CHAPTER I

INTRODUCTION
1.1 WHY ENVIRONMENTAL MANAGEMENT?

We have begun to discern the beginning of environmental crisis as we step on to the twenty first century, which is characterised by unprecedented growth and development of the human society. The past mistakes of over-utilization of natural resources and harnessing the forces of nature for the benefit of a growing population coupled with apathy to environmental regeneration and conservation have begun to boomerang on the mankind. The galloping population of the world which has crossed the 6 billion mark is placing a tremendous stress on all that the environment can provide; so much so, in parts, the environment has started to give way. Economic compulsions of the underdeveloped and the developing countries has lead to the mismanagement of resources. This is coupled with the Governments apathy to the Environmental problems. Evidences of these phenomena can be seen in the spread of desertification, soil maladies, floods and droughts, urban congestion, extinction of/or threat to countless species of plants and animals that make the ecosystem and the ubiquitous pollution of land, water and air. And yet, the population growth has not been arrested, the demands for food, shelter and clothing, energy and other basic needs of society have not abated nor has the realization grown that environmental resources, even renewable ones, are finite.

The socio-economic system of man in contrast to natural ecosystem which is capable of self maintenance; is founded on a material base, which is partly finite. The increasing demands and aspirations of human society create a rising demand for goods and services. Unlike in ecology which stresses on limits rather than continuous growth, stability rather than continuous development, the economic process is unidirectional and human being can only progress forward.

Thus the changes imposed by human being on natural ecosystem in order to obtain greater control of his environment, and to achieve greater yields by way of deflecting the natural flow of energy, bypassing natural processes, severing food chain
has simplified the ecosystem, which in turn has caused the ecological crisis. In other words, the human exploitation of natural resources at a greater rate than it can be regenerated, and without putting back inputs into the natural ecosystem, is responsible for environmental maladies.

In view of the impending doom, it is imperative for the mankind to adopt a reformed approach to resource consumption therefore, environmental management is required for proper resource use and resource management. Environmental management is an interdisciplinary approach to resource conservation and recycling and it acts as a regulatory force on human wantonness in resource exploitation and resource wasting. The central theme of environmental management is thus the reduction or minimization of the impact of human activities on the physical and ecological environments. It is an endeavour to avoid the overuse, misuse and abuse of the resources in the environment.

The natural environment has considerable resilience and normally it bounces back to near pristine state after it is perturbed if left alone. It can make available its bounties the resources for consumption if it is not desecrated beyond recovery. This is what environmental management aims to do: conserve what needs to be conserved, protect what needs to be protected and regulate utilisation of natural resources to acceptable limits.

1.2 GLOBAL ENVIRONMENTAL AGENCIES

In order to overcome the environmental crisis, there is a need for a stratagem, a plan of action and a machinery to implement these. At the global level, the UN has established the United Nations Environment Programme (UNEP), which has been given a catalytic role to urge appropriate actions to halt and reverse environmental degradation in various parts of the world. Several countries have also initiated programmes for environmental improvement and set up organizational structures for dealing with the environmental problems in their own countries. The Indian
Government has set up a Department of environment at the centre with the overall responsibilities of ensuring environmental protection and conservation.

However during the past few decades much effort has been expended on conservation of nature and natural resources, including wetlands, and on educating people about the need for conservation. These efforts have been spearheaded by the International Union for Conservation of Nature and Natural Resources (IUCN) and the World Wide Fund (WWF). The World Conservation Strategy, launched by the IUCN in 1980, defines conservation as, “the management of human use of the biosphere so that it may yield the greatest sustainable benefit to the present generation while maintaining its potential to meet the needs and aspiration of future generation”. Thus, conservation does not necessarily imply complete protection against all kinds of human interference but allows for sustainable utilization or “wise use” of natural resources. Protection, however, is often necessary where a resource is rare or seriously threatened.

1.3 ENVIRONMENTAL CONCERNS IN DEVELOPING COUNTRIES

The world's major environmental resources are concentrated in the third world and developing countries of tropical and subtropical region. However, increasing population pressure and poverty is putting an immense pressure on the resources leading to its over-exploitation and loss of biodiversity. The hunger for agricultural land in the third world and the developing countries has lead to deforestation, loss of fishery resources, reductions in wildlife and habitats, extinction of many species, pollution etc. However the pressure on the environmental resources, can lead to tragedies : Floods, drought, starvation, disease etc. The loss of mangrove forest in Sundarbans lead to loss of 10,000 lines in cyclone of May 1985.

