

CHAPTER: 1

1. INTRODUCTION

Wetland means the areas those are with sufficient wetness. The soil of the wetlands is generally very rich in nutrients, which is responsible for the existence of a great floral and faunal diversity in such areas. At present wetland is the hot and interesting topic for the scientists or environmental biologists in particular who are involved in world's environment and ecological research especially after the Ramsar Convention of IUCN in Iran in 1971. Wetlands are water bodies and are most beautiful and full of unique biodiversity including animals, plants, microbes etc. These are the areas where terrestrial habitat meet with aquatic habitat. It includes all kind of water bodies even ocean where water depth is not more than 6 meters. Wetlands are the richest ecosystems after the tropical rain forests of the world. According to Tiner (1999) it is a generic term used to define universe of wet habitats including marshes, swamps, bogs, fens and similar areas.

From the very beginning the wetlands were neglected and treated as *wasteland* throughout the world, but people use or take all facilities from such places. For that all the civilization, business, population grown and migrated along with larger water bodies and river courses. In recent years, for the last 6-7 decades it drew the attention of scientists and environmentalists of the world for its great importance from different points of view.

For its unique relationship with two or more ecosystems i.e. covering aquatic, marsh and terrestrial habitat such wetlands are also considered as *ecotonal* habitat (Mitsch & Gosselink, 1993). Such ecotonal environment clearly shows its capacity to hold rich biodiversity that support aquatic, marsh and land vegetation. It is a transition zone of tension between two or more communities (Clark, 1954; Odum, 1959). But few wetlands are surrounded by the upland areas that are not supporting the ecotonal habitat. The combination of biotic and abiotic systems of such areas is maintained by its annual periodic hydrological cycle which can maintain the nutrient and pollutant concentration of water and soil.

1.1. Ramsar Convention

Ramsar is a city of Iran that is situated on the southern shore of Caspian Sea where for the first time the *Convention on Wetlands* was held. It is an intergovernmental treaty and has been adopted on February 2, 1971. The convention is now called as "Convention on Wetlands (Ramsar, Iran, 1971)" or popularly

as the "Ramsar Convention". Ramsar is the first of the modern global intergovernmental treaties on the conservation and sustainable use of natural resources of wetland areas. There are presently 158 Contracting Parties to the Convention, with 1718 wetland sites, covering 159 million hectares areas under Ramsar List of Wetlands for their International Importance.

The official name of the treaty, *The Convention on Wetlands of International Importance especially as Waterfowl Habitat*, reflects the original emphasis upon the conservation and wise use of wetlands primarily as habitat for water birds.

The Convention comes into force in 1975. Though the central Ramsar message is the need for the sustainable use of all wetlands, the "flagship" of the Convention is the **List of Wetlands of International Importance** (the "Ramsar List") – presently.

IUCN-The World Conservation Union with its head quarter in Gland, Switzerland act as the Ramsar Secretariat.

The mission of the Ramsar Convention, as adopted by the Parties in 1999 and refined in 2002, is *"the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world"*.

The Convention classifies the wetlands in the following manner:

- i. **Marine:** coastal wetlands including coastal lagoons, rocky shores, and coral reefs
- ii. **Estuarine:** including deltas, tidal marshes, and mangrove swamps
- iii. **Lacustrine:** wetlands associated with lakes
- iv. **Riverine:** wetlands along rivers and streams
- v. **Palustrine:** meaning "marshy" - marshes, swamps and bogs

1.2. Definitions of Wetlands

Wetlands are such a ecosystem or units of the landscape that are found on the interface between the water and terrestrial where the water is the main factor along with the contribution of characteristics of soil, vegetation and animal life. As for every thing in this universe, wetlands also bearing its proper definition and its number are more than 50. A number of definitions were established by different persons, agencies and countries in different times. Among the several definitions few selected are given below:

One of the earliest wetland definitions was given by Nathaniel Shaler, who defined it in a report (1980):

“ General Account of the Freshwater Morasses of the United States” as “all areas... in which the natural declivity is insufficient, when the forest cover is removed, to reduce the soil to the measure of dryness necessary for agriculture. Wherever any unprofitable until the land is necessary to secure this desiccation, the area is classified as swamp”.

