

Investing in Ecosystems as Water Infrastructure

Key Message

Sustainable river basin management pays dividends for poverty reduction, water security and economic development. Conventional water investments, however, ignore the economic role of river basins themselves and ecosystems as natural water infrastructure. They omit the natural ecosystems which safeguard and maintain water quality and supplies, protect against water-related disasters and generate goods and services that are vital for human well-being and economic development.

Economic planning for water resources development, at basin or national scales, needs to account for ecosystem services. With the costs and benefits of ecosystem services valued, a business case can be made for investing in ecosystems and watersheds as natural infrastructure, as part of sustainable financing for river basin management.



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Recommendations

- Treat ecosystems as an integral part of the water infrastructure necessary for development, both at basin level and in national accounts. Require valuation of the costs and benefits of ecosystem services in investment assessment, including for dams, storage, irrigation and drainage. Base economic planning and investment decisions on analysis of costs and benefits for the full suite of both natural and built infrastructure options.
- The returns on investment for river basin management should be clear and quantified to inform better decision making. Apply economic tools to create a business case in which the dividends from investing in river basin management account for the benefits of ecosystems and water security for livelihoods and economic development.
- Implementation of sustainable water resources management benefits from economic incentives. Use economic incentives to encourage changes in behaviour needed to implement IWRM. Reward those who manage watersheds sustainably, including by using payments for ecosystem services where appropriate stakeholder participation and water governance is in place.
- Financing for water resources management must be sustainable. Use a sound business case to mobilise innovative financing of water resources management, from governments, the private sector and water users. Make financing available to local initiatives for watershed management through decentralised funds and credit schemes that integrate clean and adequate water for all, ecosystem services, livelihoods and economic development.

Justification

Clean and regular water supplies are among the most basic human needs, as well as being core to most industries and to food and energy security. Each year, hundreds of billions of dollars are invested in the equipment and facilities that are required to abstract, store, treat and distribute water. Such investments, however, have paid scant attention to some of the most important, and productive, components of water infrastructure: these are the ecosystems – wetlands, forests, grasslands and other natural habitats – that provide a wide array of services to maintain water supplies, uphold water quality and guard against water-related hazards such as pollution, storms, floods and droughts.

Just like built infrastructure, natural infrastructure provided by ecosystems in healthy watersheds is a valuable part of the stock of facilities, services and equipment needed to ensure water security for poverty reduction and economic growth.

The key to investing in ecosystem services as natural water infrastructure is understanding their value. Economic valuations of ecosystems are being made increasingly using tried and tested tools for analysis. With ecosystem values in hand, decision makers can then weigh up the costs and benefits of alternate choices for water infrastructure development and operation, with a more complete picture of the likely impacts on sustainable development.

Performing ecosystem valuations, especially in ways that encourage whole communities to participate, empowers all stakeholders. Better informed decisions can be made and consensus improved for initiatives that sustain both the environment and livelihoods.

With knowledge gained from ecosystem valuations, priority can be given to projects that combine investment in natural and built infrastructure. Development outcomes will be more sustainable and climate resilient as a result. Incorporating investment in ecosystems into water infrastructure development will be a fundamental building block of the future green economy.



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Evidence for action

Count ecosystems as water infrastructure

Governments are under increasing pressure to find the most effective means of supplying clean water for their populations, while meeting demands from agriculture and the needs of developing industries. Deciding how to allocate water fairly requires knowledge of how all components of the water system interlink so that investment is efficient and sustainable. Ecosystem valuation offers a method to compare costs and benefits of different scenarios so that both short-term gains and sustainable growth can be achieved without sacrificing the health of the environment.

Leaving natural systems out of the planning process can be costly. In Nigeria's Komadugu Yobe Basin (KYB), upstream of Lake Chad, engineers built dams to supply freshwater to an expanding population without considering the impact on the ecosystem and subsequent loss of income to subsistence farmers downstream. New streamflow patterns altered yearly droughts, allowing the invasive weed *Typha* to constrict flows, stopping navigation and fishing. To overcome this situation, IUCN's KYB Project started with a water audit, identifying water availability and needs. Though it took time and was expensive, its transparent nature helped build trust. A fragmented and uncoordinated management system was transformed into State Integrated Water Resource Management (IWRM) Committees. Convinced that river restoration would pay dividends, Nigeria's President set up a \$125 million Trust Fund for the KYB. To create an initial

Further reading

- *Values and rewards: counting and capturing ecosystem water services for sustainable* Report (2005)
- *Muthurajavela Marsh, Sri Lanka* Case study
- *Lessons Learned from the KYB Project* Report (2008)
- *Okavango Delta* Management plan
- *Pangani River System: Future of the Basin* Report (2011)

All publications available from: www.waterandnature.org

\$13 million investment, authorities across the six riparian states matched the Federal government's contribution. Investment in the natural infrastructure of the basin means that river channels are being cleared, restoring wetlands for fisheries and allowing navigation. But more importantly, the Trust Fund is building investment in sustainable water management for the future.

