors in later years, as costs to restore wetlands multiply following degradation and loss of wetlands.

CASE STUDY 7. EVALUATING RELATIVE WETLAND RESTORATION COSTS IN THE MEDITERRANEAN REGION

Wetland type: Multiple

The Mediterranean region has developed a valuable tool to map restorable wetlands in a given area (country, watershed, etc.) and indicate the relative costs (e.g., High, Moderate, Low) for their restoration. The tool enables local and national authorities and wetland managers to target the most promising areas geographically for restoration projects.

The method developed by the Mediterranean Wetland Observatory consists of three stages. First, Potential Wetland Areas (PWA) are mapped at the desired scale, using a rule-based classification model that considers topography, hydro-geomorphology, soils, and climate variables. Mapping PWAs enables identifying and delineating all wetland ecosystems, including lost wetlands. Secondly, a Land Use and Land Cover (LULC) map is produced using satellite image time series data, identifying existing wetlands and assessing conservation status and the main pressures and threats the wetlands face. Finally, combining PWAs and LULC maps is used to determine the Potentially Restorable Wetlands (PRW), i.e., transformed wetlands due to human activities, and the estimation of their "restorability" using an expert-based scoring system depending on which LULC class they have been converted to. For instance, ancient wetlands that are today urban or industrial areas will typically receive a Low score, whilst some types of farmland, e.g., irrigated fields, will have a High score.

The tool has been applied to several major watersheds in the Mediterranean basin, including the Sebou basin in Morocco (Figure below). This watershed has lost approximately 93% of its historical wetlands, which used to cover almost 20% of the basin.

For further information, see Guelmami[126].

Mapping potentially restorable wetlands ensures restoration efforts are strategic—not symbolic.

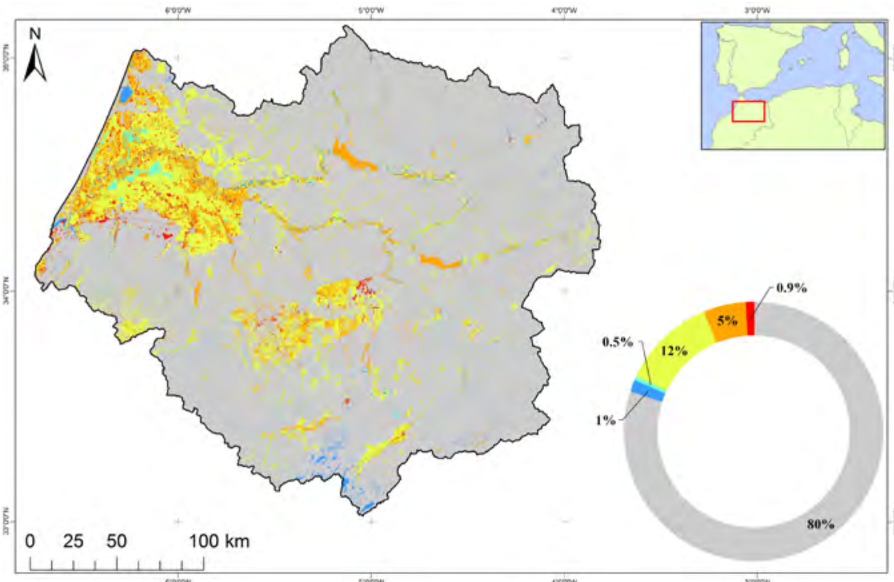


Figure 15
Potentially Restorable Wetlands (PRW) in the Sebou river basin (Morocco), with an estimation of the needed regain efforts.

- Unsuitable
- Unconverted natural wetlands
- Low efforts
- Moderate efforts
- High efforts
- Very high efforts

Data limitations must be recognised, however. For instance, there are few published information sources on the costs of wetland conservation, which significantly limit assessment of the resources required to conserve 30% of the world's remaining wetlands. Data on wetland management costs are not often reported in the literature, and it is acknowledged that restoration costs may be greater in high-income countries than in lower and middle-income countries, partially due to higher wages, land and fuel costs[127]. Project scale, the extent of habitat degradation, restoration techniques and local site conditions will also contribute to data variability.

The financing gap for wetlands

Nature conservation faces substantial funding challenges. The spending on biodiversity conservation in 2019 for all ecosystems was $124-$143 billion, against a total annual estimated biodiversity protection need of $722-$967 billion, causing a financing gap of $598-$824 billion each year[128]. The restoration gap for peatlands and mangroves alone has been estimated at $316 billion by 2050[129] and for coastal wetlands, between $27 and $37 billion annually[130], while recognising these estimates may not consider the potential for other sustainable livelihoods, such as paludiculture that mitigate opportunity costs associated with restoration. In addition to funding shortfalls, subsidies remain that directly or indirectly lead to ecosystem loss and degradation in many regions, including the agriculture, fisheries and energy sectors[131].

At least 123 million hectares must be restored—and 428 million hectares conserved—to meet global wetland targets.

The Global Wetland Outlook 2025 indicates that action to **conserve and restore at least 550 million hectares of wetlands** is needed to meet Target 2 and Target 3 of the KM-GBF (Table 10). That is, to restore at least 123 million ha of wetlands (increasing to an estimated 350 million ha when including the extent of degraded wetlands) and to conserve an estimated 428 million ha of remaining wetlands.

Applying a highly simplified and nominal annual cost to restore and conserve wetlands of 500-1,000 2023 Int$ per hectare (see Table 11) provides a preliminary estimated of the financial gap faced. A first order approximation is that between 275-550 billion Int$ may be required to effectively manage wetlands. The estimate considers average restoration costs for different wetland types from available studies, with values ranging from 1,094 Int$/ha/yr for peatlands, to 37,343 Int$/ha/yr for coral reefs, as well as conservation costs.

There are known limitations in the financing gap estimate due to high uncertainty in the mapping of current and historical wetland extent and variability of cost estimates per hectare. The anticipated costs for lake ecosystems for example are likely underestimated, as significant resources are typically required to respond to lake ecosystem degradation. Around the world, the excessive use of nitrogen and phosphorus has caused eutrophication of lake ecosystems, leading to algal blooms and loss of biodiversity that requires mitigation at the watershed scale over many decades[110] Further, as wetland management initiatives proceed, the on-the-ground activities to address hydrological issues, invasive species, or pollution may decrease over time.

Delaying investment in wetlands risks rising restoration costs and irreversible biodiversity loss.

The global financing gap in of the order of $275-550 billion is substantial, in the order of 0.5% of the global GDP in 2023[132], highlighting the importance of novel and adaptive pathways to integrate wetland wise use into sustainable development. Delayed action is also a risk, as costs to safeguard nature and the services it provides can increase over time[109]. The funding gap reinforces the need for national wetland conservation and restoration targets to be accompanied by specific, costed investment plans, reflecting the UNEP call to quadruple restoration finance by 2030 to meet climate, biodiversity, and land targets[133].