Later on several definitions were established in 19th century. Few are given below:

i. Wetlands are *“areas of seasonally, intermittently, or permanently waterlogged soils or inundated land, whether natural or artificial, fresh or saline, e.g., waterlogged soils, ponds, billabongs, lakes, swamps, tidal flats, estuaries, rivers and their tributaries.”* (Australian Wetland Advisory Committee, 1977).

ii. *Wetlands form the transitional zone between land and water, where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in and on it* (Cowardin *et al.*, 1979).

iii. Wetlands are *“land permanently or temporarily under water or waterlogged. Temporary wetlands must have surface water or water logging of sufficient frequency and/or duration to affect the biota. Thus the occurrence, at least sometimes, of hydrophytic vegetation or use by water birds is necessary attributes. This wide definition includes some areas, whose wetland nature is arguable, notably land subject to inundation but having little or no hydrophytic vegetation and bare ‘dry lakes’ in the arid interior”* (Paijmans *et. al.*, 1985).

iv. *“A wetland is an ecosystem that depends on constant or recurrent, shallow inundation, or saturation at or near the surface of the substrate. The minimum essential characteristics of a wetland are recurrent, sustained inundation, or saturation at or near the surface and the presence of physical, chemical, and biological features reflective or recurrent, sustained inundation or saturation. Common diagnostic features of wetlands are hydric soils and hydrophytic vegetation. These features will be present except where specific physiochemical, biotic or anthropogenic factors have removed them or prevented their development”* (National Research Council, 1995).

Among the several definition of wetland most important and excepted definition was established in Ramsar Convention (1998):

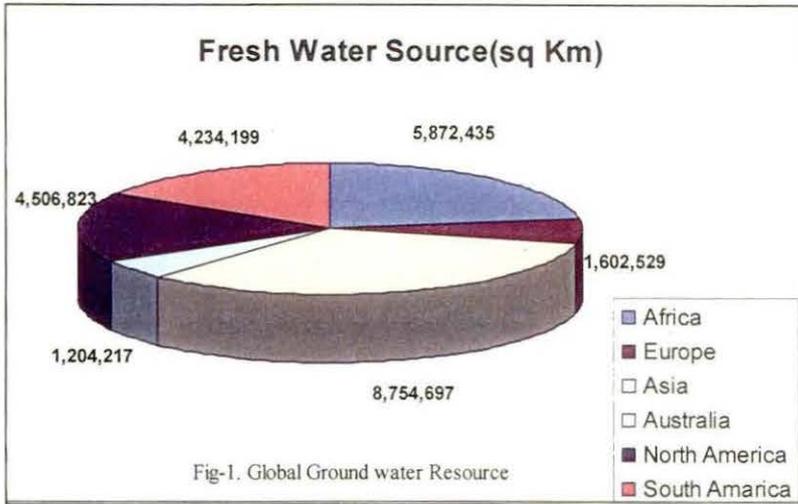
“Wetlands are areas of marsh, fen, peatland, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish, or salt, including areas of marine water the depth of which at low tide does not exceed 6 meter”.

1.3. Distribution and Classification of Wetlands

1.3.1. Global scenario

Wetlands are distributed throughout the world from temperate to tropics, from glacial mountain to plains. Two-third areas of this blue planet are covered by water (UNEP, 1994). 97.5% water of total hydrological system is deposited on the oceans that are 71.5% of the total global area. Wetlands occur in every country – from the tundra to the tropics. The World Conservation Monitoring Center has suggested an estimate of about 5.7 million square kilometers - roughly 6% of the earth's land surface [WCMC, *Global Biodiversity*, 1992] as wetlands. Out of this 6% of total wetlands, only 2.53% area covers fresh water wetlands and the rest vast areas are seawater. Of the global fresh water 69.6% is locked away in the continental ice, 30.1% is in under ground aquifers and 0.26% is composed of rivers and lakes. However, 0.0075 % fresh water areas are covered by particular lakes (UNEP, 1994). Out of total global wetlands, 30% are bogs, 26% fens, 20% swamps, about 15% flood plains, etc. (IUCN, 1999).

