THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY FOR WATER AND WETLANDS

A contribution to CBD COP11

Final consultation draft

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Thank you !

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The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

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I. INTRODUCTION

The "nexus" between water, food and energy has been recognised as one of the most fundamental relationships and challenges for society. The importance of this nexus was re-emphasised at the recent UN Conference on Sustainable Development (Rio+20) in June 2012. Wetlands[2] are a fundamental part of local and global water cycles and are at the heart of this nexus.

Wetlands are essential in providing water-related ecosystem services, such as clean water for drinking, water for agriculture, cooling water for the energy sector and regulating water quantity (e.g. flood regulation). In conjunction with their role in erosion control and sediment transport, wetlands also contribute to land formation and therefore resilience to storms. Moreover, they provide a wide range of services that are dependent on water, such as agricultural production, fisheries and tourism.

Notwithstanding the high value of the ecosystem services that wetlands provide to humankind, wetlands continue to be degraded or lost due to the effects of intensive agricultural production, irrigation for food provision, water extraction for domestic and industrial use, urbanisation, infrastructure and industrial development and pollution.

In many cases, policies and decisions do not take into account these interconnections and interdependencies sufficiently. However, the full value of water and wetlands needs to be recognised and integrated into decision-making in order to meet our future social, economic and environmental needs. Using the maintenance and enhancement of the benefits of water and wetlands is, therefore, a key element in a transition to a sustainable economy.

Questions this report addresses

The report responds to the following questions by presenting insights from experience from across the globe:

- What are the values and benefits associated with water and wetlands?
- What are the roles of wetlands in terms of providing water and wetland related ecosystem services and what are their values?
- What are the wider set of ecosystem system services that water and wetlands provide and what are their values?
- What needs to be done to improve the consideration of the values and benefits of water and wetland in policy developments and in practical decision making?
- What approaches have been successfully used to date to respond to the challenges and take account of the values of water and wetlands?
- What existing examples demonstrate how policy, investment and water and land use decisions can be based on the values and benefits associated with water and wetlands?
- What are the recommendations for transforming the regional, national and international approaches for managing water, wetlands and their ecosystem services?

[1] The development of this report has been initiated by the Ramsar Convention Secretariat, supported by the Norwegian, Swiss and Finnish Governments and the International Union for Conservation of Nature (IUCN). A team comprising the secretariats of The Ramsar Convention on Wetlands and the Convention on Biological Diversity (CBD), the Institute for European Environmental Policy (IEEP), International Union for Conservation of Nature (IUCN), the Helmholtz Centre for Environmental Research UFZ (UFZ) and Wetlands International drafted the report.

[2] For the purpose of the Ramsar Convention wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres. Article 1, Ramsar Convention (1971). The Ramsar Convention has 163 Contracting Parties.

II. WATER AND WETLANDS: WHAT BENEFITS DO WE DERIVE AND WHAT DO WE RISK LOSING?

Wetlands and the water cycle

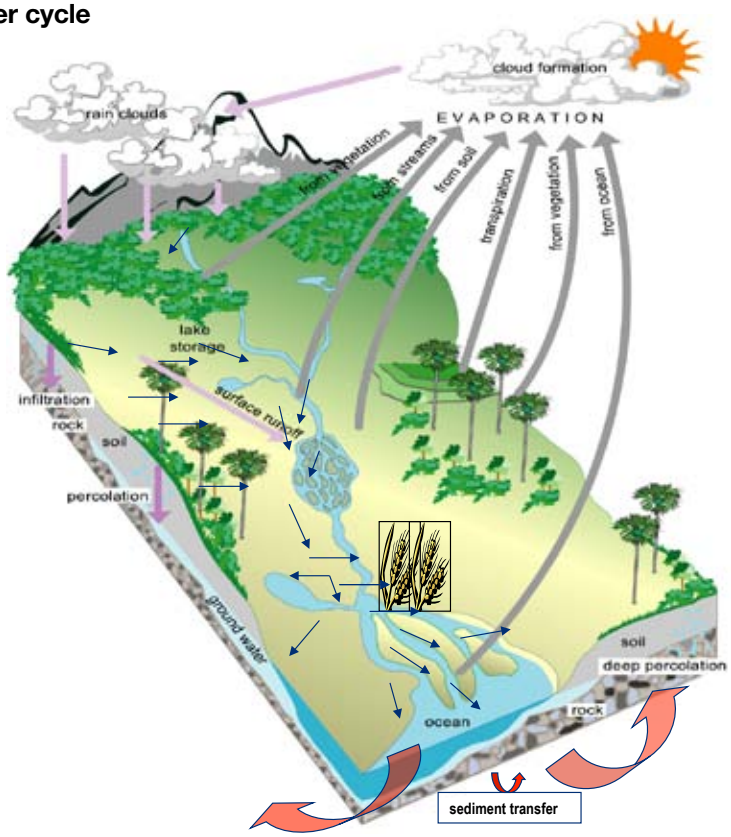
Water security is a major and increasing concern in many parts of the world, including both the availability (including extremes) and quality of water. Understanding the value of water and wetlands helps provide a firm foundation for protection and enhancement of these resources, and thereby contributes to delivering secure water supplies, while improving water allocation and management decisions.