CASE STUDY 8. COASTAL WETLAND RESTORATION SUPPORTS THREATENED SHORE BIRDS AND GROWS ECOTOURISM, CHINA

Wetland type: Coastal tidal flats

Tiaozini in Jiangsu Province, China, is a coastal wetland historically threatened by land reclamation plans. It has since been designated a World Heritage Site, and the focus has shifted from reclamation to ecological conservation, with the area now developed for ecotourism. Tiaozini is one of the most important stopover sites for hundreds of thousands of migratory shorebirds on the East Asian-Australasian Flyway and in the Yellow Sea Ecoregion. The Tiaozini intertidal area is roughly 80,000 ha, of which 7,000 ha was reclaimed in 2010. Such changes led to the loss of livelihoods for local fishermen despite economic compensation having been agreed between the reclamation company and the fishery community. The tidal marsh wetlands were of low habitat quality and supported few water birds at high tide.

Beijing Forestry University partnered with Mangrove Foundation and Dongtai Coastal Economic Development District to restore 50 ha of aquaculture fishing pond into a high tide roosting site, under the mechanism of eco-compensation. The main objectives were to restore muddy tidal areas, sand beach and shallow water with water levels controlled by a sluice gate. Monitoring facilities, nature education information and a visitor centre were also developed as part of the restoration project to realise its ecosystem services. These include research, education, and ecotourism. During the preparation of Tiaozini and Yancheng's nomination for World Heritage in 2018, the local government established a wetland park in the reclaimed area, restoring a high tide roosting site.

While the cost to fishery companies was estimated at around $100,000 per year, the ecotourism and biodiversity benefits have been significant. Shorebird populations have increased markedly, from around 70,000 shorebirds in 2020 to 350,000 birds in 2024. The restoration programme also supports the conservation of threatened shorebirds. In 2024, 73 spoon-billed sandpipers and 1,450 Nordmann's greenshanks were recorded.

The success of the restoration led the local government to pursue ecotourism. Visitors from all over the country and abroad come to Tiaozini to see the water birds. The revenue from ecotourism has reached more than $20 million and employed more than 100 local community members. The project has restored only a very small proportion of the reclaimed area, attracting millions of visitors and generating 10 times more income than the previous fishery. More importantly, the project has offered society an excellent opportunity to experience bird watching, as well as the beauty of nature.

For further information, see https://whc.unesco.org/en/list/.

Restoring 50 hectares of tidal flats has transformed Tiaozini into a vital sanctuary for threatened migratory birds

Figure 16.
Shorebirds take flight over restored tidal wetlands in Tiaozini, China.

4. PATHWAYS FOR CONSERVATION AND WISE USE OF WETLANDS

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Transformative change for wetlands

Thriving ecosystems, such as wetlands, support humanity's just and sustainable future. The decline and degradation of nature, including wetlands, carries immense costs for governments, economic sectors and communities (see Section 2). Unless nature is brought into decision-making at all levels, our ability to wisely use the biosphere's goods and services efficiently while allowing regeneration so that these are sustained and enhanced over time remains compromised. The world is facing a colossal biodiversity financing gap – current investments in conservation are only about one-fifth of the finances needed to arrest the decline and loss of biodiversity[128]. This Global Wetland Outlook has identified the immense scale of resources needed to conserve 30% of the world's remaining wetlands and to restore 30% of lost and degraded wetlands (see Section 3). Simultaneously, nature-negative public and private financial flows, such as environmentally harmful subsidies, have only increased over time, severely undermining the impact of nature-positive investments (for example, using wetlands as nature-based solutions)[129].

Bridging the financing gap for wetlands conservation and wise use needs investments at two levels. The first includes substantially enhancing and unlocking investments in actions that contribute to the conservation, restoration, and sustainable use of nature and her ecosystem services[134],[135],[136]. The second needs to be aimed at directing financial flows away from investments that adversely impact nature and the flow of ecosystem services, towards investments that mitigate negative impacts while delivering positive environmental co-benefits[137],[138]. This section illustrates pathways that can help achieve these.

Pathway 1: Improve natural capital valuation and integration in decision-making

Values form an important basis of economic decision-making, including resource allocation to wetlands conservation and wise use. As several wetland ecosystem services have "public goods" characteristics, market mechanisms tend to fail to capture these and thus provide inadequate signals to decision-making[139],[140]. Valuation failures drive unsustainable production and consumption practices and processes, ultimately degrading wetlands. There is a pressing need to address these valuation failures. The science-based valuation of nature and her contributions to people has considerably improved in recent years. The recently concluded IPBES assessment on the values of nature provides a compilation of over 50 methods that can be used to unpack diverse values of nature, and all of these can be effectively applied in the context of wetlands[141].

A significant shift in perspective is that economic systems and financial mechanisms must recognise the true wealth of wetlands, the invisible and visible, not just a limited subset of benefits[142]. Traditional economic "progress" has been highly correlated with the degradation of wetlands, but this does not need to be the case. By recognising wetlands as a shared benefit, embedding wetlands into good natural capital accounting, and changing our approach to finance, we can redefine how we govern wetlands. Further, there needs to be a shift from addressing the negative drivers and pressures (e.g., pollutants) once the wetlands are degrading or degraded (and considered as externalities), towards ensuring that wetlands are conserved and wisely used from the start. For example, in 2022, private finance investments in activities that directly harm nature were estimated to be at least $5 trillion, 140 times more than the private funding currently directed toward nature-based solutions (NbS)[129].

The System of Environmental and Economic Accounting (SEEA) presents information on the contribution natural capital makes to economic activity and provides a framework for including natural capital in macroeconomic analysis and policy-making at various levels[143]. Natural capital accounting (NCA) can provide information on the contribution that the stocks of natural assets and the flow of ecosystem services make to human well-being, but it can also include their importance to ecosystem integrity and biodiversity[144],[145]. The application of NCA can be facilitated by integrating diverse knowledge systems based on different values (such as data from biophysical modelling, economic modelling, perception surveys) incorporating systems-thinking approaches, making better use of digital technology (especially data from earth observation), and incorporating natural capital into financial and management accounting[146]. By 2024, 94 countries have implemented SEEA[147], indicating that its application is gaining currency.

Transformative change for wetlands can be enabled by mobilising value-based levers[148]. The first of these is recognising the full range of values of wetlands. The second is to embed these values in decision-making. The third lever is to reform policies to support wetland conservation and, importantly, to prevent degradation before it occurs. Policymakers should be encouraged to value wetlands as critical natural capital and integrate them into climate change, water management, and sustainable development agendas. Strengthening intergovernmental cooperation, fostering multi-stakeholder involvement, and aligning wetland conservation goals with national and global environmental targets are key strategies to ensure effective governance and management of wetlands. Lastly, a broader shift in society toward wise use of wetlands needs to be encouraged by triggering shifts and deep changes in individual and societal views, structures and practices which respect and provide stewardship to the plural values of wetland. This can be achieved, for example, by advancing strategies and actions for conservation, restoration and wise use of wetlands that integrate across views, structures and practices specifically to address underlying causes of wetland loss and degradation[149].