As per ground water source, Asia holds first position in area followed by Africa, North America, South America, Australia and Europe (Fig - 1). Wetlands are also showing variations, which creates a need to classify them for its proper understanding and conservation. These may be salt water or fresh water or lies in mountain areas or in low land plains. In Ramsar convention the wetlands are also classified into the following categories: *Lacustrine* (wetlands associated with lakes), *Palustrine* (Marsh, floodplains, swamp and bogs), *Riverine* (wetlands along with rivers and streams), *Marine* (marine wetlands with rocky shores and coral reef) and *Estuarine* (deltas, tidal marshes and mangrove). Except these many countries classify their wetland systems based on their distribution pattern.



1.3.2. Indian sub-continental scenario

The land of Indian sub-continent is also blessed by several water bodies, ocean and river or stream systems. India is agricultural land based country only due to its wide range of drainage system. Because of its variable topographic structure, it is blessed by wealth of both inland and marine wetlands systems (**Plate-I**). India has a very wide river network system among them Northern part is constituted three big river systems these are *Indus*, *Ganga* and *Brahmaputra* which are perennial and originated from different sources on the Himalayas. This *Indus-Ganga* river system creates the largest wetland system of this country. Northeast and Eastern part located within the track of *Ganga-Brahmaputra* river system. This largest track constitutes several productive floodplains, lakes, marshes and swamps. The southern part of the country constitutes the river systems like *Krishna*, *Godavari* and *Cauveri* which are not perennial but rain-fed and originated from different Hills of South India. Middle part of India is blessed by river *Narmada*, *Tapti* etc.

The Indian wetlands support 20 percent of total Biodiversity of the country (Deepa and Ramachandra, 1999). Gopal (1995) prepared a list of over 1200 plant species and a partial list of animals those are found in aquatic and wetland systems.

In India also assessing their wetland wealth in different times, primary inventory by the Department of Science and Technology, Government of India recorded a total of 1,193 wetlands, covering an area of about 3,904,543 ha, of which 572 were natural (Scott and Poole, 1989). The latest inventory records total 67,429 numbers of wetlands are estimated from India, which covers about 4.1 million hectares of total land, out of which 2,175 wetlands are natural and 65,254 are man made i.e. artificial and are occupying the 1.5 and 2.6 million hectares of area respectively [Ministry of Environment and Forests (MoEF), 1990].

In India a variety of wetlands are found which cover inland and costal areas even ponds than small ephemeral water bodies. Excluding rivers wetland area of India is occupied by 18.4% of total land of the country. Of this the major part of 70 % is concern with paddy field. The total wetland systems of India are differentiating into 8 regions:

1. Reservoirs of the Daccan plateau of south and lagoons and other wetlands of south-western coast.
2. Saline expanses of Rajasthan, Gujarat and the gulf of Kachchh.
3. Fresh water lakes and reservoirs from Gujarat eastwards through Rajasthan (Kaeoladeo Ghana National Park) and Madhya Pradesh.
4. The delta wetlands and lagoons of East coast (Chilika Lake); the freshwater marshes of Gangetic plains.
5. The floodplain of the Brahmaputra.
6. The marshes and swamps in the hills of North-East India and Himalayan foothills.
7. The lakes and rivers of the mountain region of Kashmir and Ladakh.
8. The mangroves and other wetlands of the island areas of Andaman and Nicobar Islands.

As per satellite data it was estimated that 75.8 million hector (ISRO, 1998) areas of total geographical land of India is wetlands that are widely distributed in the different part of the country. It is estimated that over 98 wetlands matching with the criteria under the Ramsar convention and 68 wetlands under protected areas. So far, among all wetlands of the country 25 wetlands are declared as Ramsar sites (**Plate-II**). State-wise distribution of wetlands in India (Chatrath, 1992) is given in Table: 1.1.