The global and local water cycles are strongly dependent on wetlands (Ramsar, 1971; MA, 2005b; SCBD, 2012). Land cover affects water retention and flows and hence the availability of surface and ground waters. Transpiration from plants affects rainfall patterns. Biodiversity plays a critical role in the nutrient cycle and carbon cycles (carbon stored, sequestered and released from biomass). A loss of biodiversity can compromise the functioning of these cycles, leading to major impacts on people, society and the economy. **Without wetlands the water cycle, carbon cycle and nutrient cycles would be significantly altered, usually detrimentally.** In turn, water cycles are of paramount importance to biodiversity and to the functioning of essentially all terrestrial and coastal ecosystems.

Wetlands and water-related ecosystem services

Biodiversity and ecosystems provide a range of services which benefit people, society and economy at large; these are known as ecosystem services (MA, 2005a). Many of these ecosystem services are related to water and wetlands via water provision, regulation, purification, and groundwater replenishment, and are crucial in addressing objectives of water security, including personal **water security**. Other ecosystem services provided by wetlands play important roles in relation to **climate change** (local climate regulation, climate mitigation and adaptation), **food security** (provision of food and provision of habitats and nurseries for fisheries), **job security** (maintenance of fisheries, soil quality for agriculture) and a range of cultural benefits, including **knowledge** (scientific and traditional), **recreation and tourism**, and formation of **cultural values**, including identity and spiritual values.

Figure E1 The water cycle



Source: redrawn from MRC (2003)

Wetlands are particularly important providers of all water-related ecosystem services - they are essential sources of water for many rural areas, towns and cities. They regulate water quantity (including availability in surface water), groundwater recharge, and can contribute to flood and storm regulation. Lesser known, but no less important, wetlands particularly help in erosion control and sediment transport, thereby contributing to land formation and increasing resilience to storms in deltas and coastal areas. All these ecosystem services improve water security, security from natural hazards and climate change adaptation. The final Rio+20 declaration "The Future We Want", inter alia, recognised the role of ecosystems in the supply of water and its quality (para. 122, UNCSD, 2012).

Values of wetlands ecosystem services are typically higher than for other ecosystem types. The literature on the values of wetlands and other ecosystems underlines that wetlands ecosystems can have some of the highest values compared to other ecosystems due to the importance of clean water provision, natural hazards mitigation (e.g. mangrove forests and floodplains), and carbon storage (e.g. in peatlands, mangroves and tidal marshes) (see TEEB, 2010; de Groot et al., 2012)[3].

The roles and values of water-related ecosystems and wetlands in providing key ecosystem services need to be fully appreciated and integrated into decision making at local, national and international scales. Incomplete understanding of these can result in favouring the ecosystem services whose values are well reflected in markets (e.g. food, timber) over those which are largely invisible in markets (e.g. ecosystem based water purification, flood and storm protection, nutrient cycling).

While the value of wetlands for water supply can be considerable, an additional advantage of maintaining them is that **wetlands also deliver multiple co-benefits of significant social and economic values, and hence can help address a wide range of needs and objectives.** Wetlands contribute to local climate regulation and act as carbon sinks, helping reduce **climate change**, and for this reason their degradation (e.g. draining peatlands) can lead to very significant GHG emissions. Wetlands also regulate sediment transport thereby contributing to **land formation** and **coastal zone stability.** Mangroves, for instance, can provide important fish nursery functions and provide a basis for local **food security** and **livelihoods** (fisheries), as well as sources of materials and fuel. These benefits merit a significant re-evaluation as to their importance and the misperceptions as to their lack of utility need to be challenged (MA, 2005b; TEEB, 2010; TEEB, 2011; TEEB, 2012a; TEEB, 2012b).

