

From functioning as natural sewage and wastewater treatment plants to supporting an immensely rich biodiversity, wetlands perform several key ecological functions. There is a growing need to preserve these rapidly shrinking wetlands in India, says A. BIJU KUMAR

OUR VANISHING WETLANDS

upper layers.

Types of Wetlands

The total wetland area of the world is estimated to be around 85,58,000 sq. km. which is about 6.4% of the total area of Earth. India has 2,167 recorded natural wetlands, covering an area of 1.5 million hectares. Further, there are 65,254 artificial wetlands, spreading over an area of 0.25 million hectares. Yet, a comprehensive data on the wetlands in India is still not available.

ONCE considered useless and water-logged unproductive areas and sometimes even as deleterious ecosystems, wetlands are now being looked upon as ecosystems with specific ecological characteristics, functions and values. They are one of the most productive ecosystems of the world and essential life supporting systems, providing a wide array of benefits to human kind. Yet, wetlands are today fast declining and rapidly deteriorating ecosystems in many parts of the world. The same is true of India as well.

The term wetland is rather broad. It includes a variety of habitats such as marshes, swamps, lakes, river flood plains and so on. Hence a common definition covering all these areas is rather difficult to give. The International Union for Conservation of Nature (IUCN) defines wetlands as "areas of marsh, fen, peatland or water, whether natural or artificial, that is static or flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed 6 metres". According to a comprehensive definition by the U.S. Fish and Wildlife Service wetlands are "lands transitional between terrestrial and aquatic systems where the water table is at or near the surface, or the land is covered by shallow waters". Wetlands are unique in their own way, yet they exhibit characters of both terrestrial and aquatic environments. Some of the important characters of a wetland are:

- Water should be present for at least seven successive days in the season.
- It should support aquatic macrophytes in water and soil at least in some part of the year.
- Soil should be flooded for a long time and become anaerobic in the

There are a great variety of inland and coastal wetland ecosystems in India. The inland wetlands include marshes, swamps, flood plains of rivers and littoral area (marginal zone) of ponds and lakes. Along the coast there are salt marshes, lagoons, backwaters, estuaries, mangrove forests and coral reefs.

Marshes are shallow water areas with abundant emergent vegetation such as reeds, rushes, grasses and