Table 1.1 : State wise wetland distribution in India

Sl.. No.	State	Natural Wetland		Artificial Wetland	
		Nos.	Area (ha)	Nos.	Area (ha)
1	Andhra Pradesh	219	1,00,457	19,020	4,25,892
2	Arunachal Pradesh	2	20,200	NA	NA
3	Assam	1394	86,355	NA	NA
4	Bihar	62	2,24,788	33	48,607
5	Goa	3	12,360	NA	NA
6	Gujarat	22	3,94,627	57	1,29,660
7	Hariyana	14	2,691	4	1,079
8	Himchal Pradesh	5	702	3	19,165
9	Jammu & Kashmir	18	7,227	NA	21,880

10	Karnataka	10	3,320	22,758	5,39,195
11	Kerala	32	24,329	2,121	2,10,579
12	Madhya Pradesh	8	324	53	1,87,818
13	Maharashtra	49	21,675	1,004	2,79,025
14	Manipur	5	26,600	NA	NA
15	Meghalaya	2	NA	NA	NA
16	Mizoram	3	36	1	1
17	Nagaland	2	210	NA	NA
18	Orissa	20	1,37,022	36	1,48,454
19	Punjab	33	17,085	6	5,391
20	Rajasthan	9	14,027	85	1,00,217
21	Sikkim	42	1,107	2	3
22	Tamilnadu	31	58,068	20,030	2,01,132
23	Tripura	3	575	1	4,833
24	Uttar Pradesh	125	12,832	28	2,12,470
25	West Bengal	54	2,91,963	9	52,564
TOTAL		2167	14,58,580	65,251	25,87,965

** NA = Not available

The details of the 25 Ramsar sites in Indian territory are shown in table- 1.2.

Table 1.2: Details of Indian Ramsar sites

Sl. No.	Ramsar site	Date of declaration	State	Area (ha)	Location
1.	Ashtamudi wetland	19/08/02	Kerala	61,400	08°57'N 076°36'E
2	Bhitarkanika mangroves	19/08/02	Orissa	65.500	20°39'N 086°54'E
3.	Bhoj Wetland	19/08/02	Madhya Pradesh	3,201	23°14'N 077°20'E
4.	Chandertal Wetland	08/11/05	Himachal Pradesh	49	32°29'N 077°36'E
5.	Chilika Lake	01/10/81	Orissa	116,500	19°42'N 085°21'E
6.	Deepor Beel	19/08/02	Assam	4,000	26°08'N 091°39'E
7.	East Calcutta wetland	19/08/02	West Bengal	12,500	19°42'N 085°21'E
8.	Harike Lake	23/03/90	Punjab	4,100	31°13'N

					075°12'E
9.	Hokera wetland	08/11/05	Jammu & Kashmir	1375	34°05'N 074°42'E
10.	Kanjli	22/01/02	Punjab	183	31°25'N 075°22'E
11.	Keoladeo National Park	01/08/02	Rajasthan	2,873	27°13'N 077°32'E
12.	Kolleru lake	19/08/02	Andhra Pradesh	90,100	16°37'N 081°12'E
13.	Loktak Lake	23/03/90	Manipur	26,600	24°26'N 093°49'E
14.	Point Calimere wildlife and Bird sanctuary	19/08/02	Tamilnadu	38,500	10°19'N 079°38'E
15.	Pong dam Lake	19/08/02	Himachal Pradesh	15,662	32°01'N 076°05'E
16.	Renuka wetland	08/11/05	Himachal Pradesh	20	31°37'N 077°27'E
17.	Roper	22/01/02	Punjab	1,365	31°01'N 076°30'E
18.	Rudrasagar Lake	08/11/05	Tripura	240	23°29'N 090°01'E
19.	Sambhar Lake	23/03/90	Rajasthan	24,000	27°00'N 075°00'E
20.	Sasthamkotta lake	19/08/02	Kerala	373	09°02'N 076°37'E
21.	Surinsar-Mansar Lake	08/11/05	Jammu & Kashmir	350	32°45'N 075°12'E
22.	Tsomoriri	19/08/02	Jammu & Kashmir	12,000	32°54'N 078°18'E
23.	Upper Ganga river (Brijghat to Narora stretch)	08/11/05	Uttar Pradesh	26,590	28°33'N 078°12'E
24.	Vembanad-Kol wetland	19/08/02	Kerala	151,250	09°50'N 076°45'E
25.	Wular Lake	23/03/90	Jammu & Kashmir	18,900	34°16'N 074°33'E

