



## ***Wetland Conservation - Evolving Concepts of Nature and Built Environment***

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### **Abstract**

*Wetlands have hardly had any mention in planning circles as there is a bias towards the planning of the built environment. These fragile and endangered ecosystems are essential for sustainable human existence. While the destruction of the natural ecosystems due to human intervention is generally deplored, it is accepted as an inevitable consequence of urbanization. It is necessary to understand the relevance of wetlands as only then can its conservation be an active part of the planning process. It is possible for wetland conservation and development of built environment should go hand in hand as can be seen in the shining example of the thriving metropolis of Curitiba in Brazil.*

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### **1. INTRODUCTION**

Human civilization is an integral part of the natural world and is greatly dependent on the preservation of nature to the fullest for its own perpetuation. Our understanding of nature and our concepts of the relationship between humans and nature are changing rapidly. Shorter periods of rapid intellectual change create confusion and dilemma on the much longer periods and gradual evolution in the human struggle to grasp nature's pattern. Many of our habitats were shaped according to the concept that grew out of the Renaissance notion that humans are the measure of all things. Thinkers like Francis Bacon, Rene Descartes, and Isaac Newton, all are credited to originating ideas with highly mechanistic world view, which is best symbolized by the conception of the earth as a giant machine.

As time passed by, scientists studied the reductionist assumption to understand nature by understanding her most minute parts. Industrialization began the task of reshaping global landscape, undertaken without much programming, with only pragmatic visions. Among the revolutionary conceptions of nature's processes that have emerged in the 20th century are Einstein's theory of relativity, Heisenberg's uncertainty principle, global perspectives, chaos theory design, scale relationships of fractal geometry and general systems theory. It is unclear how all these fundamental concepts fit together to form a new model of nature, though they are integrally related to one emerging, fundamental concept that has great importance for environmental design: the ecosystem concept. The ecosystem concept articulated by Tansley (1935) reveals that nature's fundamental order does not lie

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entirely at the molecular level, as reductionist thinking implies, but at every level. An ecosystem has consistent order and everything is indeed 'hitched to everything else', within a vast organic unity, and humans are included (Lyle, 1994).

## 2. RELEVANCE OF WETLANDS

Wetlands are transitional zones that occupy an intermediate position between dry land and open water and are valuable as sources, sinks, and transformers of a multitude of chemical, biological, and genetic materials. Wetland ecosystems possess characteristics of both terrestrial and aquatic ecosystems and are dominated by the influence of water. They support a wide array of flora and fauna and deliver many ecological, climatic and societal functions and scientists often refer to wetlands as the kidneys of the earth (Mitsch and Gosselink 1986) because of the function they perform in hydrological and chemical cycles, and because they function as the downstream receivers of wastes and thereby supplying freshwater. They are useful in protecting biodiversity, replenishing ground water by them holding rainwater and purifying it and controlling natural disasters such as floods. Local people earn their livelihood from the wetlands either directly or indirectly by providing goods and services to them. Yet this vital natural resource is rapidly declining in most parts of the world.

The Ramsar Convention (The Convention on Wetlands of International Importance, 1971) has defined wetlands as 'areas of marsh, fen, peat land 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 meters'. A wide variety of wetlands like marshes, swamps, open water bodies, mangroves and tidal flats and salt marshes, etc; exist in our country. According to Ministry of Environment and Forests, Government of India, wetlands are broadly divided into Inland wetlands and coastal wetlands and each class is further divided into different types. Inland wetlands consists of lakes and ponds, cut off meanders, waterlogged areas, swamps and marshy areas, reservoirs, tanks, abandoned quarries and coastal wetlands include estuaries, lagoons, creeks, backwaters, tidal bars, coral reefs, rocky coasts, mangrove forests, salt pans and saline marshy vegetation.

There exists much ambiguity regarding the classification of wetlands in Kerala due to land's unique physical characteristics. For the sake of convenience, geomorphologically, the wetlands in Kerala may be divided among five major systems at the broadest level as marine, estuarine, riverine, and thustrine and palustrine.

## 3. MAN VERSUS NATURE

As long as human intervention remained minimal, the ecosystem, through its all encompassing balancing nature, was self cleansing. But the development demands



that determine the choice of the paths upset the natural harmony. Infrastructure development in the form of roads, railways, and other lines of communication fragmented the contiguity of the wetlands, and destroyed extensive tracts of coastal vegetation thereby upsetting the entire complex ecology; rapid urbanization encroached into the rich and luxuriant mangrove forests, while industrial development not only caused pollution but prevented any regeneration possibilities as well; modern shrimp farms brought in the final onslaught - the irreversible destruction of wetlands.