Policymakers should be encouraged to value wetlands as critical natural capital and integrate them into climate change, water management, and sustainable development agendas.

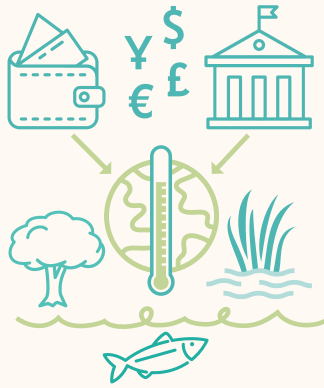
CASE STUDY 9. **BLUE ALLIANCE PUBLIC PRIVATE PARTNERSHIP (PPP) FRAMEWORK FOR MPAs**

Wetland type: coral reefs (8,000 km² section of the Mesoamerican Reef)

Blue Alliance is an international non-profit organization focused on the co-management of marine protected areas (MPAs), working in partnership with governments to restore coral reef ecosystems and enhance local livelihoods. The organization advances marine conservation finance by supporting reef-positive blue economy enterprises such as ecotourism, fisheries improvement projects, blue carbon credit initiatives, and community-based aquaculture. Its model relies on providing up-front and early-stage capital to grow these enterprises to the point where they can attract private investment. Blue Alliance currently manages 80 MPAs across the Philippines, Indonesia, Zanzibar, and Belize, protecting 1.42 million hectares of coral reef ecosystems and supporting more than 18,000 coastal community members – half of the MPAs under its management are already generating revenue.

For further information see https://bluealliance.earth/how-we-work.

Pathway 2: Recognise wetlands as an integral component of the global water cycle for all people



There is a compelling case to reframe the role of wetlands in the global water cycle as a global public good for all humanity, connecting countries and communities regionally and globally, including in overcoming the ongoing and deepening biodiversity and climate crises[150]. The interdependence of people and wetlands is not merely through transboundary blue water[1] (as more than 263 watersheds and 300 aquifers span political boundaries) but also through atmospheric water flows[152],[153]. Current water management approaches focus mostly on local water resources and predominantly on "blue water" rather than other drivers that are altering our water cycle.

Wetlands play a key role in the global hydrological cycle by changing how water moves in and through landscapes and seascapes. Their degradation and destruction disrupt this cycle, posing risks to global and regional water systems. A shift to recognising wetlands as a global public good would highlight the urgency for transformative financial, social, and governance reforms to protect these ecosystems. This recognition would also enable globally coordinated actions for wetlands conservation as part of investments and actions for a water-secure world.

Conserving wetlands would also require ensuring adequate financial mechanisms to achieve the goals and targets of the Convention on Wetlands, the Kunming-Montreal GBF and the global Sustainable Development Agenda. The framework for reframing the economics of water, recognising the connection between environmental sustainability, social equity and economic efficiency, needs to be extended to wetlands[150]. Focusing on these elements can help reframe how individuals and societies think, act, and measure economic success in combination with the wise use of wetlands.

CASE STUDY 10. **SEYCHELLES' BLUE BOND AND DEBT-FOR-ADAPTATION SWAP**

Wetland type: Mangroves and seagrasses (210,000 km² of MPAs)

In October 2018, the Republic of Seychelles issued the world's first sovereign "blue bond" with a 10-year maturity and a 6.5% interest rate[154]). The bond raised $15 million from three U.S.-based investors: Nuveen, Prudential Financial, and Calvert Impact Capital, with each purchasing $5 million worth of the notes. It was also supported by a $5 million loan and a $5 million guarantee approved by the World Bank to repay the coupon in the early years. The bond will later be supplemented with a $5 million grant from GEF and a $5 million non-grant instrument[155].

The bond aims to expand marine protected areas, improve governance of priority fisheries, and foster the blue economy. Its primary function is to ensure sufficient interest payments to investors, with the proceeds allocated as grants and loans through the Blue Grants Fund and Blue Investment Fund, managed by the Seychelles Conservation and Climate Adaptation Trust and the Development Bank of Seychelles[155],[156].

Before issuing the 2018 Blue Bond, The Nature Conservancy (TNC) developed a debt swap with the Seychelles, which was finalised in 2016. This arrangement restructured $20 million of Seychelles' national debt into a TNC loan ($15.2 million) in exchange for designating 210,000 square kilometres of ocean as marine protected areas (MPAs). Essentially, the debt swap aimed to transform sovereign debt repayments into investments in marine conservation. In April 2019, TNC announced a plan to extend this model to 20 additional coastal countries over five years, aiming to catalyse up to $1.6 billion in investment through a $200 million TNC-funded grant to purchase national debts[156],[157].

For further information see Hunt & Hilborn[154] and https://thecommonwealth.org/case-study.

1 Blue water refers to the water in rivers, lakes, and ponds and groundwater that can be pumped to the surface, while green water is the plant-available water in the soil[151].

Pathway 3: Embedding and prioritising wetlands in innovative financial solutions for nature and people

Target 19 of the Kunming-Montreal Global Biodiversity Framework aims at mobilising at least $200 billion per year from all sources, including $30 billion through international finance, to implement national biodiversity strategies and action plans. However, for wetlands alone, meeting Target 2 and Target 3 of the KM-GBF may require more than $550 billion (see page 55). Several options have been proposed within the KM-GBF to address this gap: increasing biodiversity-related international and domestic resources, leveraging private finance and promoting blended finance, stimulating innovative schemes, optimising and co-financing and synergies of finance targeting the biodiversity and climate crisis. It is critical that financing for wetlands conservation and wise use is embedded within these financial mechanisms.

An inventory of innovative financial instruments for climate change adaptation maintained by the National Adaptation Plan Global Network includes a list of mature, emerging and pilot instruments that have been, or potentially could be, used to finance the implementation of climate change adaptation measures[158]. A range of debt instruments (such as green bonds, blue bonds, sustainability-linked bonds), results-based financing instruments (such as biodiversity credits, payment for ecosystem services, adaptation benefit mechanisms), and financial risk management instruments (such as pooled investment funds, public-private partnerships, credit guarantees, debt for nature swaps) provide opportunities for embedding wetland conservation and wise use in the financial instruments for climate change adaptation. Biodiversity-positive carbon credits and nature certificates have been identified as promising innovative mechanisms that could be leveraged to mobilise domestic and international private sector resources[159]. Pilot testing of such credits through bilateral and multilateral support opportunities may trigger meaningful scaling, good governance, and embedding wetlands within existing carbon governance, which can provide the necessary environment needed to support this market. Table 12 is an illustrative list of innovative financial mechanisms that can be used in different sectors to sustain and enhance financial flows for wetlands conservation and wise use.

Governance needs to be improved at all levels – local, regional, national, and global – to initiate transformative change and facilitate innovative financial solutions. Governments must have the tools and capacity to design and enforce policies that protect wetlands, develop inclusive valuations, and deliver better financial arrangements for natural capital accounting. Stronger governance and smarter financial strategies can ensure that wetlands remain valuable ecosystems for future generations.