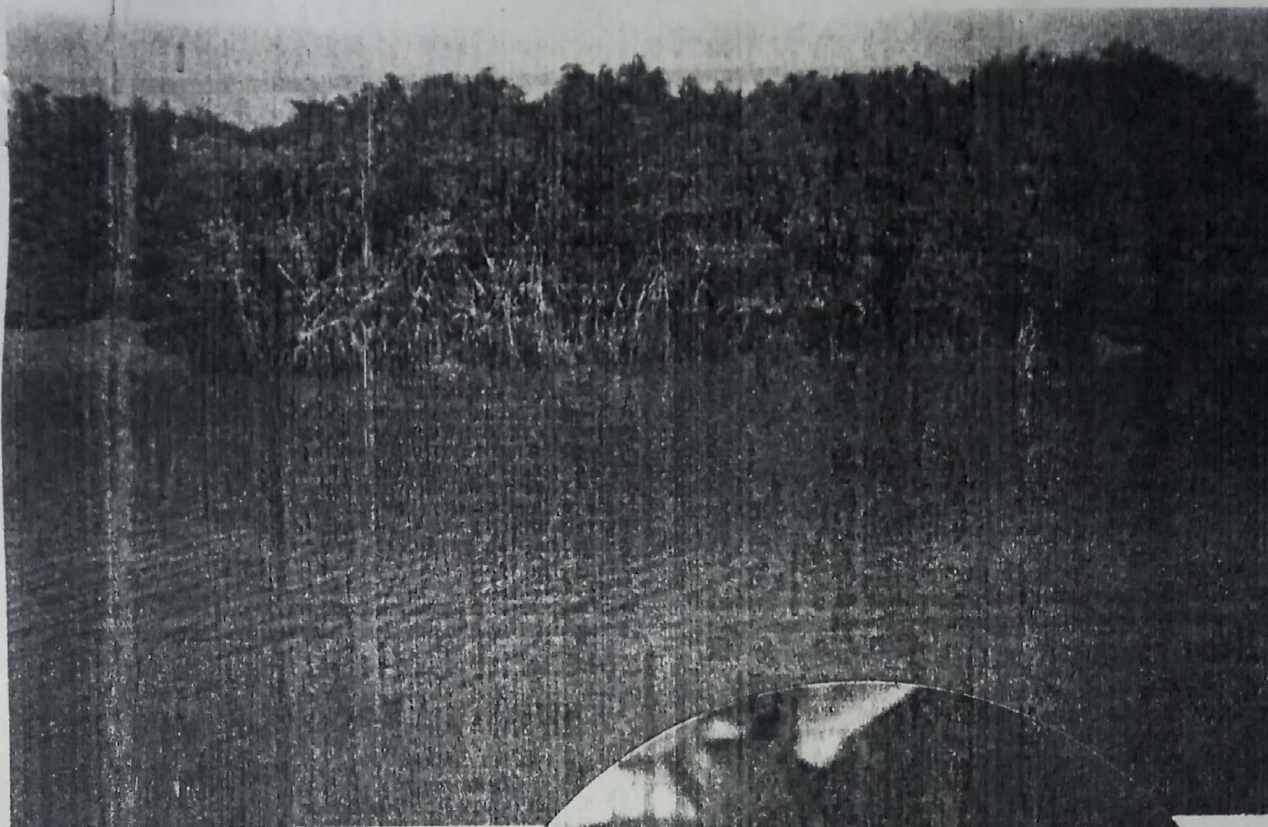


Wetlands are getting filled up with solid waste

"Wetlands are one of the most productive ecosystems of the world and essential life supporting systems, providing a wide array of benefits to human kind."

sedges. These are one of the most productive ecosystems of the world. The *terai* located along the Himalayan foothills, the Rann of Kutch salt marsh of the Gujarat coast, and the *Chushul* and *Henle* river marshes of Ladakh are a few good examples. The famous bird sanctuary of India, Keoladeo Ghana National Park in Rajasthan is a man-made marshy wetland.

Swamps differ from marshes in possessing woody shrubs and trees which are adapted for life in saline water-logged areas. India has a large number of swampy forests or mangroves along both the east and west coasts, representing about 7% of the world's mangroves. The Vedaranyam salt swamp in Tamilnadu and the Riparian swamps of Dudhwa Na-



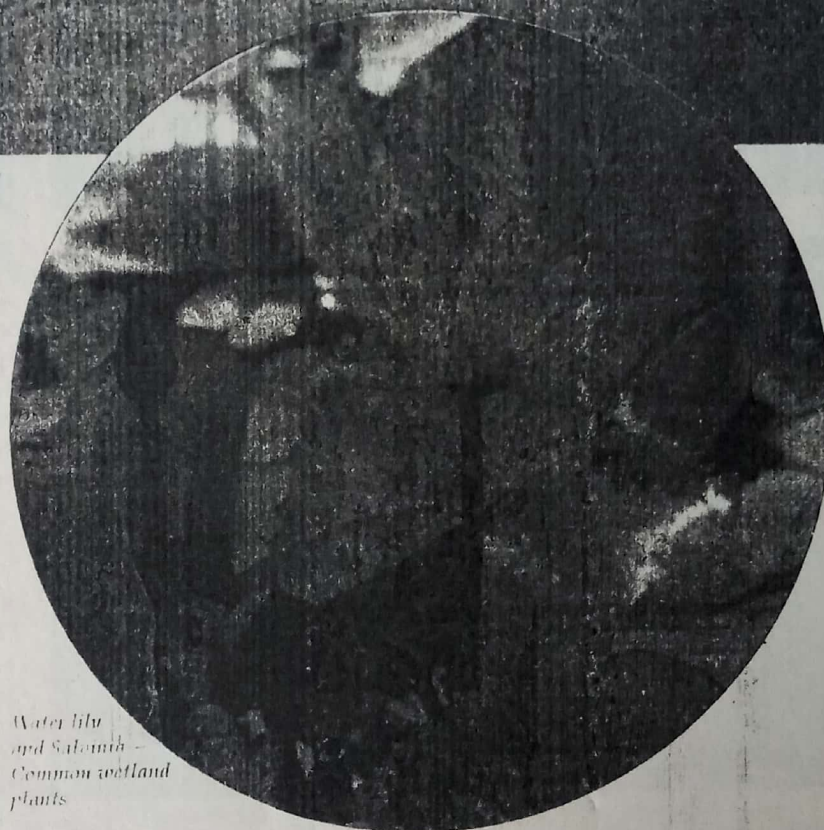
Mangrove forests in Bhitarkanika wildlife sanctuary, Orissa