Wetlands are some of the most important biodiverse areas in the world and provide essential habitats for many species. The global Ramsar Convention network of "Wetlands of International Importance" (Ramsar Sites), which comprises over 2000 sites covering over 1.9 million km^2 (up to 15% of estimated global wetland area) supports unique biodiversity in ecosystems (e.g. coral reefs, peatlands, freshwater lakes and marshes and mangroves), species (e.g. waterbirds, amphibians and wetland-dependant mammals such as hippopotamus, manatees and river dolphins) and genetic diversity.

Examples of major wetlands in the Ramsar Site network include the Danube Delta in Romania and the Ukraine; the Waddensea across the Netherlands, Germany and Denmark; the Everglades in the USA; the Pantanal wetlands across Brazil, Bolivia and Paraguay; the Okavanga Delta in Botswana; the Sundarbans in Bangladesh; the Camargue in France; the arctic tundra of Queen Maud Gulf in Canada; the Volga Delta and southern Lake Baikal in the Russian Federation; Wasur National Park in Indonesia; Kakadu National Park in northern Australia; the forest, lake and river systems of Grands affluents and Ngiri-Tumba-Maindombe in Congo and Democratic Republic of Congo; and Lake Tchad across Tchad, Niger and Nigeria.[4]

Meeting sustainable water management objectives cost effectively via ecosystem services from wetlands

Wetlands provide natural infrastructure that delivers a wider range of services and benefits than corresponding man-made infrastructure

[3] It has to be noted that ecosystem functions, the flow of ecosystem services, and the economic value to society and the economy are site specific and depend on the ecological, social and economic systems and their interactions. As such, the values derived in particular valuation study are very site-specific and cannot be easily extrapolated to another site/location. For further discussion see value transfer in TEEB (2010) Chapter 5.

[4] Information on all Ramsar Sites is available on: http://ramsar.wetlands.org/

and can do this at lower cost. They are also an important, but poorly recognised, **complement to man-made infrastructure in river basin planning and management efforts.** Wetlands can, for example, provide protection against coastal and river flooding to (partially) offset the need for man-made infrastructure, whilst at the same time providing a multitude of other services (e.g. recreation and tourism, carbon storage, or a range of provisioning services). Nature-based solutions can constitute a lower cost approach than alternative built capital solutions, or offer significant cost savings where an integrated natural and man-made infrastructure approach is adopted.

Strategies for integrated water resource management can take account of these wider benefits, balance the needs of humans and nature and help enhance water security through maintaining biodiversity and ecosystem services, thereby providing cost-effective and sustainable options. These options can also be applied at larger scales (Vörösmarty et al., 2010). Examples include water provision and filtration, waste water treatment, and flood control. As regards waste water treatment, there are ecological engineering solutions that combine man-made approaches with nature, for example, by installing man-made wetlands/ponds. However, while nature provides important waste management services, care is needed to not breach ecological limits, both for biodiversity reasons and as the functions and services of the wetland itself may be impaired. In addition to direct water services, wetlands can offer cost effective solutions for other global environmental challenges, such as climate change mitigation through peatlands protection and restoration and climate change adaptation through mangroves which can help reduce damage from increasingly frequent storms. Peatlands cover 3 per cent of the world's land surface, about 400 million hectares (4 million km^2), of which 50 million hectares are being drained and degraded, producing the equivalent of 6 per cent of all global CO_2 emissions (Crooks et al., 2011).

Wetlands degradation continues, despite their values

Status and trends of wetlands. Inland wetlands cover at least 9.5 million km^2 (i.e. about 6.5% of the Earth's land surface) with inland and coastal wetlands together covering a minimum of 12.8 million km^2 (Finlayson et al., 1999; UNEP, 2012). Since 1900, the world has lost around 50% of its wetlands (UNWWAP, 2003). Recent coastal wetland loss in some places, notably East Asia, has been up to 1.6% a year (Gong et al., 2010), and is ongoing. Taking mangroves as an example, 20 per cent (3.6 million hectares) of total coverage has been lost since 1980, with recent rates of loss of up to 1% per year (FAO, 2007).

Degradation of the remaining wetlands can lead to biodiversity loss, changes to ecological functions, and changes to ecosystem service flows with subsequent impacts on the health, livelihoods and wellbeing of communities and economic activity. For example eutrophication of inland freshwater wetlands and coastal wetlands can lead to the ecosystem becoming algae dominated, which in turn leads to declines of fish availability, health risks and reduction in recreation and tourism opportunity, and where it concerns coastal reefs, also reductions in natural hazard management (SCBD, 2010). Pressures on wetlands include habitat loss (e.g. wetland drainage), invasive species, pollution, siltation, over-exploitation (e.g. unsustainable harvesting of fish), excessive water withdrawals (e.g. for irrigated agriculture), nutrient loading (e.g. from fertiliser use and urban waste water), and climate change (e.g. temperature rises changing ecosystem conditions).

