

Wetland Values and Functions



Wetlands are areas where water is the primary factor controlling the environment and the associated plant and animal life. The Ramsar Convention's definition of wetlands include a wide variety of habitat types, including rivers and lakes, coastal lagoons, mangroves, peatlands, and even coral reefs. In addition, there are human made wetlands such as fish and shrimp ponds, irrigated agricultural lands (e.g. rice fields), salt pans, reservoirs, sewage farms and canals.

Wetland ecosystems are part of our natural wealth. A recent assessment of the dollar value of our natural ecosystems estimated them at US\$ 33 trillion. The study estimated the global value of wetland ecosystems at an amazing US\$ 14.9 trillion, 45 percent of the total. This reflects the many functions of wetlands. Information contained in this leaflet has been summarized from the Ramsar information pack on wetland functions and values,



FLOOD CONTROL

Wetlands play a crucial role in flood control by essentially "holding" heavy rainfalls, preventing possible flooding downstream.

- Wetlands often play a crucial role in flood control. Loss of floodplains to agriculture and human habitation has reduced this capacity. Construction of levees and dams on rivers to improve flood control has often had the reverse effect.
- Floodplain restoration and removal of structures is providing a partial solution in many countries.
- Economic losses in the 1998 floods in China amounted to US\$ 32 billion.
- The 1993 floods along the Mississippi, USA caused US\$ 12-16 billion in damages.
- 3,800 hectares of intact wetlands on the Charles River, USA have been valued at US\$ 17 million per year in terms of flood protection alone.

RESERVOIRS OF BIODIVERSITY

- Freshwater wetlands hold more than 40 percent of the world's species and 12 percent of all animal species.
- Some wetlands contain significant numbers of endemic species - such as Lake Tanganyika in Africa with 632 endemic animal species and the Amazon River, in South America with an estimated 1,800 endemic species of fish.
- Wetland biodiversity is a significant reservoir of genes that has considerable economic potential in the pharmaceutical industry and in commercial crop plants such as rice.
- Rice is a common wetland plant and the staple diet for over half the world's population. Wild rice continues to be an invaluable source of new genetic material for developing disease resistance, yet many different varieties of rice have disappeared in recent years - leaving us dependent on a shrinking genetic base. Commercially bred crops, such as rice, have a "lifespan" of 10-15 years before new genetic material is required

to combat pest and disease problems.

- Wetland animal and plant species play a role in the pharmaceutical industry - 80 percent of the world's population depends on traditional medicine for primary health care.
- Coral reefs rival tropical rainforests in terms of biological diversity; they may contain 25 percent of all marine species. Reefs hold an estimated 4,000 species of fish and 800 species of reef-building corals; total number of species associated with reefs may be over one million.

CLIMATE CHANGE MITIGATION

- Wetlands may store as much as 40 percent of global terrestrial carbon; peatlands and forested wetlands are particularly important carbon sinks.
- Conversion to agricultural use and destruction of wetlands will release large quantities of carbon dioxide, the gas that accounts for at least 60 percent of the global warming effect.
- As the full effects of global warming are felt over the next 100 years, the ability of coastal wetlands in some parts of the world to mitigate the effects of storm surges and other extreme weather effects will be put to the test; maintaining wetlands in a healthy state, avoiding further wetland losses and restoring and rehabilitating wetlands in the frontline of defenses would be sensible tactics.

SHORELINE STABILISATION AND STORM PROTECTION

- Loss of vegetation along river banks in eastern England was costed at US\$ 425 per metre of bank - the cost of maintaining artificial bank reinforcement to prevent erosion.
- Coastal wetlands play a critical role in many parts of the world in protecting the land from storm surges and other weather events; they reduce wind, wave and current action, and coastal vegetation helps to hold sediment in place.
- The value of intact mangrove swamps in Malaysia for storm protection and flood control alone has been valued at US\$ 300,000 per kilometre - the cost of replacing them with rock walls.
- The value of one kilometre of coral reef ranged from US\$ 137,000 to almost US\$ 1.2 million over a 25-year period, based on the economic value of storm protection, fishing and tourism.



CULTURAL VALUE

- Wetlands are frequently of religious, historical, archaeological or other cultural significance at the local or national level.
- In a preliminary survey of Ramsar sites, over 30 percent of a sample of 603 Ramsar sites recorded some archaeological, historical, religious, mythological or cultural significance at either local or national level.
- In Portugal, despite the investment of US\$ 150 million, authorities abandoned the construction of the Coa Dam in 1995 when Palaeolithic engravings were unearthed.
- In Tibet certain lakes have deep religious significance for local populations and associated with this are strict regulations that determine exploitation of the lakes.
- The Coburg Peninsula Ramsar site in Australia has great significance for the traditional Aboriginal owners, who still conduct an active ceremonial life and undertake semi-traditional hunting and gathering.
- The operation of the Gei Wai, a traditional way of shrimp cultivation practised by local people for hundreds of years, can only be seen by Hong Kong residents at the Mai Po marshes Ramsar site.
- The Stavns Fjord Ramsar site in Denmark is an outstanding archaeological site from the Bronze age.
- Divers in Lake Titicaca, South America, have recently discovered a temple that pre-dates the Inca period.