tional Park in Uttar Pradesh are some of the major swamps.

The major rivers in India have extensive flood plains. The flat land close to the large rivers remains covered with flood waters due to natural floods during some seasons of the year. These areas remain completely inundated even after the flood waters recede. The flood plains are more diverse along the lower reaches of the rivers. They are the ideal habitats for fish and wildlife; some of the best forests of the world are located in the flood plains. There are also a large number of estuaries, the meeting place between the rivers and the sea.

Lakes are yet another form of wetlands. Besides submerged, emergent and true plants, plenty of fauna also inhabit the lakes.

Coral reefs are shallow water tropical marine ecosystems exhibiting very high productivity and biological diversity. They are formed by the deposition of calcareous exoskeleton of marine coelenterates called coral polyps over thousands of years. The major reef formations in India are located in the Gulf of Mannar, Palk Bay, Gulf of Kutch, Lakshadweep, and



Water lily and Salvinia - Common wetland plants

“The major rivers in India have extensive flood plains. The flat land close to the large rivers remains covered with flood waters due to natural floods during some seasons of the year.”



The Chilka lake

Andaman and Nicobar Islands.

Reservoirs, tanks, fish ponds, canals and paddy fields could be considered as man-made or artificial wetlands. Although they cannot be compared with natural wetlands in terms of biodiversity and other functions, they may still be ecologically as important as the former.

Importance of Wetlands

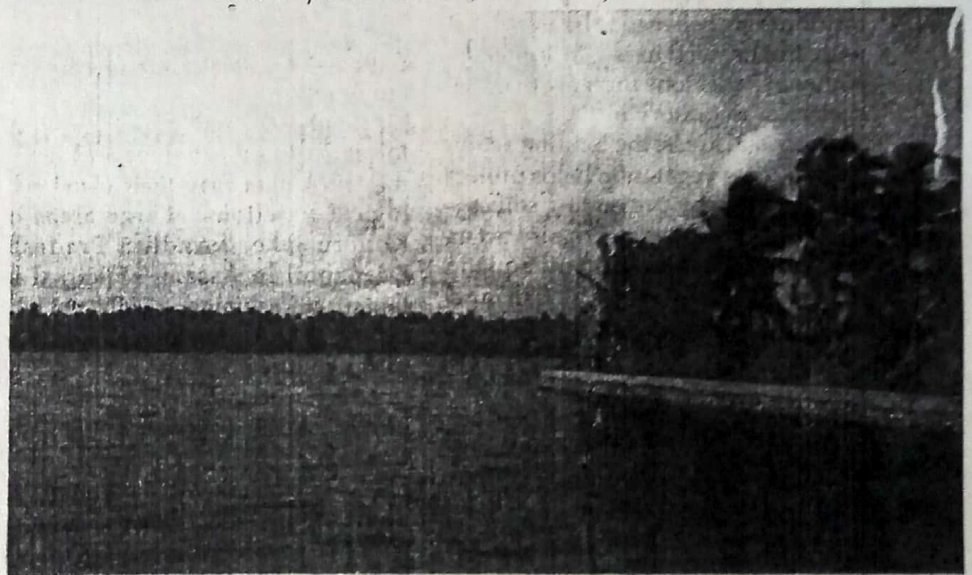
Man has been associated with wetlands for ages. Many ancient human civilizations flourished along the flood plains of major river systems. Even today wetlands continue to help human beings in many ways.