Stronger governance and smarter financial strategies can ensure that wetlands remain valuable ecosystems for future generations.

Pathway 4: Unlocking a private and public financial mix for investment in wetlands as nature-based solutions

Several assessments have highlighted the material risks for governments, economic sectors, and local communities following the loss and degradation of nature, including that of wetlands[173],[174]. At the same time, nature provides an untapped investment opportunity through nature-based solutions[175],[176]. For the private sector, wetland investments can be stimulated by assessing, accounting and reporting for dependencies, impacts, risks and opportunities related to wetlands within the Taskforce on Nature-related Financial Disclosures (TNFD) framework[177].. For the public sector, options include eliminating subsidies for activities that degrade and damage wetlands, and redirecting and repurposing these flows into activities that conserve and wisely use wetlands[178]. Correctly pricing water and allocating subsidies to achieve both its efficient use and access for all would help address the widespread profligate use of water and consequent stress upon wetlands, which sustain large proportions of blue and green water flows. Measures to eliminate harmful subsidies in water-intensive sectors, redirect them towards water-saving solutions, and provide targeted support for the poor and vulnerable are also aligned with conservation and wise use of wetlands[150]. By combining these mechanisms, global standards can be developed to support businesses and financial institutions in fully embedding wetlands within the nature-related considerations of their decision-making and assessing and disclosing their use of, and impact on, nature. Both public and private sectors can broadly benefit by explicit integration of a full range of wetland ecosystem services and their multiple values in conservation and development sector policies, programmes and investment.

A range of instruments can be used to unlock public and private finance into nature-based solutions (NbS) – these include information and empowerment instruments (relying on knowledge, communication, and persuasion to influence behaviour) control and regulatory instruments (establishment of obligations, encouraging or prohibiting or restricting certain types of behaviour) economic and market instruments (financial incentives and disincentives to influence private sector behaviour and investment decision-making), institutional instruments (creating an institutional and organisational environment to facilitate policy development and innovation), and financial instruments (direct public sector (co-) investment to establish a proof of concept or commercial track record of new solutions), which can help create a market or work on a mix of demand and supply-side mechanisms[179]. Public sector finance is crucial to the scaling of NbS. Such finance can be in the form of direct concessional funding and technical support and can also be used to establish incentives for beneficiaries to engage with NbS. Guarantees can also be catalytic instruments to drive private capital to NbS, by enabling investment de-risking and creating a safer environment for testing new solutions. Capacity-building support (for example, training on wetlands management and use of financial mechanisms) can improve a project's revenue-generation potential and decrease the likelihood of having to activate a guarantee. The potential of NbS can also be unlocked by creating a constructive regulatory environment to support financial solutions and developing a long-term NbS strategy. The public sector can create an enabling environment by providing incentives for new agents to engage with NbS, supporting the creation of new revenue streams[180],[181].

Public sector finance is crucial to the scaling of nature based solutions (NbS). Such finance can be in the form of direct concessional funding and technical support and can also be used to establish incentives for beneficiaries to engage with NbS future generations.

Integrating natural capital, policy and finance for wetlands

Economic growth has driven wetland loss for a prolonged period, and the underpinning institutions have been aligned with direct and indirect drivers of adverse change in these ecosystems. However, this does not have to continue. The first major shift needed is the recognition of true wealth – the natural capital of wetlands – and the reflection of this wealth in the measures of economic progress. Recognising wetlands as a global public good would form the basis of collective action at the global level for securing these ecosystems, through effective implementation of the Convention on Wetlands and wetland related commitments in various international agreements and processes. A related aspect is ensuring that the efforts for wetlands restoration and effective management are systematically captured and reported (such as through use of FERM (the Framework for Ecosystem Restoration Monitoring developed by FAO to support the UN Decade of Ecosystem Restoration and reporting under KM-GBF Target 2). Embedding wetlands in innovative financial solutions designed for climate change adaptation, biodiversity conservation and other purposes is also highly aligned with wetlands conservation. Governance improvements at various levels could enable this. A closely related pathway is blended finance, which could unlock investments into wetlands as NbS.

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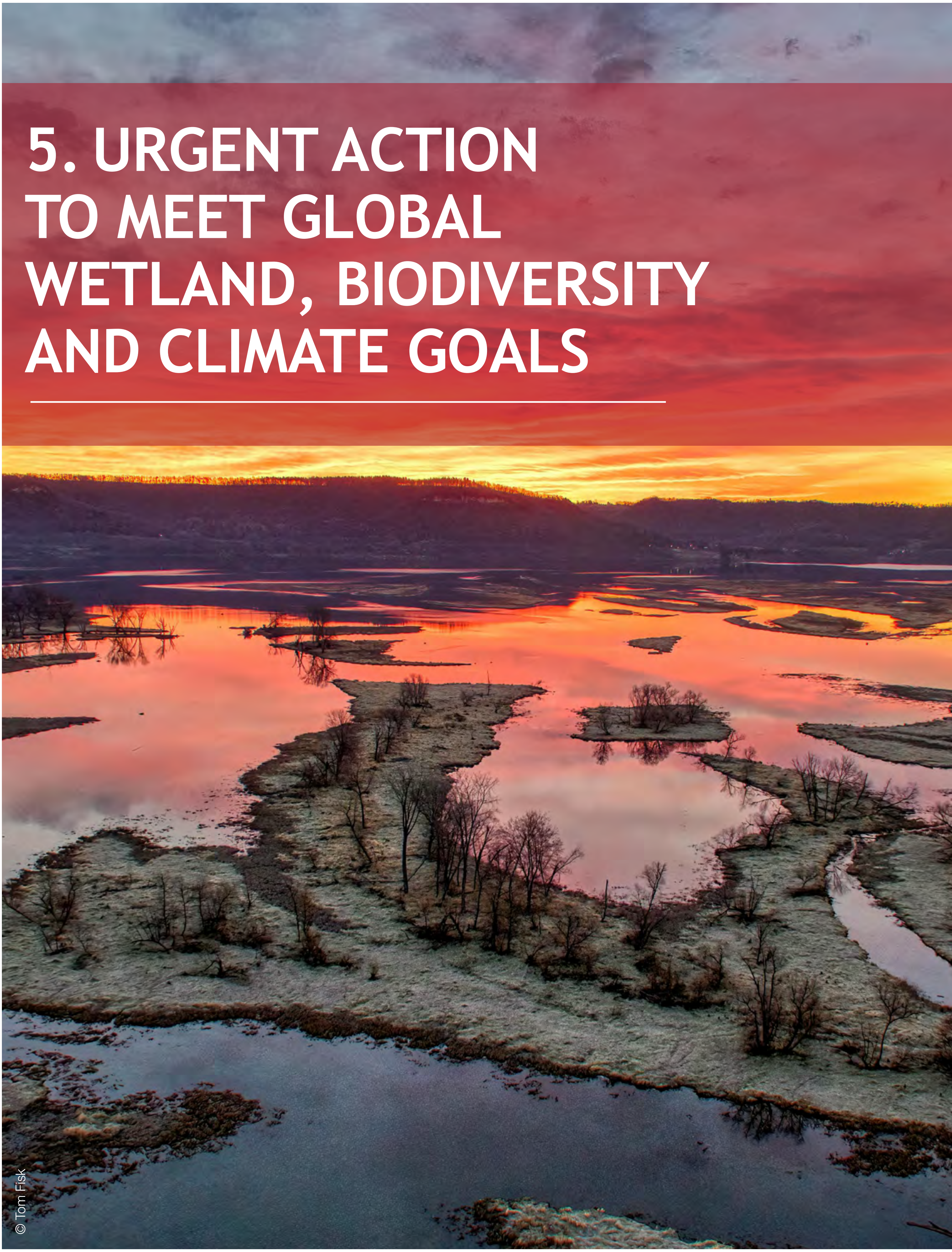
Table 12
Innovative financial mechanisms for wetlands conservation and wise use.