Shrinking wetlands prove to be disastrous to the freshwater supply. The rapidly exploding human population and their ever increasing demands have led to large scale changes in the land use and incorrect use of watersheds have added to the total destruction of wetland resources of India. Whatever exists is under the threat of extinction due to hydrological alterations, non availability of reliable database and survey documents of these fragile ecosystems and their exclusion in policy development and administrative interventions by the administrators and policy makers. The management of wetlands has become important because these ecosystems are still being reclaimed or encroached for agricultural activities, aquaculture and most importantly for development of urban areas, or they are being degraded due to extreme pollution, excessive grazing and biomass removal. Sustainability can be achieved only through protecting our wetlands.

Most of the developmental activities happening around urban towns and cities have led to large scale migration of people from rural and other areas. This created immense pressure on the water bodies as they were either reclaimed for housing or associated developmental activities. Wetlands along rural areas were either transformed or drained due to developmental necessities. Most of the roadways and railways are constructed on wetlands. This has immediate benefits arising out of construction of roads and other developmental activities in and around villages overweighed the long term benefits of the wetlands and hence concern for wetland conservation was ignored.

Wetland conservation and protection involves not only buffering them from direct human pressures but also through maintaining the delicate ecosystem. Native species of plants to be grown in and around wetlands are to be encouraged. Filling of extant lands coming under the category of wetlands for development mechanisms are to be stopped at any cost. The built environment and its attendant development therefore largely present a gloomy picture with regard to wetlands, mirroring similar unhealthy relationships with other natural ecosystems.

#### **4. CURITIBA, BRAZIL**

A shining example which stands out as a model in synergetic coexistence of nature and thriving metropolis is Curitiba, Brazil. Its metropolitan area comprises 26



**Fig. 1 Urban Sprawl of Curitiba, Conserving the Wetlands**



municipalities with a total population of over 3.5 million. It is known the world over for its public transit system. However that is only a part of the holistic planning approach adopted by its former three times Mayor, Architect Jaime Lerner. The city ranks among the world leaders in per-capita park area, in spite of its population tripling over 25 years, with 21 sq km of parks, woods, gardens and squares within the city. Curitiba is located on a plateau and the flat terrain with flooded areas. The flatness of the terrain hinders quick water drainage after rain. Learning from the mistakes of other cities which expanded its boundaries by filling in its wetlands and being saddled with the subsequent perennial environmental

and civic problems, Lerner insisted that the wetlands be preserved.

#### 4.1 Conservation measures

Several measures were undertaken, the simplicity and synthesis of which is remarkable. Flood plain areas were purchased. Buildings located in flood prone areas were condemned. Such areas were designated as park areas. They were maintained through low-tech methods such as tractors, petroleum to mow these parks unaffordable. Instead, they have a municipal shepherd who moves his flock around. Proceeds from the sale of wool are used for funding children's programmes. Fishermen are paid for any garbage retrieved by weight. It helps them even in off seasons, keeps the waters clean. This alone saves Curitiba millions in garbage collection. The lakes in the parks are used to hold back floods and function as water flow regulators during the rainy season. The environment itself is a 'technology tool'. They solved the problem of dangerous flooding, while also protecting valley

**Fig. 2 Integrated Solution for Curitiba - Urban Transport and Waste Water Management**



floors and riverbanks. In addition the parks act as a barrier to illegal occupation and shanty town growth and reduce misuse as landfill sites, and providing beauty, relaxation and recreation for the city residents. Recognizing the filtering ability of wetlands, the city is rehabilitating a floodplain wetland for the pretreatment of river waters polluted by progressive unplanned, un-sewered urbanization higher in the watershed prior to entry to the water treatment facility. This wetland is projected to reduce both the cost of potable water treatment and reduce the incidences of water borne diseases.



## 5. CONCLUSIONS

Lewis Mumford called cities 'symbols of the possible'. Curitiba as it has now made possible only by consistent, innovative and dedicated action and timely amendments beginning from the mid 1960s. The far sighted vision of the leadership and the whole hearted support of its residents who were consulted and made participants in the planning process is the secret of its success. Jaime Lerner has shown through Curitiba that even in developing countries with limited resources, it is possible through planning with foresight to live not only in coexistence with nature but even to enhance human proximity to nature.

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