1.3.3. Wetlands of West Bengal

The West Bengal is a state that lies mostly in the Indo-Gangetic floodplain wetland system and blessed with the presence of several wetlands. These wetlands are distributed from high altitude Darjeeling hills to the plains of Southern part of Bengal. The wetlands of West Bengal are mainly lakes, floodplains, marshes, bogs and estuaries of Sunderbans (Restricted in 24-Parganas and Purba Medinipur districts only). Census report data placed by Ministry of Environment and Forests, Government of India record 23 large fresh water wetlands in West Bengal (Table -1.3). Here in West Bengal 3,44,570 hectares area is under fresh water wetlands and 4200 sq km area is under Mangrove ecosystem. As per Chatrath (1992), there are 54 natural (occupying 2,919,63 hectares) and 9 artificial wetlands (covering 52,564 hectares) are present in West Bengal. The fresh water wetlands of the state include lakes, marshes, floodplains, rivers and lowland agricultural areas. Outside Sundarbans, largest fresh water and littoral wetland area in the

Plate: I

Indian Wetland Areas

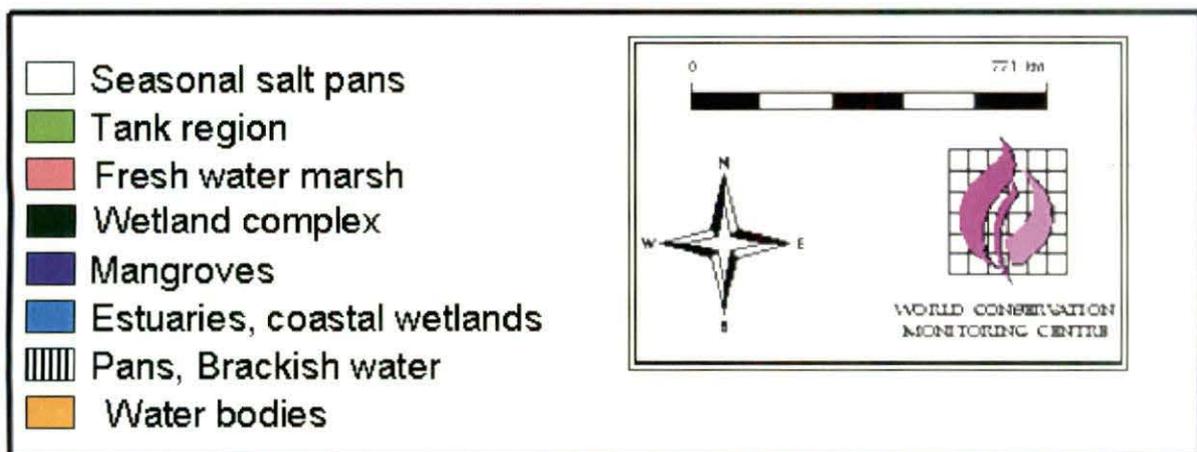
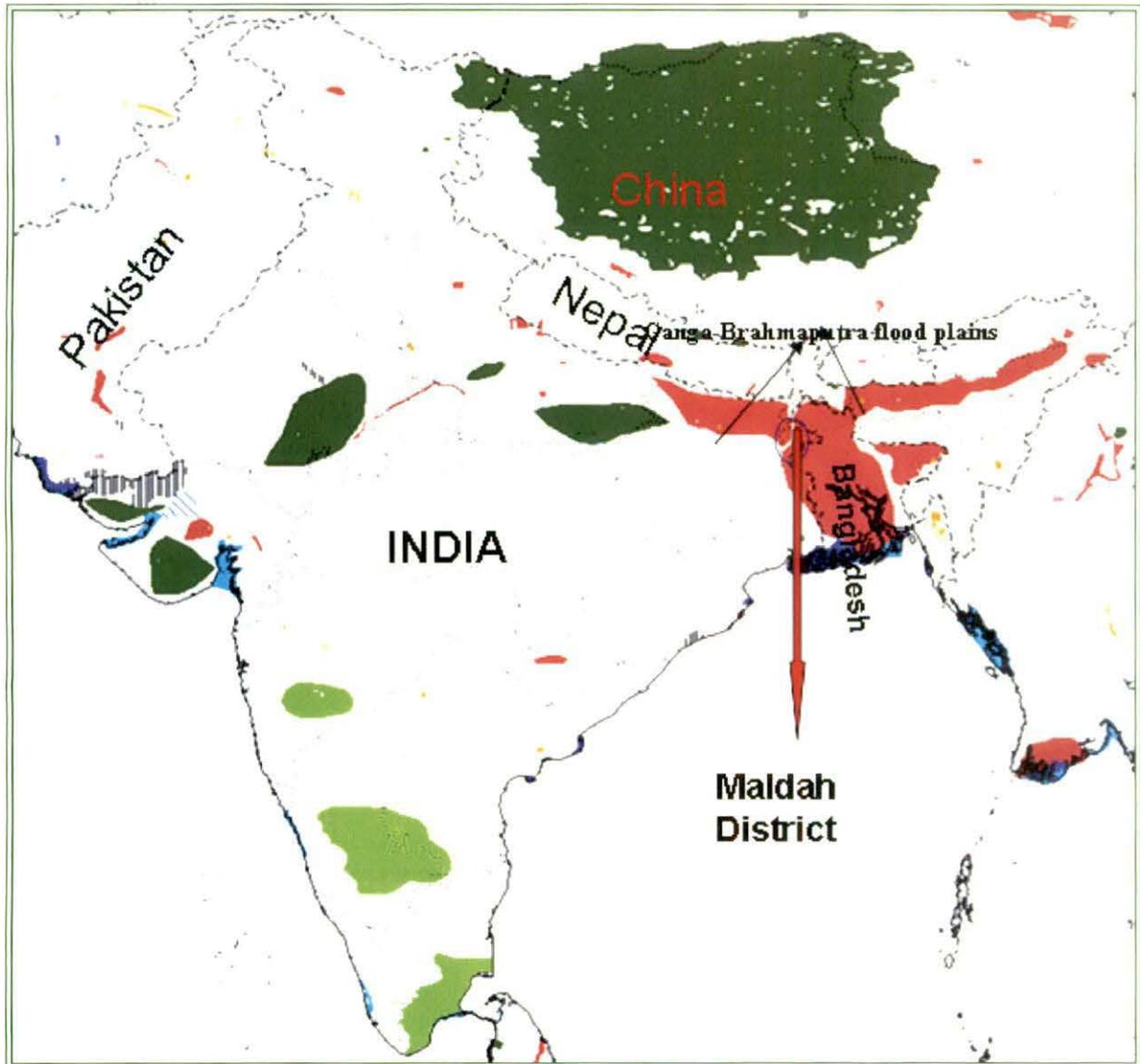
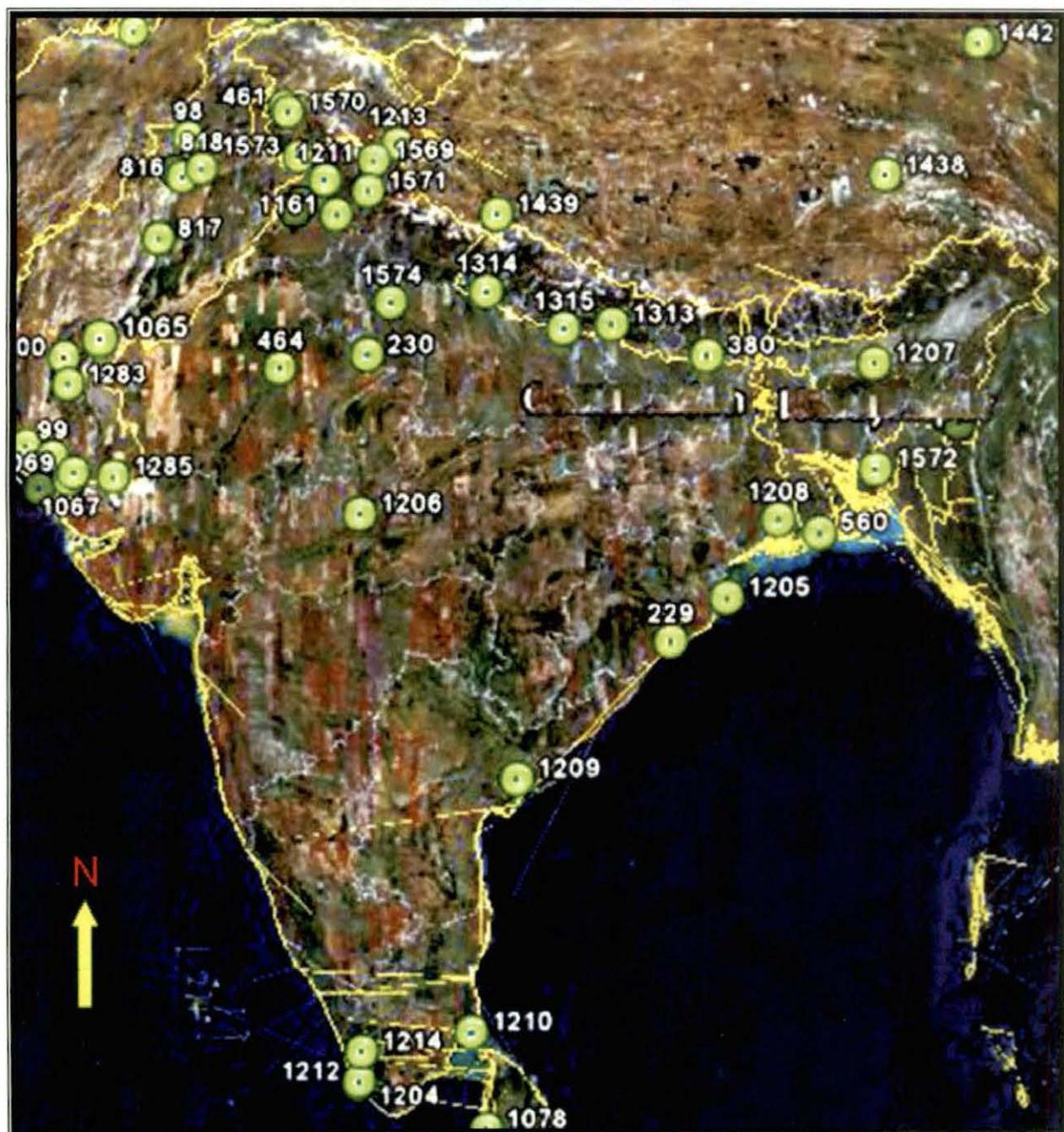