Financial Mechanism	Description	Examples
Charges, fees and taxation systems		
Entrance / access fees	Directly charged from users in exchange for their entry or benefit from natural environments [160]	Protected Area (PA) entry fees (public or private)
Special use permits and rights-based schemes	Conditional activities like diving or filming in public land, or rights-based fishery schemes [161].	Pelagic fishing licenses
Concessions	Loosely defined as lease licenses, usually provided by the public sector to touristic operators and other private companies [162].	Ecosystem restoration concessions in Indonesia
Green taxes and levies	Taxes are imposed by the government on individuals or businesses that engage in environmental or conservation-related activities, such as tourists, businesses, fishermen, and coastal residents [157].	Maldives green tax
Payment for Ecosystem Services (PES)		
Periodic/perpetual programmes	Programmes where beneficiaries pay for the ecosystem services they receive from conservation stewards [160].	Mexico's Matching Funds Programme for water provision
Marine conservation agreements (MCAs)	Similar to PES schemes, MCAs are usually structured as one-time payments to achieve specific conservation goals [161].	Community-based reef management in Palau, funded by international investors
Regulated markets and offsets		
Voluntary carbon markets	Through verification standards like Verra and Gold Standard, institutions voluntarily set carbon emissions reduction targets and purchase offsets in markets for carbon credits [160], [163].	Blue carbon credits [164].
Biodiversity offsets	Regulatory instruments place financial responsibility for environmental damages on project developers, compelling companies to mitigate and compensate [160], [165].	Great Barrier Reef funds paid into trust by companies compensating for impacts [157].
REDD+	UNFCCC mechanisms to channel investments that reduce emissions from deforestation, forest degradation, and better conservation/management [165].	UN-REDD, the Forest Investment Programme, and the Forest Carbon Partnership Facility
Mitigation banking	A strategy for offsetting environmental impacts where developers purchase pre-existing credits from a mitigation bank, or a site where an ecosystem has been restored or preserved [166], [167], [168]	Caltrans and Southern California Edison (utility companies), in the USA

Financial Mechanism	Description	Examples
Investments, debt and other financing facilities		
Green and blue bonds	Defined as "debt instruments where proceeds are used exclusively to finance or refinance projects with environmental benefits" [160].	Forest Resilience Bond
Impact or pay-for-performance bonds/ resilience bonds	A mechanism that ties investor repayments to the successful performance of restoration, transferring project risks from the state to private investors [169].	Louisiana Environmental Impact Bond
Debt-for-nature or debt-for-adaptation swaps	Instrument where sovereign debt of a country is partially forgiven in exchange for commitments to conservation [156].	Seychelles blended finance for marine conservation
Conservation enterprise incubators/venture capital	Programmes provide commercial enterprises with technical assistance, grants, or other financing [157].	Verde Ventures on debt finance
Impact Investment	Investments are made to generate a positive environmental impact, as well as a financial return and low interest rates [170].	BF framework in the Dominican Republic [157].
Impact-oriented equity	Financial instruments involve purchasing ownership in a company, prioritising environmental and social impacts alongside financial returns [160].	BNP Paribas Ecosystem Restoration Fund, New Forests' Tropical Asia Forest Fund 2
Disaster and climate risk sharing		
Parametric insurance	Parametric insurances provide payouts based on predetermined metrics or indicators, ensuring fast compensation for restoration after extreme weather events [160].	Mesoamerican Reef hurricane risk model to support reef recovery
Indemnity insurance or resilience bonds	Compensates policyholders for actual losses incurred and can be structured to cover damages or flooding-related losses, providing incentives for landowners to maintain wetlands [171].	Restoration of upstream wetlands in Windsor (Canada) to mitigate flood risks
Multi-donor funds		
Conservation Trust Funds (CTFs)	Private institutions are designed to be long-term instruments that rely on several types of funds from donors, national governments, and the private sector to fund protected areas. They often rely on financial endowment [161].	Caribbean Biodiversity Fund [157].
Common Asset Trusts (CATs)	Institutional structures for managing ecosystems, with shared assets that allow trustees to oversee portfolios like wetlands, benefiting various stakeholders through a legal framework that includes conflict resolution, flexible investment decisions, and coordinated management of ecosystem services [172].	Wetland Investment Fund

5. URGENT ACTION TO MEET GLOBAL WETLAND, BIODIVERSITY AND CLIMATE GOALS



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Wetlands have been systematically undervalued

The rapid decline of nature is widely recognised, and wetlands in particular have experienced an alarming rate of loss and degradation. Economic development has often come at their expense, in part because wetlands have been systematically undervalued and markets, policies and institutions have failed to recognise the essential role wetlands play in supporting human well-being[182],[183]. There is an urgent need for action if we are to meet the global wetland, biodiversity and climate goals, including Sustainable Development Goal 6 (ensuring access to clean water and sanitation for all) and the associated Water Action Agenda. Wetlands support an astonishing 40% of known plant and animal species, serve as critical connectors across landscapes, and lock away more than a third of the world's soil carbon – all while occupying just 6% of Earth's land surface[21],[184]. If we are serious about reversing the loss of nature, we must invest now in conserving, restoring, and wisely managing these vital ecosystems. The window for transformative change is narrow but is still within reach.

An estimated 22% of global wetlands have been lost since 1970—most dramatically in freshwater ecosystems.

The 11 wetland types described in this report cover over 1,425 million ha, with inland marshes, swamps, lakes, and peatlands being the most extensive types (see Section 1). Estimating wetland area is complex due to data gaps and differences in methods used for reporting on wetland extent. These challenges are acute when making historical estimates, particularly when reporting by wetland type. The result is that data on wetland extent are likely underestimates. With that caveat, recent work indicates that c.1970, there were about 1,837 million ha (see Section 1). Wetland loss has accelerated since that time, with an estimated 22% of wetland area lost since 1970[185]. Losses vary regionally and by wetland type, with freshwater ecosystems (lakes, inland marshes and swamps) showing the highest proportional declines.