Human drivers of ecosystem change pose a threat to water security for 80% of the world's population and to global freshwater biodiversity (Vörösmarty et al., 2010). In developed countries, costly technical solutions for water treatment are used to reduce some of these negative effects, but do little to address the source of the problem. Developing countries often cannot afford such capital costly approaches to water management.

To address the economic drivers of ecosystem change, there is a need to mainstream ecosystem services into economic decisions. The Millennium Ecosystem Assessment concluded that many water resource developments that have been undertaken to increase access to water have not given adequate consideration to the harmful trade-offs with other services provided by wetlands (MA, 2005b). An increased appreciation of the societal values of water-related ecosystem services from nature and the wider range of wetland ecosystem services will be essential to catalyse appropriate policy and business response.

The continuing loss and degradation of wetlands and associated loss of ecosystem services can lead to significant losses of human wellbeing, biodiversity, and economic impacts on communities, countries and business.

III. MEASURING TO MANAGE BETTER

An improved evidence base on the interconnections **between wetland ecosystems and social and economic systems will support improved management** of wetlands. Furthermore, assessing the value of water and wetlands can help **demonstrate their importance** and be an essential new evidence base for decisions at different levels, across both public and private sectors. An extended evidence base will help in the good governance of natural capital and support wetlands in finding their due place in policy, planning and investment decisions. A diverse range of tools help identify, demonstrate and take account of the benefits of water and wetlands (TEEB, 2010; TEEB, 2011; De Groot et al., 2006). Valuation of these benefits can make use of a mix of qualitative, quantitative, spatial, and monetary approaches. Furthermore, there are different methods to derive monetary values and they often build on biophysical assessments.

- **Bio-physical assessments**
  - **Measurement and indicators** of the state and trends of biodiversity, as well as the flow of ecosystem services - e.g. water quality and quantity, biodiversity or ecosystem service indicators such as carbon sequestration, water retention, and number of people benefitting from ecosystem-provided clean water;
  - **Mapping** the location and extent of wetlands, along with their interrelationships with ecosystems, population centres and man-made infrastructure provides essential insights on their interdependencies. Communities can be dependent on the ecosystem service flows from a wetland and the wetland health and functions can be dependent on the management by the local community. Furthermore, flood management for cities can be dependent on a combination of wetlands and human-made infrastructure, and understanding their complementarity can be fundamentally important for land use planning, management and investment choices.
- **Natural capital and environmental-economic accounts** are systematic ways of collating the biophysical evidence base and associated values at regional or national levels, in order to give policy makers a tool to complement national economic accounts (Gross Domestic Product (GDP) calculations). Tools and approaches for environmental accounts at the national level include the UN System of Environmental-Economic Accounts (SEEA) initiative, the World Bank-led Wealth Accounting and Valuation of Ecosystem Services (WAVES), the Ecosystem Capital Accounts being developed by the European Environment Agency (EEA, 2011) and a range of national approaches. At the private sector level, emerging developments include corporate sustainability reporting and accounting - such as Environmental Profit and Loss Accounts and the Natural Capital Declaration of the financial sector (Puma, 2011; Natural Capital Declaration, 2012).

IV. INTEGRATING THE VALUES OF WATER AND WETLANDS INTO DECISION MAKING

The Ramsar Convention signed in 1971, with its 163 government signatories (Contracting Parties) and its current Strategic Plan 2009-2015, commits Parties to implementing wise use principles for water and wetlands. Actions by Parties to deliver wise use provide important initiatives for protecting key water and wetland services. Integrating the values of water and wetlands can facilitate and inform decision making for wise use.

The globally agreed **Strategic Plan for Biodiversity 2011-2020** (launched at the Convention of Biological Diversity Conference of the Parties in Japan in 2010 and supported by the Rio+20 Declaration) **includes commitments to raise awareness of the values of biodiversity and to integrate them into plans, strategies, and accounts** (Aichi Biodiversity Targets 1 and 2). Parties to the CBD (193 parties from across the world) are currently revising their National Biodiversity Strategies and Actions Plans (NBSAPs) to take on board physical assessments of nature and flow of ecosystem services as well as growing number of initiatives to value nature by non-monetary and monetary means[5].