There are millions in India who depend upon wetlands for sustenance activities such as farming, fishing, hunting and for collecting reeds and other economically important plants, including the edible forms. The flood plains are excellent grazing ground for cattle. Mangroves and corals offer a variety of economically important products for the local coastal population.

Wetlands help lessen the severity



Wetlands provide sanctuary to millions of birds



The backwaters of Kerala are getting filled up with coconut husk waste

of floods by storing rain water and releasing the run off slowly. For their role in water discharge and recharge, they act as natural water storage devices. They provide a source of drinking water for humans as well as animals; the water is also utilised for other activities such as agriculture and for industrial applications.

Wetlands also function as natural

sewage and wastewater treatment plants. Many wetland plants are known to reduce phosphate and nitrate level by up to 90%; their role in the removal of heavy metals has been widely acknowledged. Sea grasses in many parts of the world play a vital role in cleaning up coastal waters. They reduce the quantity of suspended particles, thus increasing the

clarity of water as it runs through the wetlands.

Wetlands are valuable as sources, sinks and transformers of a multitude of chemical, biological and genetic materials. On a global scale, wetlands are considered as CO₂ sinks and climate stabilizers. Considering the function they perform in hydrological and chemical cycles and their function as downstream reservoirs of wastes, wetlands are considered as "the kidneys of the landscape":

Wetlands are also known as "biological supermarkets" because of the extensive food chain and immensely rich biodiversity they support. The diverse type of wetlands harbour many rare, threatened and endangered animals; major wildlife sanctuaries in India are located close to wetlands. Wetlands are most famous the world over as water fowl habitats. Millions of birds representing 318 species, including large number of migratory birds are believed to be associated with Indian wetlands. In Keoladeo National Park alone there are over 300 species of migratory birds.

In coastal areas, the binding action of mangrove vegetation helps protect the shore line by preventing soil erosion. The mangrove areas also act as breeding grounds of many aquatic organisms, particularly fish and prawns.

Wetland plants and animals (dragon flies, molluscs, etc.) are sensitive to even slightest changes in environmental quality. Their population decreases considerably in polluted waters. Hence they could be used as potential biological indicators to predict pollution of water bodies.

Threats To Wetlands

Despite the worldwide heightened interest in wetlands, the wetland cover of our planet has been declining consistently over the last few decades. Increase in human population and rapid urbanization have put considerable pressure on the wetlands; the pressures of denuding, polluting, draining, filling and building continue

The Ramsar Convention

IN order to create awareness about the importance of wetlands, particularly as breeding grounds of water fowls, the International Biological Programme (IBP), International Union for Conservation of Nature (IUCN) and International Waterfowl and Wetland Research Bureau (IWWRB) organised a series of international conferences in the 1960s. All these paved the way for the Convention on Wetlands of International Importance at Ramsar, Iran in 1971. This treaty aims at international cooperation for the conservation of wetlands. It also envisages formulation of effective plans and their implementation to protect the dwindling wetlands by the contracting parties.

A list of wetlands of international importance (Ramsar sites) has been prepared. Under this convention a total of 881 wetlands of international importance, occupying an area of 62.77 million hectares have been designated by 101 contracting parties. India became a signatory of this convention in 1981. As a signatory a country has to meet obligations such as: (a) designate wetlands of international importance in the list of so-called Ramsar sites, (b) maintain ecological characters of the listed wetland sites, (c) organise planning in such a way as to achieve sustainable use of all the wetlands in their territory, and (d) designate wetlands as natural reserves. Indian wetlands designated as Ramsar sites are Chilka, Keoladeo National Park, Wular Lake in Jammu & Kashmir, Sambhar in Rajasthan and Loktak in Manipur.