However, Developing countries are in desperate need of development in order to meet the basic essentials for life of its teeming millions. All development requires a
resource base and takes place in the background of a given physical and socio-economic environment. However the development process profoundly alters the environmental fabric, leading to both beneficial and adverse impacts on each sphere of the environment. Thus the strategy has to be aimed at protecting the resource, or environment for sustaining development. In other words, the resource, that is the environment, must be optimally managed without unduly depleting or degrading it. The past has shown the consequences of the mismanagement of the environment.

Environment is the resource comprising land and all that it contains on the surface and beneath, water and the life it supports and air. Government has to deploy these resource components of the environment for efficient development for optimum benefits to all, and for enhanced quality of life and the environment. Government thus, is concerned with wise management of resources, which is synonymous with environmental management. Government, even now, carries out this function of environmental management when it manages agricultural land and practices for sustained yield of food products, It manages the security and sovereignty of land and water holdings and air space: Government is thus the supreme manager of the environment.

1.4 ENVIRONMENTAL RESOURCES – DIVERSE BUT THREATENED

The wide variety in physical features and climate situation have resulted in a diversity of ecological habitats like forests, grasslands, wetlands, coastal and marine ecosystems and deserts ecosystems which harbour and sustain the immense biodiversity.

Forests ecosystem not only provide several essential services to mankind like source of timber, fuelwood, fodder, food items etc. but also perform important ecological functions such as maintaining delicate ecological balance, conserving soil controlling floods, drought and pollution. Forests are now a threatened ecosystem on
account of diversion of forests land for agriculture, industry, human settlement and other development projects.

**Grasslands**, which are also known as steppes, prairies, pampas and savannas in various parts of the world, are vegetation types with predominance of grass and grass-like species. Much of the grasslands world wide have been converted to agricultural land leading to loss of immense species that they support.

**Coastal and marine ecosystem**, comprises of mangroves and coral reefs. Mangroves are, salt-tolerant ecosystems in tropical and sub-tropical regions and constitute an important economic resource as well as play an important role in stabilising shorelines and harbour a variety of plants and animals including rare and endangered ones. Mangrove face threats of being drained and logged completely for reclamation of land.

**Coral reefs**, are the most productive marine ecosystem, extremely sensitive and susceptible to environmental stress. Coral reefs have been subjected to stresses because of increase in industrialisation in coastal areas, offshore mining, dredging, construction, shell and coral collection and oil transport.

**Desert ecosystem**, is characterised by low precipitation, arid lands, with expanse of sands, rock or salt, which are largely barren except for sparse or seasonal vegetal cover, Deserts harbour a wide variety and rare species which are adapted to an extremely harsh, water-scarce environments.

**Wetlands**, are complex ecosystems often occupying the interface between land and water. They have served the mankind throughout the world since historical times as agriculture had its beginning in river floodplains. Reeds and papyrus from wetlands were the first materials used for boats and paper. Wetlands have been extensively used, especially in the tropics, for food, feed, fibre and to a small extent fuel. People living in or near wetlands have depended on them for fish and ducks, and for disposal of their waters. More than half of the world’s population still depends on modified and
intensively managed wetlands which provide rice and fish.

However in the quest for rapid economic growth, man focussed greater attention on terrestrial resources and started considering wetlands as impediments to development. After large areas of natural wetlands in all parts of the world were totally lost by drainage and landfills or were highly degraded by other human activities, values and functions of natural wetlands are being rediscovered.

Ramsar convention (IUCN. 1971) highlighted their value as habitats for wildlife, especially waterfowl, and called for conservation of internationally important wetlands. Since then, much effort has gone into understanding wetlands and emphasising the need for their conservation and management throughout the world.