Policy synergies. **Working with nature can be a cost effective way of meeting a range**

of policy, business and private objectives. This includes water, food and energy security (ensuring water security for agriculture and energy production), poverty alleviation and meeting sustainable development goals collectively. Water and wetlands are at risk from climate change and sustainable management of these ecosystems can increase their resilience and hence reduce this risk. The sustainable use of water and wetlands by protecting the services they provide is also critical to enabling society to adapt to climate change and improving social cohesion and economic stability.

Integrated decision making. A range of tools have proved invaluable in helping to take the values of water and wetlands into account and realising synergies in policy, business and management decisions:

- **Land and water use planning and regulation** to manage, and where necessary designate and protect, areas to ensure the sustainable provision of services, as well as helping ensure connectivity between ecosystems within wider ecological networks and with social and economic systems. This can include designating wetlands for water regulation benefits for rural or urban centres, defining non-conversion zones to safeguard mangroves that provide important public goods benefits, or protecting coastal areas for fisheries nurseries. Effective regulation and careful land use planning helps control some critical pressures on wetlands, which in turn help avoid detrimental effects on provision of crucial local ecosystem services such as flood protection and water provision or global ones such as carbon storage;

- **Using wetland services to deliver investment and achieve management objectives**, by considering wetlands as natural water infrastructure that can offer solutions to meet water management objectives. Cost comparisons can often be favourable for the conservation of wetlands, even considering water management alone (e.g. flood risk), and particularly when factoring in co-benefits on offer (e.g., recreation, tourism). Investment to conserve and sustainably manage wetland ecosystem services can be critical to rural communities dependent on natural capital for food, water, fuel and livelihoods and global objectives of climate change mitigation and adaption. It can be a means of cost effectively achieving a range of policy and development objectives, including the Millenium Development Goals (MDGs) and the future sustainable development goals;

- **Prices, subsidies and their reform** to encourage efficient use of resources and innovation. This can be done for example by moving to full cost recovery for water (paying for the costs of supply) and, where relevant, also by resource pricing (taking into account the value of the resource itself for society). Furthermore, making use of pollution charges, liability and compensation requirements (e.g. for pollution incidence or damage) can reduce the pressures on wetlands and help implement the polluter pays principle. Reforming subsidies (e.g. direct grants, preferential tax treatment, pricing) can encourage management practices that promote public goods, innovation, reduce technological lock-ins, and save public budgets for other objectives;

- **Payments for ecosystem services** to remunerate land owners or managers for the delivery of ecosystem services, through programmes funded either by government agencies to have public payments for public goods, private ecosystem services' users (e.g. water utilities, beverage companies, citizens) or foundations and NGOs. This supports the principle that the beneficiary pays and the provider of a service gets rewarded for sustainable practice.

Synergies with policies aimed at enhancing livelihoods and alleviating poverty. Good water and wetland management can provide co-benefits in terms of improving the health and livelihoods of local communities and reducing poverty, e.g. through sustainable fisheries, agriculture and tourism. When possible, projects aimed at improving wetland management should involve local communities and make use of traditional practices and local knowledge, as this both increases the local acceptance of the policy action and potentially provide more locally tailored techniques for ecosystem management. Good transition management is key to gaining wider acceptance and participation, and supports the creation of employment opportunities for those who may lose their jobs because of conservation/ restoration policies.

[5] (see www.teebweb.org for countries embarking on national assessments)

V. RECOMMENDATIONS: TRANSFORMING OUR APPROACH TO WATER AND WETLANDS

There is a need to put wetlands and water-related ecosystem services at the heart of water management in the transition to a resource efficient, sustainable economy. Key elements to transform our approach include:

- **Appreciating and taking account of the values of water and wetlands in public policy and private decisions. This includes both investment in developing a more complete knowledge of the economic importance of water and wetlands** (as some wetland types and geographic locations are less well understood than others) and committing to their integration into decisions (e.g. in policy and investment decisions);

- **Committing to fully integrate the management of wetlands and securing their wise use in water management** (integrated water resource management);

- **Prioritising avoiding further loss/conversion of wetlands** - by better and more comprehensive consideration of wetland ecosystem services in Strategic Environmental Assessment (SEA) of policies and programmes and project-level Environmental Impact Assessment (EIA); development of ecosystem capital accounts to develop a foundation for systematic response to systemic problems, assessment, land use planning, regulation, setting of appropriate incentives and enforcement;