WATER PURIFICATION

- Plants and soils in wetlands play a significant role in purifying water, removing high levels of nitrogen and phosphorous and, in some cases, removing toxic chemicals.
- New York City, USA recently avoided spending US\$ 3-8 billion on new waste water treatment plants by investing US\$ 1.5 billion in buying land around the reservoirs upstate as well as instituting other watershed protective measures.
- Florida, USA's cypress swamps removed 98 percent of all nitrogen and 97 percent of all phosphorous entering the wetlands from waste water before this water entered the groundwater.
- The 8,000-hectare East Calcutta marshes in India, a patchwork of tree-fringed canals, vegetable plots, rice paddies and fish ponds, along with the assistance of 20,000 people, daily transform one third of the city's sewage and most of its domestic

refuse into 20 tonnes of fish and 150 tonnes of vegetables.

- In the Chesapeake Bay in USA, one million oysters have been seeded in a tributary to "clean" the water before it reaches the Bay



SEDIMENT AND NUTRIENT RETENTION AND EXPORT

- Wetlands slow the passage of water and encourage the deposition of nutrients and sediments carried in water.
- Nutrient retention in wetlands makes them among the most productive recorded, rivalling even intensive agricultural systems.
- Coastal deltas are dependent on riverine sediments and nutrients for their survival; engineered structures that interfere with the natural movement of sediments and nutrients can degrade deltas.
- The Rhine River in Europe has lost 90 percent of its natural floodplains and now flows twice as fast as before.
- The Hadejia-Jama'are floodplain in northern Nigeria has long supported tens of thousands of people through fishing, agriculture, fuelwood and fodder production, livestock and tourism. Using the water in this way has been valued at US\$ 45 per 1,000 cubic metres in contrast to US\$ 0.04 for the value of diverted water for a proposed irrigation scheme.
- The degradation of the Mississippi delta threatens the Louisiana fishery, made up mainly of wetland-dependent species and valued at US\$ 264 million in 1989.
- Efforts to restore the Waza-Logone floodplain in Cameroon over an eight year period cost over US\$ 5 million.



annually on their hobby.

- In Canada, Mexico and the USA, more than 60 million people watch migratory birds as a hobby and 3.2 million ducks, geese and other game birds; collectively they generate more than US\$ 20 billion annually in economic activity.

The Wetlands of Lao PDR

Lao PDR is intimately associated with one of the world's major wetlands - the Mekong River system. The Mekong basin covers 88 percent of the country. The functions and values of the wetlands in Lao are significant and are also of critical importance to the livelihoods of local communities.

- Food for local communities: Wetlands provide the main source of food - rice, fish and other aquatic animals. They are the basis for people's strategies to cope with rice deficit and the major source of protein for much of the population. Non-fish aquatic animals harvested from the wetlands of Lao include several species of frogs, most species of waterbirds, molluscs, turtles, crabs etc. Aquatic plants are also consumed for various purposes.
- River bank gardens: These are highly productive seasonal gardens with various crops. Cultivation takes place as water recedes in the dry season as the soil here is often more fertile than the soil away from the river.
- Economic safety nets: In subsistence economy based largely on the production of non-irrigated rice there are significant risks posed by weather, insect pests and other threats to rice crops. Natural wetland resources serve as a "safety net" to ensure survival through these years of crop loss.
- Water supply - water from wetlands are extracted for domestic, agricultural and industrial use. Some wetlands are used as a water supply for the villages. Wetlands also recharge the aquifer and therefore increase the availability of groundwater. Rural villages in Lao PDR depend a lot on groundwater.
- Flood control and flow regulation: Wetlands in Lao PDR especially floodplains play an important role in flood height reduction to areas immediately downstream in early wet-season. Equally important is the role of these wetlands in the maintenance of dry season flows (e.g. Bung Kiat Ngor, Champasak Province)
- Recreation and eco-tourism opportunities - wetlands in Lao PDR (e.g. Siphandone wetland complex) have been recognized as important eco-tourism destinations.

RECREATION AND TOURISM

- Many wetlands are prime locations for tourism; some of the finest are protected as National Parks, World Heritage Sites, Ramsar sites, or Biosphere Reserves. Many wetland sites generate considerable income locally and nationally.
- Recreational activities such as fishing, hunting and boating, etc., involve millions of people who spend billions of dollars on their activities.
- Wetlands offer ideal locations for involving the general public and schoolchildren in hands-on learning experiences, in an essentially recreational atmosphere, to raise awareness of environmental issues.
- In Australia, the Great Barrier Reef Marine Park recorded 1.6 million visitor-days with a value of more than US\$ 540 million in 1997 while the more remote Kakadu National Park collects US\$ 800,000 annually.
- The Cayman Islands attract 168,000 divers per year, who spend US\$ 53 million.
- Collectively, Caribbean countries rely on their beaches and reefs to attract million of visitors each year; their tourist industry was valued at US\$ 8.9 billion in 1990, one half of their GNP.
- Recreational fishing involves more than 45 million people in the USA, who spend US\$ 24 billion



Despite all their important values and functions, wetland habitats and the resources they contain are under great threat from unsustainable practices. Some examples of these include alterations in the flow regime, degradation of water quality from pollution, conversion into other land uses, illegal fishing practices and introduction of invasive alien species.