This ongoing loss of wetland area highlights the essential benefits they provide, including food, raw materials, flood regulation, climate mitigation, and cultural value. However, these contributions are often underappreciated, particularly in economic assessments. This report documents that, economically (using median values, see Section 2), wetlands currently contribute an estimated $7.98 trillion 2023 Int$. annually to the global economy, amounting to > 7.5% of global GDP. Despite this immense value, wetlands are declining at an average rate of 0.52% per year since 1970 (see Section 1); with costs of cumulative losses over the past 50 years totalling 5.1 trillion 2023 Int$. Continued degradation risks further losses and highlights the clear benefits of conservation and restoration. And while these economic losses are huge, they don't capture the profound intrinsic values of wetlands – their worth simply by existing as living systems. Wetlands hold cultural, spiritual, and ecological significance that transcends monetary metrics[141]. For example, they are sacred landscapes for many Indigenous peoples, refuges of biodiversity, and irreplaceable parts of Earth's natural heritage[186].

Wetlands contribute over $7.98 trillion to the global economy each year—more than 7.5% of global GDP.

CASE STUDY 11. **PROTECTING ZAMBIA'S WETLAND WEALTH: KAFUE FLATS RESTORATION PARTNERSHIP**

Wetland type: Inland marshes

The restoration of the Kafue Flats, located in south-central Zambia and part of the Zambezi River Basin, invests in ecological integrity, human well-being and climate resilience. The 6,500 km^2 wetland supports exceptional biodiversity and livelihoods; it is home to the entire population of the endemic Kafue Lechwe, 30% of the global Wattled Crane population, and nearly 470 bird species. As a Ramsar Site, Man and Biosphere Reserve, and Key Biodiversity Area, it also supports 20% of Zambia's livestock, 89% of its sugar production, artisanal fisheries valued at $30 million annually and generates 50% of the nation's hydroelectric power.

However, the Itezhi-tezhi and Kafue Gorge dams, alongside intensive agricultural development, have fundamentally altered the system. The Flats face severe degradation, increasing pressure on the fishery and decreasing wildlife numbers due to unsustainable practices, increases in mining and prospecting, increased human population and resource use, and climate change. Although past restoration efforts aimed to replicate natural flood patterns by adapting dam operations to restore freshwater and floodplain ecosystems and increase food security, it has become clear that returning to historical ecological conditions is no longer feasible. While the dams support power generation and agriculture, the operation of these dams altered the natural flooding regime of the wetland, with large impacts on habitat quality for wildlife and local livelihoods, especially grazing. As a result, restoration goals now focus on achieving a realistic set of ecosystem services adapted to these new constraints – a shift to an ongoing management regime to simulate some of the lost wetland benefits.

In response, the Kafue Flats Restoration Partnership was launched in 2022 as a collaborative initiative to unite the Zambian government, the International Crane Foundation and WWF. Building on decades of engagement, including $300,000 to remove the invasive Mimosa pigra (giant sensitive tree; 2017-2021), the partnership aims to balance conservation, sustainable development, and community well-being through co-management and adaptive practices. The goals for restoration benefits are multifaceted. First, it safeguards ecosystem services that directly support over 1.3 million people, including freshwater supply, livestock grazing, livelihoods, tourism and cultural practices. Second, it protects critical biodiversity, including endangered species like the Grey Crowned Crane and the Wattled Crane, critically endangered vultures, and the endemic Kafue Lechwe. Third, it enhances the resilience of the ecosystem to climate shocks, mitigating the impacts of droughts and floods through ecosystem-based adaptation strategies.

Meeting this goal requires sustained investment. At least $1 million is needed for core restoration efforts, and double that when including infrastructure and livelihood support. Funding has come from multiple sources – including the Segre and JRS Foundations, WWF, IWMI, and others – with over $1 million annually now going toward conservation, community resilience, and ecological research. Additional projects include a proposed $9 million initiative for park infrastructure, fire and range management, tourism, and local job creation.

While expensive, these investments safeguard critical ecosystem services for over 1.3 million people, protect iconic species, and increase the landscape's resilience to climate shocks. Restoration efforts emphasise integrated water management, strong community engagement, and long-term, inclusive governance. The central lesson is clear: with dams and agriculture in place, full

The Kafue Flats support 1.3 million people, 470 bird species, 89% of Zambia's sugar production, and half its hydropower.

CS11 **cont.**

ecological restoration is not possible, but with smart, sustained management, a new balance of benefits, bringing the greatest return, can be achieved.

For further information see https://savingcranes.org/africa and https://www.wwfzm.panda.org.

Figure 17
Wattled Cranes and Spur-winged Geese in Kafue Flats (photo by ICF EWT).

Understanding the scale of these losses is critical to mobilising conservation and restoration actions and accomplishing the goals of the Convention on Wetlands, including commitments made under the KM-GBF, the Sustainable Development Goals and the Freshwater Challenge. The KM-GBF stresses the need for immediate action to address the accelerating loss of biodiversity worldwide for the benefit of people and nature, with goals and targets to halt and reverse biodiversity loss by 2030, including wetlands. These targets provide ambitious priorities for wetland conservation and restoration, including restoring at least 123 million ha of wetlands to achieve Target 2 (30% restoration target) and conserving 428 million ha to meet Target 3 (30% conservation target as protected areas or other effective area-based conservation measures; see Section 3). Because these figures do not account for the costs of improving the ecological condition of degraded wetlands, this likely underestimates the true need. Globally, about 25% of remaining wetlands are in poor condition, so the actual restoration needs is likely to exceed 350 million ha. These goals also align with The Freshwater Challenge, which aims to restore 300,000 kilometres of degraded rivers and 350 million hectares of freshwater wetlands by 2030.

Meeting these goals requires immediate action. As delays continue, costs also mount. For example, a delay of just 10 years in efforts to halt and reverse biodiversity loss is estimated to double the costs compared to taking immediate action[149]. Meeting commitments under Target 2 and Target 3 of the KM-GBF for wetland types for which we have data shows that restoration costs are between 2 to 123 times more than the cost of conservation (see Section 3). Wetland conservation and restoration are both critical, but as the ecological character of wetlands becomes degraded, the cost of restoration and recovery is more difficult and expensive, i.e., restoring wetlands costs significantly more than protecting them in the first place. Actions taken now also deliver co-benefits for the economy and people and contribute to the 2030 SDGs, including SDG 6[149]. Without immediate action, many of these commitments will fail.

Immediate action is needed to halt biodiversity loss and meet wetland targets by 2030.