- **Promoting the restoration of degraded wetlands** – to improve water, food and energy security, biodiversity conservation, climate benefits (mitigation and adaptation), natural protection against extreme events, and benefits for people and livelihoods. In places this will be done in conjunction with man-made infrastructure investments. For the public sector, restoration can be a critical means of ensuring the provision of public goods, addressing poverty (as the rural poor are generally more directly reliant on ecosystem services) and saving public finance (due to cost effective solutions of working with nature). For the private sector, it can be a means of securing resources for the future and reducing resource availability risks. Restoration can also help in minimising liabilities, be part of a licence to operate (e.g. where restoration or offsets are required) and in cases positive business opportunities (e.g. where water trading or PES schemes are in place); and

- **Ensuring equitable benefit sharing and social and economic efficiency** recognising that there will be winners and losers in the transition to a sustainable economy.

There is a need for action at all levels and across stakeholders if the opportunities and benefits of working with water and wetlands are to be fully realised and the risks of losses appreciated and acted upon.

Practical recommendations for stakeholders to respond to the value of water and wetlands in decision-making

At the **global level** there is a need to ensure implementation of the Strategic Plan for Biodiversity 2011-2020, the Ramar Strategic Plan 2009-2015, the UNFCCC, the MDGs, and strategic planning and implementation of the many multilateral environmental agreements (MEAs). The role and value of water and wetlands should be interegrated in each of these. This is an awareness and governance challenge, with potential for signficant synergies and efficiency gains.

National and international policy makers

- Integrate the values of water and wetlands into decision making and national development strategies – for policies, regulation and land use planning, incentives and investment, and enforcement;

- Regulate to protect wetlands from pressures that do not lead to improvements in public goods and overall societal benefits;

- Regulate to ensure that wetland ecosystem services options and benefits are fully considered as solutions to land and water use management objectives and development;

- Commit to and develop improved measurement and address knowldge gaps – using biodiversity and ecosystem services indicators and environmental accounts (notably SEEA & water accounts). This will require an improved science-policy interface and support for the scientific/research communities. The recently established IPBES (Intergovernmental Platform on Biodiversity and Ecosystem Services) could contribute signficantly in this area.;
- Reform price signals (getting prices right) via water cost recovery, resource pricing and reforming subsidies;
- Commit to restoration targets and/or programmes, improving ecosystem health and functioning, the water cycles, addressing poverty and development concerns and acheiving the mutliple benefits of working with nature.

Local and regional policy-makers

- Assess the interactions between wetland ecosystems, communities, man-made infastructures and the economy and ensure the evidence base is available to decision makers, whether spatial planners, permit authorities, investment programme responsibles, inspectors or the judiciary;
- Integrate into river basin and coastal management the ecosystem functions and the interaction between hydrological, social and economic systems;
- Integrate planning systems - e.g. water supply and management to take into account both ecosystem-based infrastructure and man-made infastructures;
- Ensure due engagement/participation of communities (including indigenous peoples) and ensure that traditional knowledge is duly integrated into management solutions.

Site managers

- When possible and relevant, assess the values of sites and trade-offs of different land use decisions to help inform site management decisions to protect and enhance the values of wetland ecosystems being managed;
- Communicate the values at the local level - to get buy-in for the site management, attract funding for protection and management measures, and reduce the pressures on weltands, including risks of land use permit decisions that may undermine public goods.

Valuation research and statistical communities

- Systematically contribute to filling the gaps in knowledge on the the values of water and wetlands, on improved governance solutions, on measures and tools to support the development of environmental accounts;
- Improve the understanding of public goods and trade-offs between public goods and private benefits from policies and investment choices.

Development cooperation community

- Integrate the appreciation of the multiple values of wetlands and potential cost savings/to meet objectives of development cooperation:
  - e.g. ecosystem restoration to improve water security, poverty alleviation, local development and wellbeing;
  - e.g. investment in ecosystem-based adaptation to climate change.

Business

- Assess the dependency of the business on water and wetlands related ecosystem services from the short to long term;
- Assess the risks to operation inputs, eventual liabilities, risk to reputation and to the licence to operate from both resource availability and impacts, including pollution pressures;
- Develop corporate ecosystem valuation and environmental profit and loss accounts to improve disclosures;
- Explore synergies between private interests and public goods and realise opportunities for synergies whether via restoration activities, engagement in markets or wider commitments to no net loss of biodiversity (or net positive gain); commit to water footprint reduction, in order to safeguard future resource availabilty for private and public benefits.

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