A. B. K.

unabatedly at the wetland sites around the globe.

In India, the wetlands are drained for agricultural activities and hence they no longer play their usual ecological functions. Large areas of Kolleru lake in Andhra Pradesh, Deepanbil in Assam, Hokarsal in Jammu & Kashmir and Vellayani lake in Kerala have already been lost due to agriculture operations.

Many wetland areas in India are now established human settlements; the encroachment continues even now. For instance, rapid urban development has shrunken the area of Cochin backwaters in Kerala to 8,000 hectares from the original area of 70,000 hectares. This has also reduced the fishery potential of the backwaters and led to the disappearance of the estuarine crocodile.

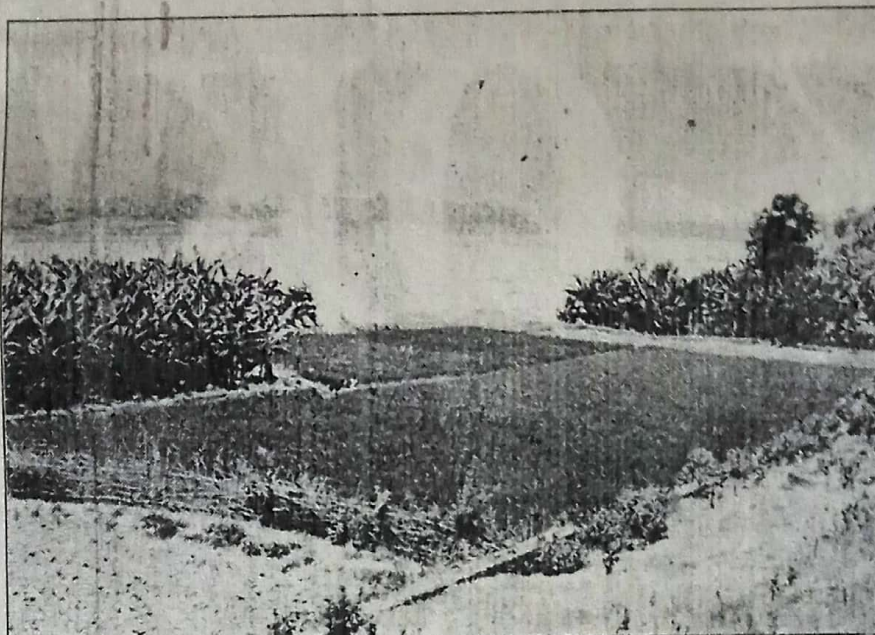
The sewage effluent of Calcutta city was once released into the swamps and marshes on the eastern edge of the city; these wetlands were functioning as biological filters and flood-control centres. This area was later converted into a residential complex by dump-

ing silt from the river Hooghly. Now the city is under threat of floods and it has to find out new alternatives to manage the colossal amounts of sewage formed every day.