Barriers that impede action

The heart of the wetland loss crisis lies in our persistent failure to recognise and reflect the true value of wetlands. As discussed in Section 4 of this Outlook, markets, policies, and institutions often overlook society's reliance on ecosystem services – the essential benefits that functioning wetlands provide. A long-standing question is why problems related to wetland loss and degradation persist when we have a sound understanding of their causes and options for how to solve them.[182] A key part of understanding this dilemma is that wetland ecosystem services are often undervalued due to market failures in managing public goods sustainably. The result is inequities in how the benefits and losses associated with wetlands are distributed. Disadvantaged communities, which rely more directly on wetlands for food, clean water, and flood protection, tend to suffer more from their degradation or conversion. Meanwhile, private gains from replacing wetlands with agriculture or infrastructure often go to wealthier groups. Many wetland services – particularly regulating and cultural services – are public goods, and since conventional markets are designed to handle private goods, markets cannot effectively capture their value[187].

Markets, policies, and institutions continue to undervalue wetlands—despite society's deep reliance on them.

As a result, wetland benefits are commonly overlooked in economic analyses, leading to underinvestment in conservation and widespread wetland degradation. Inadequate financial investments exacerbate this. The IPBES Transformative Change Assessment estimates that funding for biodiversity conservation generally represents only about 0.25% (one quarter of one per cent) of the global GDP. This starkly illustrates the magnitude of the underinvestment in nature, including wetlands.

This 2025 GWO stresses a need for large-scale resources to protect and restore wetlands while also eliminating harmful financial flows that undermine conservation efforts. This includes actions to:

- Integrate restoration efforts across various sectors, including agriculture, water infrastructure, and urban planning, Traditional policies often address environmental issues in isolation; this compartmentalisation hinders the development of integrated solutions necessary for tackling interconnected challenges.
- Prioritise long-term economic outcomes: Societal, economic, and policy decisions frequently prioritise immediate financial returns while neglecting the long-term negative impacts on biodiversity, water quality, food security, and health. This short-term thinking exacerbates wetland loss and degradation.
- Increase funding: There is inadequate funding for wetland conservation, restoration, and sustainable management, as well as competition with other economic sectors for resources.
- Embed subsidies that conserve wetlands: Substantial subsidies are directed toward industries and activities that harm wetlands each year, creating perverse incentives and undermining conservation efforts. Such subsidies often create a disconnect between short-term and long-term economic and ecological goals and reinforce the undervaluation of nature in policy and planning. Target 18 of the KM-GBF addresses this, calling for reducing or reforming harmful subsidies affecting biodiversity, including wetlands.

We need transformative change that realigns finance, policy, and markets to support wetland conservation.

Addressing these barriers requires transformative change that promotes equity, integrates policy approaches, focuses on financial incentives that favour conservation and restoration, and empowers vulnerable communities to participate actively in conservation and restoration efforts[109]

CASE STUDY 12. **INTEGRATING SCIENCE, LAW AND TRADITIONAL KNOWLEDGE: FUTURE PATHWAYS FOR GLOBAL WETLAND ECOSYSTEM STEWARDSHIP, NEW ZEALAND**

The Whangamarino Wetland, one of New Zealand's seven Ramsar Sites, is of immense cultural significance to the Indigenous people of the area, the iwi (tribe) of Waikato and local communities. A recent significant peat fire, a low oxygen anoxia event and the cumulative impacts of surrounding land use change have negatively impacted the ecological health of this internationally significant wetland.

As part of New Zealand's response to its obligations under the Convention on Wetlands, the Department of Conservation, as the lead authority for the Convention in New Zealand, is working together with Waikato Tainui, Ngā Muka Development Trust and other stakeholders, to integrate science, law and policy with Indigenous knowledge systems/ Mātauranga Māori to work towards a more holistic understanding of ecosystem change and restoration in the Whangamarino wetland. The work is underpinned by the Convention's central concept of wise use and an ecosystem approach. This means the framework for assessing ecological change considers traditional knowledge not only in relation to identifying cultural ecosystem services but also to better understand changes to all ecosystem components and processes, acknowledging the contribution of Indigenous people as ecosystem stewards.

For the Indigenous people, Waikato-Tainui, wetlands are living organs, keepers of genealogies, and a source of cultural identity and nourishment. This work explores how a variety of different Indigenous monitoring tools, systems and relational understandings are used to observe and detect ecosystem change. It then examines how changes to ecosystem components have impacted cultural and spiritual connections, intergenerational learning, kinship, and connection in the Whangamarino.

Waikato Tainui use environmental signs and seasonal knowledge derived from centuries of observation encoded in lunar calendars and seasonal changes to detect ecosystem change. For example, the first appearance of migrating eels (tuna heke) demonstrates wetland vitality and hydrology. Waikato Tainui elders (kaumatua) observed a three-week delay in eel migration in 2018 due to disrupted hydrological cues, providing early warning of a significant water quality issue before changes were detected by technical experts conducting field monitoring.

Recognising and supporting the role of traditional knowledge in global and national wetland and biodiversity monitoring processes provides a valuable contribution to understanding overall ecosystem change and facilitates the effective participation of Indigenous peoples in wetland management.

The Whangamarino framework supports and has the potential to further clarify and strengthen the existing guidance under the Convention regarding traditional knowledge and the role of Indigenous peoples in the stewardship of wetlands building upon Resolution XIII.15 regarding cultural values and Resolution X.16 regarding processes for assessing ecological character change.

For further information see https://www.doc.govt.nz/our-work/freshwater-restoration.

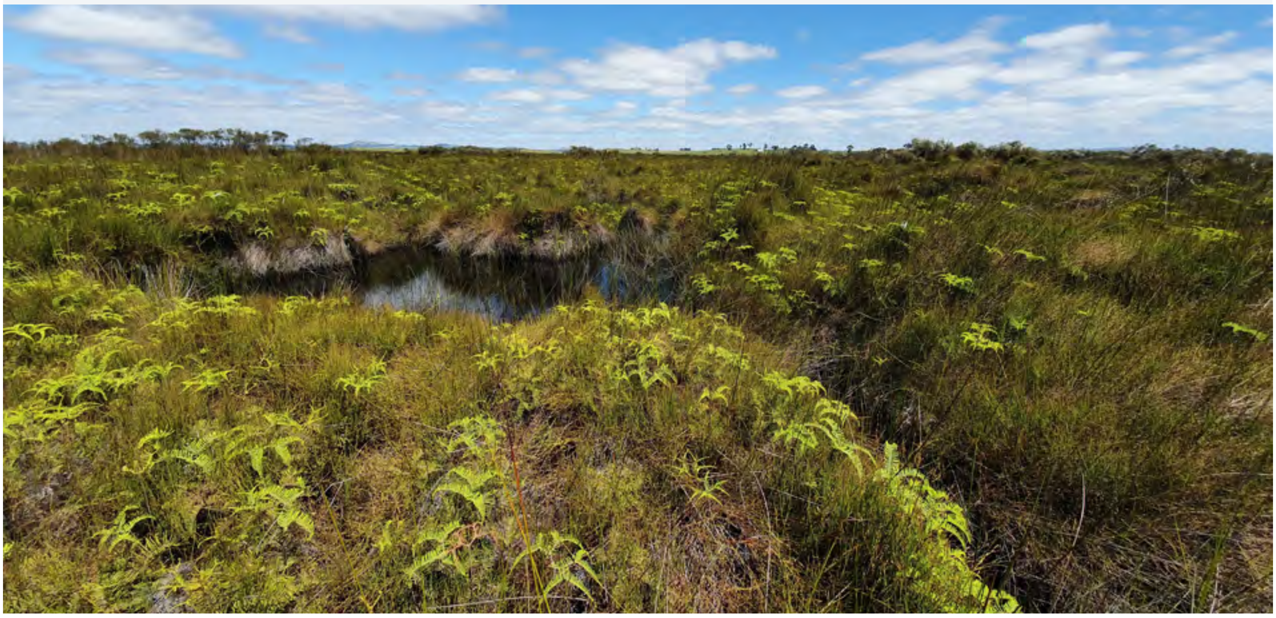

Figure 18 Whangamarino in New Zealand.

