Water Purification

In Brief

- ✔ **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 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's cypress swamps removed 98% of all nitrogen and 97% of all phosphorous entering the wetlands from waste water before this water entered the groundwater.**
- **The 8,000-hectare East Calcutta marshes, 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 one million oysters have been seeded in a tributary to "clean" the water before it reaches the Bay.**

PLANTS AND SOILS IN WETLANDS play a significant role in purifying water. High levels of nutrients such as phosphorous and nitrogen, commonly associated with agricultural run-off, are effectively removed by wetlands. This is important in preventing eutrophication further downstream, a process that leads to rapid plant and algal growth followed by depleted oxygen levels that affect other species. It can also be important in preventing high concentrations of these nutrients reaching groundwater supplies or other water sources that may be used for drinking water.

Wetlands can be highly effective in dealing with these high levels of nutrients – in Florida's cypress swamps, 98% of all nitrogen and 97% of all phosphorous entering the wetlands from waste water were removed before this water entered the groundwater.

Photo: DRAE

Many wetland plants have the capacity to remove toxic substances that have come from pesticides, industrial discharges and mining activities. Some wetland plants have been found to accumulate heavy metals in their tissues at 100,000 times the concentration in the surrounding water and so can detoxify certain kinds of effluent. *Eichhornia crassipes* (water hyacinth), some *Typha* and *Phragmites* species have been used to treat effluents from mining areas that contain high concentrations of heavy metals such as cadmium, zinc, mercury, nickel, copper and vanadium. (*Eichhornia crassipes*, a native of South America, is a "Jekyll and Hyde" of the wetland world, helpfully removing toxic materials in some wetlands and proving to be a costly adversary in others because of its phenomenal growth rate.)

In West Bengal, India, 430 members of a Fisherman's Cooperative harvest one tonne of fish a day from ponds that

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receive 23 million litres of polluted water daily from both industrial and domestic sources. *Eichhornia crassipes* is used here to remove the heavy metals while other wetland plants remove grease and oil. Mercury levels, although high in incoming water, cannot be detected in the outflow, and the wetland plants remove 99.9% of the faecal coliform bacteria.

Some wetland animal species are also proving to be useful in this regard. In the Chesapeake Bay in the USA, one million oysters are being re-seeded in a tributary feeding into the Bay in an effort to "clean-up" the pollutants in the water before they reach the Bay.

Photo: WWF/UNEP/TOPHAM/Ezequiel Becerra

Of course nature has its limitations, and it would be wrong to consider that wetlands can deal with whatever waste concentrations we humans can produce. The environmental catastrophes associated with mining wastes in the past two years are testimony to this – in Southern Spain in 1999, when more than 5 million cubic metres of heavy metal-laden sludge poured into the Guadiamar river and part of Coto Doñana wetlands; and in Romania in January 2000, when 100,000 cubic metres of cyanide and heavy metal-contaminated wastewater flowed into three rivers and devastated 1,000 km of river ecosystems in Romania, Hungary, Yugoslavia, and Bulgaria.

The value of the purification function of wetlands is significant: New York City recently found that it could avoid spending US $3-8 billion on new waste water treatment plants (with US$ 700 million annual operating costs) by investing just US$ 1.5 billion in buying land around the reservoirs upstate as well as instituting other protective measures to protect the watershed that will do the job of purifying the water supply for free.

Using this purification capacity of wetlands, Calcutta has pioneered a system of sewage disposal that is both efficient and environmentally friendly. Built to house one million people, Calcutta is now home to over 10 million, many living in slums and creating a sanitation nightmare. But the 8,000-hectare East Calcutta marshes, 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. Mobilising people and wetlands here dispenses with the need for costly engineered sewage systems, brings great benefit to many local people, and solves at least part of the sanitation problem in the city. ◆

Ramsar
CONVENTION ON WETLANDS
CONVENTION SUR LES ZONES HUMIDES
CONVENCIÓN SOBRE LOS HUMEDALES
(Ramsar, Iran, 1971)

Wetland Values and Functions

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