Include ecosystem valuations in water investment decisions

Ecosystem valuation can help supply the tools to make better economic decisions about threats to the environment. In Sri Lanka, the Muthurajawela Wetlands control flooding and filter waste and pollution, while providing income opportunities through tourism and fishing. Though a wetlands management plan has been in place for several years, low levels of compliance meant that biodiversity and water services were lost through land reclamation and contamination from factory discharge. A valuation assessment revealed the marsh's highest economic benefits are services such as flood control and waste treatment, followed by income from fisheries and agriculture. The valuation showed the benefit of wetland restoration, not only for the 30,000 vulner-

Economic Value of Muthurajawela Wetland, Sri Lanka

| | Value (\$/year) | Value (\$/ha/year) |
|---------------------------------|------------------|--------------------|
| Flood attenuation | 5,394,556 | 1,758 |
| Industrial wastewater treatment | 1,803,444 | 588 |
| Agricultural production | 336,556 | 110 |
| Support to downstream fisheries | 222,222 | 72 |
| Firewood | 88,444 | 29 |
| Fishing | 69,556 | 23 |
| Leisure and recreation | 58,667 | 19 |
| Domestic sewage treatment | 48,000 | 16 |
| Freshwater supplies | 42,000 | 14 |
| TOTAL | 8,072,111 | 2,631 |

L. Emerton (ed), 2005, Values and Rewards: Counting and Capturing Ecosystem Water Services for Sustainable Development. IUCN

able people who profit directly from income, employment and food security, but also for businesses. Conserving the marshes helps industries avoid the cost of building and maintaining the treatment plants necessary to replace the buffering effect of lost wetlands, saving almost \$3.6 million per year. Knowing the value of the ecosystem helps convince water users to comply with wetlands management to yield the highest possible return on development.

Create economic incentives for implementing sustainable basin management

Increasing demand requires innovative ways of funding new infrastructure and promoting conservation. Using payments for economic services (PES) can effectively change the way water users behave and encourage implementation of IWRM and sustainable river basin management. The residents of San Pablo, Guatemala have found a way to reward improved management practices and overcome reluctance to change. The many rivers around San Pablo provide high value services, but over the years heavy logging and the resultant lack of ground cover caused aquifers to dry up, leading to almost daily water shortages. Contamination from coffee production reduced water quality, causing health problems. Understanding that their future was under threat, the community started the Participative Water Management Fund, Agua Viva (FOGESHIP), a legal institution, to implement a PES scheme. By raising urban water rates they are able to fund work plans and compensate landowners for sustainably managing their forests. Because the whole community is involved, everyone has learned the value of the watershed. Working together they have created a rational, sustainable plan for the basin's resources.

Mobilise innovative financing for water resource management

The city of Quito, Ecuador, provides an example of how sustainable funding for water resource management can work. By 2025 the city's population is expected to reach nearly 4 million, increasing the demand for water by almost 50%. Recognizing that the city's watersheds are vital to its development, the municipal government and NGOs provided seed money to form the Water Protection Fund for Quito (FONAG). Water users pay into the fund, depending on their water consumption, with the largest share coming from the Quito Water Utility. By 2009 the fund held more than US\$ 7 million. Using interest accrued, FONAG pays to protect and maintain ecosystem services. Short term benefits can already be counted, including the conservation of 730,000 hectares, improved water quality and supply for more than 13 million people, 52% of whom are poor, and economic benefits for 1800 people associated with watershed management and conservation. Long-term (80 year) funding focuses on environmental education, research and watershed conservation.



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Examples from the field

To protect its water supply, a utility company in Costa Rica determined that paying incentives to landowners to manage their forests sustainably would be more cost effective than building a filtration plant. Domestic users, also shareholders in the company, pay a small monthly tariff and large bottling companies finance 55% of the costs. Landowners now receive an annual fee to protect their forests, ensuring good water quality downstream.

In Botswana's Okavango Delta, tourism businesses and local communities compete for use of the Delta's natural wealth. An economic valuation of the Delta established its direct, indirect and intrinsic values, and showed that for everyone to benefit, the ecosystem had to function at its optimum. Knowing the value of resources helped stakeholders form a sustainable management plan that protects income and conserves the Delta for the future.

Population pressures on the Volta River forced villagers to move closer to the riverbank, increasing pollution and erosion. Planting trees in strip layers stabilized the riverbanks, supplied a steady source of firewood and provided a small income from selling fruit. Even small incentives like these can make a difference. People are now taking ownership of the sustainable management plan, improving the health of the river.

Learn more

WANI Toolkits

VALUE – Counting ecosystems as water infrastructure

PAY – Establishing payments for ecosystem services

Websites

www.iucn.org/water

www.waterandnature.org

Contact us

water@iucn.org



About IUCN

IUCN, International Union for Conservation of Nature, helps the world find pragmatic solutions to our most pressing environment and development challenges. IUCN works on biodiversity, climate change, energy, human livelihoods and greening the world economy by supporting scientific research, managing field projects all over the world, and bringing governments, NGOs, the UN and companies together to develop policy, laws and best practice.

IUCN is the world's oldest and largest global environmental organization, with more than 1,000 government and NGO members and almost 11,000 volunteer experts in some 160 countries. IUCN's work is supported by over 1,000 staff in 60 offices and hundreds of partners in public, NGO and private sectors around the world.

About the IUCN Water and Nature Initiative

The Water and Nature Initiative (WANI) is an IUCN initiative that has worked with more than 80 partners in more than 30 countries to mainstream environmental and social issues into water resources planning and management. The initiative uses ecosystem management as a strategy for integrated management of land, water, nature and communities. WANI helps to solve the dilemma between fulfilling development options and conserving aquatic resources by resolving water conflicts, reviving rivers and spurring local economic development.



Water and Nature Initiative