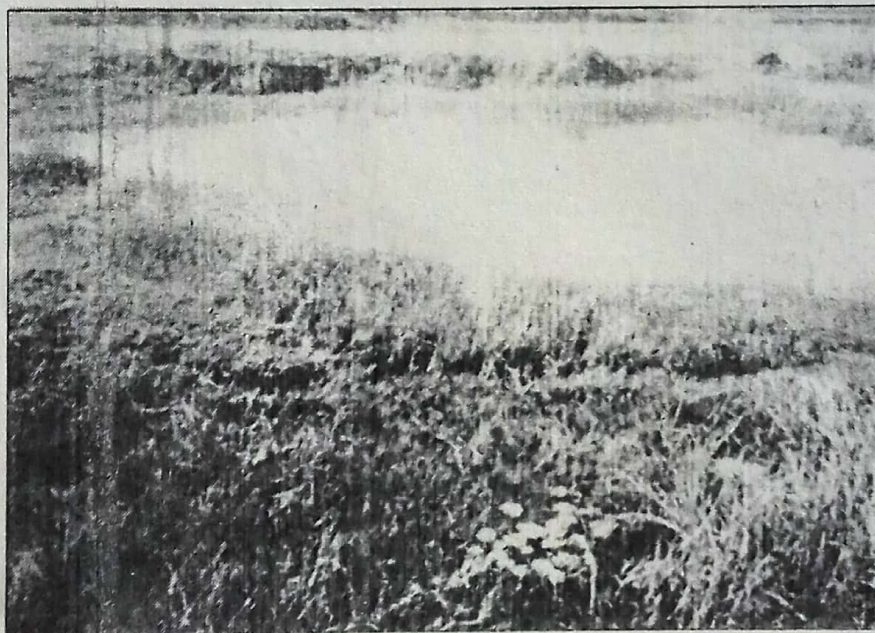
Most of the wetlands in India suffer from heavy infestation with exotic weeds such as water hyacinth, pond weed, *Pistia*, *Salvinia* and *Ipomea*. One-third area of Chilka, the biggest inland lake in India, spreading over 1,100 sq km and located in the Puri and Ganjam districts of Orissa now remains blanketed with weeds. This, coupled with aquaculture practices and silting may speed up the degradation of the lake.

The process of sedimentation of lakes has been accelerated by human activities such as deforestation and dumping of wastes. This may reduce their water holding capacity and thus pave way for flooding. Construction of dams and barricades across the rivers has resulted in the loss of flood plains and devastated life in many wetlands.

Ecological degradation of wetlands together with pollution has resulted



Rice fields—artificial wetlands



River flood plain

in the loss of flora and fauna. Hunting and poaching of wild animals including water fowls continue unabated in many parts of the country. Though millions of water birds visit India every year, only those reaching the protected areas enjoy some kind of protection. Hunting of the endangered Indian rhino has been reported from Manas and Kaziranga National Parks of Assam.

Many natural wetlands in India have been converted into fish ponds,

resulting in a host of ecological disturbances. The high amount of fertilizers and other inputs required in aquaculture for increasing the productivity has led to the degradation of the system as a whole.

The coastal wetlands, particularly coral reefs and mangroves, are threatened by increasing discharge from industrial establishments along the coastal belt, and offshore mining, and dredging. The mangrove forests of the Sunderbans delta have been reduced

to half. The disappearance of sea grass meadows in the Gulf of Mannar and Palk Bay of the east coast is believed to be the reason for considerable reduction in the population of dugong.

Preserving The Wetlands

The wetlands received greater public attention as excellent breeding grounds of water fowls mainly after the Ramsar Convention (see box). The need for conserving the precious wetlands is better realised these days and several initiatives have been taken in this regard. The Ministry of Environment and Forests, Government of India set up a National Committee on Wetlands, Mangroves and Coral Reefs in 1987 for framing policy guidelines, identifying and monitoring wetlands for intensive conservation and management and for seeking international cooperation. Based on the recommendations of this committee twenty wetlands have been identified for conservation and management. In 1993, a National Lake Conservation Plan was framed to protect the endangered lakes; eleven urban wetlands were identified under this scheme for conservation and management. Bhoj wetland (represented by upper and lower lakes) of Madhya Pradesh is now getting assistance from Overseas Economic Cooperation Fund of Japan for ecological restoration. The Ministry of Environment and Forests has also adopted the National River Conservation Plan. Major coastal wetlands have also been declared protected areas.

However, these efforts are just not enough. Many wetlands in India still remain unprotected. A holistic approach towards conservation of wetlands is the need of the hour. It has now become imperative to prevent the ecological degradation of wetlands and to implement appropriate conservation strategies to preserve these natural heritages for the generations to come.

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