1.5 WETLAND ECOSYSTEM AND THE RAMSAR CONVENTION

At the global level, the need for wetland protection picked up momentum in the early 1960 s. The International Biological Programme took a lead with project AQUA and IUCN with project MAR designed to increase awareness of the importance of these ecosystems and the threats of which they were increasingly exposed. A series of conferences and technical meetings held mainly under the auspices of the International Waterfowl Research Bureau culminated in the Convention on wetlands of International Importance, Especially as Waterfowl Habitat, known more simply as the Ramsar Convention, after the Iranian town where it was opened on 2 February 1971. The convention came into force on 21 December 1975, four months after the Seventh State had ratified. The major preoccupation of the draftsmen was concern over the rapid loss in Europe of habitat for waterfowl species. It was evident that concerted international action was urgent and essential if these migratory species were to be conserved and managed.

It was the first modern global nature conservation treaty; it remains the only one which is dedicated to the conservation of selected ecosystem types and of the
species dependent upon them, and it is predicated upon the promotion of international cooperation for nature conservation rather than the confrontation which has characterized certain subsequent international conservation arrangements”.

The broad objective of the convention are to stem the loss of wetlands and to ensure their conservation in view of their important ecological functions as well as for their rich fauna and flora. To meet these objectives, the convention provides for general obligation relating to the conservation of wetlands throughout the territory of the contracting parties and for special obligations pertaining to those wetlands which have been designated as "wetlands of International Importance". Thus there is general obligation, for the contracting parties to include wetland conservation consideration within their national planning. Article 3, para 1 provide: "the contracting parties shall formulate and implement their planning so as to promote... as far as possible the wise use of wetlands in their territory.

A second obligation under the Convention is the designation of wetlands for conclusion in a "list of wetlands of International Importance" maintained by IUCN. Specific conservation duties pertain to the listed sites. At least one site must be designated by each contracting party (Article 2, para 4) with selection based on "international significance in terms of ecology, botany, zoology, limnology or hydrology".

Thirdly, contracting parties are obliged to promote the conservation of wetlands in their territory through the establishment of nature reserves. This applies to wetland whether or not included on the "list".

Finally, contracting parties are to consult with each other about implementing obligations arising from the convention, especially in the case of shared wetlands.

The implementation of the convention by the contracting parties has lead not only mobilizing national efforts for wetland conservation but also that of raising public awareness for wetland conservation. The convention has also provided the basis for the
contracting parties, national wetland conservation policy, with particular attention being given to promotion of wetland inventories, both international and national; ensuring the protection of a network of wetland reserves, and the prevention of degradation of wetlands habitat.

Many wetland resources are of interest to more than one state. This is true of physical resources like water (diversion of river water in one state may affect water supply in another, while upstream action like deforestation may affect flood control or sedimentation downstream). It is also true of biological resources like migratory birds, or of fish which spawn in one country but are harvested in another. States therefore need to exchange information and to promote concerted action for wetland conservation. The Ramsar convention is an instrument for such international cooperation.

By the very definition of “wetlands” in the convention and its approach to habitat conservation, Ramsar was always more than a treaty “for the birds”. The initial thrust of the convention was upon achieving the designation of internationally important wetland sites on to the international Ramsar list. But the convention was wisely made global in coverage and soon site designations followed growth in membership throughout the world. While this expansion in coverage on the list was occurring, a similar change was taking place in the focus of the treaty. In particular, and very much linked to the growing participation in the convention of developing countries, the treaty’s call for “wise use” has become for many member states the central focus of work under the convention. This has been a logical progression since:

1) People depend upon wetlands and their resources for their livelihood, as well as for recreation and scientific research; and because
2) There has been an accelerated loss of wetland habitat throughout the world.

The application of wise or sustainable usage of wetlands and wetland resources will allow for on-going benefits to humans while maintaining the natural characteristics of wetland habitat.
1.6 WETLAND MANAGEMENT

Wetlands are among the world's most important environmental resources yet remain some of the least understood and most seriously abused assets. Of all global ecosystems wetlands are posing some of today's most contentious, difficult and politically sensitive environmental questions.

In many countries, wetlands are the greatest natural asset for a productive, safe and sustainable environment. The industrialised world is only now beginning to realise this, and wetlands have traditionally been seen as wastelands for conversion to other uses; in the developing world, the values of wetlands have perhaps been more appreciated due to the more direct link between human health and welfare, and the health and welfare of wetland ecosystem. Wetlands are important centres of biodiversity, harbouring endemic species, and large concentrations of migratory species; they are amongst the most productive ecosystems on earth, providing food and materials for many people; and they freely provide valuable services which play an important role in maintaining the quality and security of life on earth for human kind. Wetlands are essential for a sustainable urban or rural life.