Action for Convention on Wetlands to meet global biodiversity and climate targets

The Outlook serves as a clarion call for policymakers, businesses, and society to undertake immediate and coordinated actions. The ongoing loss and degradation of wetlands impose significant costs on governments, economic sectors, and communities. Wetlands must be fully integrated into decision-making at all levels. Without that, our capacity to sustainably use wetland natural capital will remain fundamentally limited.

Achieving this vision takes strong political will, widespread public support, and significant financial investment. Long-term structural change is essential, there is an urgent, immediate need to scale up funding for nature[188].

Four pathways have been identified to help overcome the financing gap. These include significantly increasing investment in projects that support the conservation, restoration, and wise use of wetlands and their ecosystem services and redirecting financial flows away from activities that harm wetlands. These approaches outline key strategies for aligning finance with ecological sustainability (see Section 4).

The first *Global Wetland Outlook* in 2018[8] was summarised to say that "*A switch from documenting the change in wetland biodiversity towards more emphasis on taking decisions is needed … we contend that failure to place greater emphasis on effective responses could lead to the Convention becoming an irrelevant force for the wise use of wetlands*"[189]. The current GWO has examined some critical direct and indirect pathways to transition and implement effective responses. Many sectors are aware of the challenge, and progress is underway with actions that the Convention can support, such as the Freshwater Challenge. Global activity towards transformative change can recognise the full range of wetland values, employ those in decision making and reform harmful policies. We have made a start, but more is needed.

There is an urgent need to scale up funding for wetlands—aligning finance with sustainability by investing in conservation, restoration, and wise use, while redirecting harmful subsidies. Without a major shift in financial flows, the goals of the Convention on Wetlands, the KM-GBF, and the SDGs will remain out of reach.

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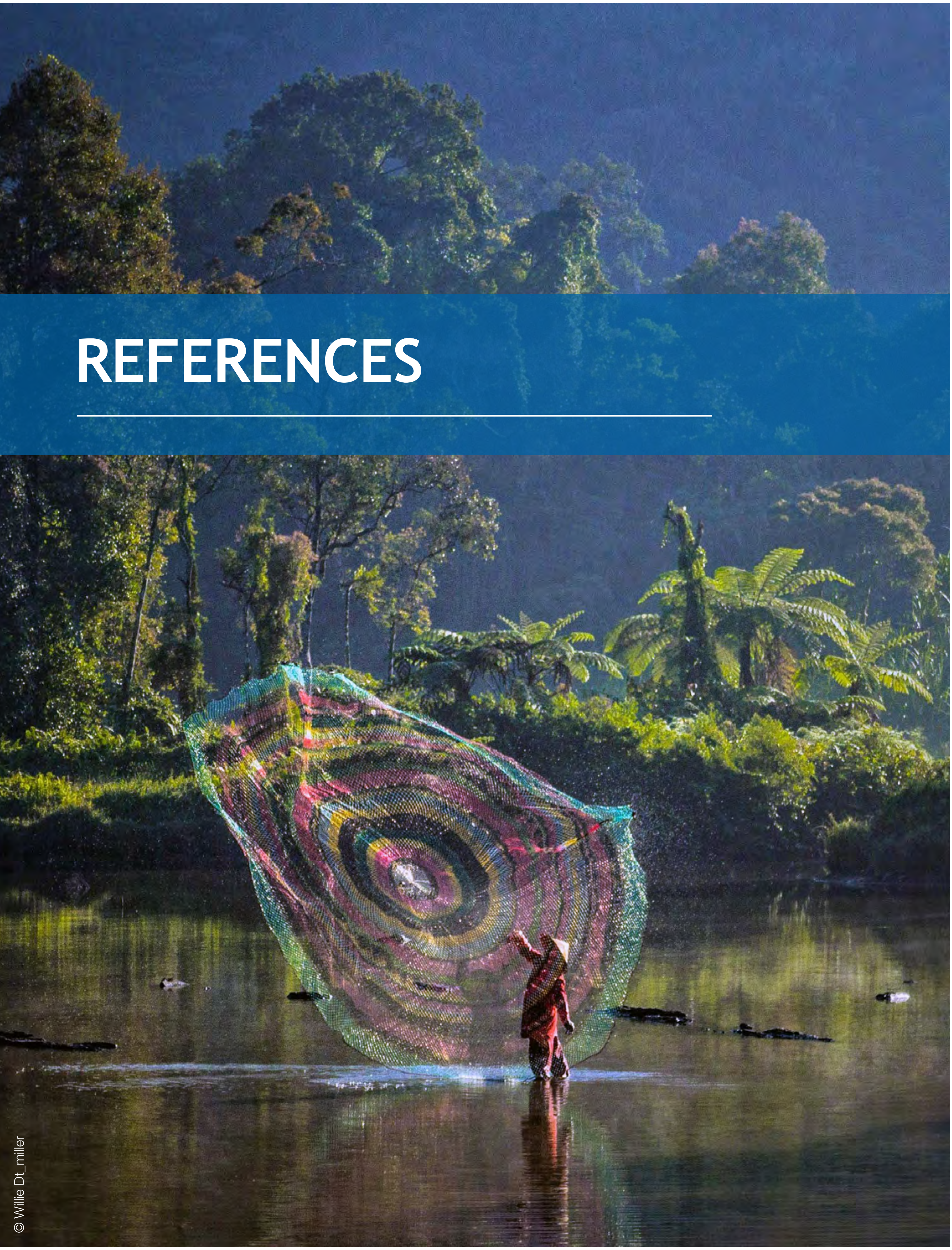

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Conservation and wise use of wetlands are vital for human livelihoods. The wide range of ecosystem services wetlands provide means that they lie at the heart of sustainable development. Yet policy and decision-makers often underestimate the value of their benefits to nature and humankind

Understanding these values and what is happening to wetlands is critical to ensuring their conservation and wise use. The *Global Wetland Outlook* summarizes wetland extent, trends, drivers of change and the steps needed to maintain or restore their ecological character.

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