In the developed world, their future seems to depend more on trends in economic, social and political development and the outcome of litigation, legislative and administrative debate rather than on any processes in the natural world. Yet these processes result in ecosystem functionings which have real values to society that can be expressed in actual economic terms, such as fisheries yield and water quality. A major challenge to scientists, economists, decision-makers, managers, users and the conservation community, is to bridge this gap between socio-economics and ecology.

Sound management and conservation are important in the developed world where so little of the original extent of wetlands remain and where concerns for environmental quality are increasing rapidly. They are, however, crucially important in the developing world where the survival of people as well as environmental and
genetic resources is linked inextricably with wetland functioning.

There are major structural differences in the management requirements for wetlands worldwide. It would be naive, however, to separate entirely the issues of wetland protection and management between the developed and developing nations. International development and technology aid and the role of remote funding agencies in the wealthy nations are important factors influencing the survival of third world wetlands.

1.7 REVIEW OF LITERATURE

The emphasis on wetland science and management has been demonstrated by a veritable flood of reports, scientific studies, and conference proceedings since the mid-to the late 1970s.

Two authoritative and wide-ranging works on wetlands have been analysed for their citation count. The 986 pages of Ecology and Management of wetlands (Hook et al. 1988) and the 680 pages of wetland Functions and Values: The State of our Understanding (Greeson et al. 1979) offer and interesting and informative insight into wetlands research. First is the explosive growth in research as evidenced by the citations. Of the approximately 2051 citations in Hook et. al., almost 48 percent are from the 1980s, 37 percent from the 1970s (the major shift coming after 1975), 8 percent from the 1960s and 5 percent before 1960. In Greeson, published ten years earlier, the concentration in the 1970s was more striking: over 84 percent of the citations were published during that decade, 14 percent during the 1960s and a mere 2 percent before 1960. Thus there is an impressive concentration of work in the last few decades that coincides with the new legislative and administrative concerns. From a state of relative ignorance about wetland before 1960 we have moved into an era characterized by a vast expansion of knowledge and a thriving 'wetlands industry', often located in specialized wetland research centres.

Two journals, wetland and wetlands Ecology and Management, are now
published to disseminate scientific and management papers on wetlands, and several other scholarly journals publish frequent papers on wetlands. Several proceedings have been published from conferences on wetlands held in the United States (e.g., Good et al., 1978; Kusler and Montanari, 1978; Greeson et al., 1979; Johnson and McCormick, 1979; Clark and Beinforado, 1981; Hook et al., 1988; Sharitz and Gibbons, 1989; Kusler and Kentula, 1990; Gosselink et al., 1990) and throughout the world (Logofet and Luckyanov, 1982; Gopal et al., 1982; Pokorny et al., 1987; Mitsch et al., 1988; Lefeuvre, 1989; Patten, 1990; Maltby et al., 1992). Beautiful coffee-table books and articles containing colour photographs have been developed by Thomas (1976) and Dennis (1988) on U.S. Swamps; by Niering (1985), Littlehales and Niering (1991), and Mitchell et al. (1992) on North American wetlands; by McComb and Lake (1990) on Australian wetlands; and by Finlayson and Moser (1991) on wetlands of the world.

Government agencies have contributed to the wetland literature. The U.S. Fish and Wildlife Service has been involved in the classification and inventory of wetlands (Cowardin et al., 1979; Frayer et al., 1983; Dahl, 1990; Dahl and Johnson, 1991) and has published a series of community profiles on various regional wetlands. The U.S. environmental Protection Agency has been interested in the impact of human activity on wetlands (Darnell, 1976; Adamus and Brandt, 1990) and in wetlands as possible systems for the control of water pollution (U.S. Environmental Protection Agency, 1983; Kentula et al., 1992; Olson, 1992). Along with the U.S. Army Corps of Engineers, the agency is now in the centre of the wetland definition debate in the United states. Interest in wetlands has been expressed by the U.S. congress, which supported summary studies of wetlands, including wetland Management (Zinn and Cope land, 1982) and wetlands: Their use and regulation (Office of Technology Assessment, 1984), and sponsored several wetland management bills in the early 1990s, most in response to changing wetland regulations. For complete descriptions of some major regional wetlands of north america, Thomas (1976) provides an excellent
The Southern tip of Florida, from lake Okeechobee southward to the Florida Bay, harbors one of the unique regional wetland in the world: The Everglades. Numerous popular books and articles, including the classic *The Everglades: River of Grass* by Majory Stoneman Douglas (1947), have been written about the Everglades and its natural and human history. Davis (1940, 1943) gives some of the earliest and best descriptions of the plant communities in Southern Florida. Since about half of the original Everglades has been best to agriculture (the Everglades Agricultural area) in the north and to urban development in the east, concern for the remaining Everglades has been extended to the quality and quantity of water delivered to the Everglades through a series of canals and water conservation areas (Koch and Reddy, 1992; Gunderson and Loftus, 1993). Several plans for improving the water quality as it leaves the agricultural areas have been suggested, some in extreme court proceedings. There is also concern about the loss of habitat and the suitable hydropertiod for declining population of wading birds such as the wood stork and the white ibis (Walters et al., 1992). North of the Everglades there is a renewed effort to restore the ecological functions of the Kissimmee River, including many of its back swamps areas (Loftin et al., 1990).

The studies on wetlands in India are relatively recent and very little is known about their distribution, structure and function, ecological status and management needs. Although many wetlands were studied for their vegetation, water quality, fish and anifaulna, a systematic survey of their distribution, area and general characteristics had not been made before 1973. In 1973, an aquatic weed survey was conducted by the Department of science and Technology (New Delhi) and estimate of wetland area were made from this survey (Varshney and Singh 1976). Biswas (1983) reported 1193
wetlands covering an area of 39,045 sq. km, from 274 districts out of a total 385 in the country. In the absence of information on the database or the methodology used for the estimate; these figures do not appear to be correct. A wetland survey was attempted in 1984 by the then Department of Environment of the Government of India but it did not succeed. Another effort made by IUCN, with the help of IWRB, by eliciting information from field workers resulted in an inventory of 93 wetlands and wetlands complexes (Wolstencroft et al 1989). The Ministry of Environment and forests of Government of India published another list of wetlands which comprises mostly the temple tanks, fishery reservoirs and some multipurpose reservoirs. Recently, WWF-India revised and updated the Indian section of the Asian Wetland Directory, with information on 77 additional, wetlands (WWF-India and AWB 1993).

Besides these efforts, information on the extent and distribution of different kinds of wetlands (including mangroves) and their conservation status is available in few publication of which the more important are, Trisal and Zutshi (1985), Gopal (1982), Gopal land Krishnamurthy Trisal (1993) have grouped wetlands according to their geographical distribution into Himalayan, coastal, and Indo-Gangetic Wetlands. Detailed accounts of the distribution, biota and other characteristics of mangroves, coral reefs and other marine wetlands are given by Untawale (1987), wafar (1986), Gopal and Krishnamurthy (1993). (Thingran 1982) gives an account of large diversity of fish and prawn species found in the mangrove swamps.

1.8 OBJECTIVES OF THE STUDY

1) Wetland distribution, extent, structure, ecological value, function, status and management needs proper study and conservation.

2) Assessment of Environment Impact of socio-economic development on wetland ecosystem.

3) Conflicts arising between development and conservation.

4) Wetland management as wetland alteration and Protection.
5) Identification of the role of wetland convention and government policies/strategies in the management of wetland.

1.9 HYPOTHESIS

1) The survival of wetland depends on protection, but depends more on management.

2) Human exploitative pressure has been the single most important factor in bringing about the degradation of wetland ecosystem and need measures beyond the traditional management practices.

1.10 METHODOLOGY

Apropos methodology, extensive use of the secondary source materials have been made which include literature on the subject, articles in journals and periodicals. Apart from these, primary sources like Annual Action Plan, Reports and International Conventions report have been given due importance. Apart from these documents of International Biological Programme, the International Union for Conservation of Nature and Natural Resources and UNESCO; documents of Non-Governmental Organisations working in this area; the Environmental Impact Assessment manuals etc. have been extensively used. The content analysis of these primary sources has been done in order to bring out the various measures, strategies of management and, or models used for management techniques of the wetlands. A preliminary attempt has been made to examine the various management issues of wetlands from there sources and also to highlight the paucity of the ecological studies on wetland ecosystem and bring out the research needs.