Plate: II Indian Ramsar sites



229= Chilka lake 230=Keoladeo National Park 461=Wular lake 462=Horeke lake
 463=Loktak 464=Sambhar Lake 1060=Kanqli Wetland 1061=Ropar lake 1204=
 Ashtamudi wetland 1205=Bhitarkanika mangroves 1206=Bhoj Wetland 1207=Deepor
 wetland 1208= East Calcutta wetland 1209=Kolleru lake 1210= Point Calimere wildlife
 and Bird sabctuary 1211=Pong Dam 1212= Sasthamkotta lake 1213=Tsomoriri
 1214=Vembanad-Kol wetland 1569=Chandertal Wetland 1570=Hokera wetland ,
 1571=Ranuka 1572=Rudrasagar 1573=Surinsar-Mansar Lake 1574= Upper ganga river
 (Brijghat to Narora Stretch).

state is situated in the district of Maldah. The wetland system of West Bengal is divided into in three regions (IWMED, 1997) based on land topography:

1. **Sub-Himalayan region** that generally extended from Darjeeling to eastern bank of Ganga river i.e. upto Maldah district. These areas includes Hilly areas of Darjeeling, Duars and Terai of Jalpaiguri and Koch Behar and low land floodplains, lakes, seasonal waterlogged areas of Uttar and Dakshin Dinajpur and Maldah districts.
2. **Gangetic region** that covers plains of entire Southern part of Bengal except the active delta and coastal areas. This area covers all the district of Southern Bengal except North and South 24-parganas and costal part of Medinipur districts.
3. **Coastal region** that covers only North and South 24-parganas and Costal part of Medinipur districts. This region includes India's largest salt-water wetlands that are situated in *Sunderban* areas (Biosphere reserve).

Table 1.3: Larger Wetlands of West Bengal

Sl. No.	Names of the wetlands	Place (District)	Area (Hectors)
Natural -			
1	Adh Soi	Pachia (Maldah)	140
2	Ashi Dob	Kasimpur (Maldah)	280
3	Balotali Beel	Jatra Danga (Maldah)	120
4	Barbila Talao	Arai Danga (Maldah)	120
5	Bochamari	Bowalia (Maldah)	120
6	Goad Bod	Bajanna (Maldah)	120
7	Hazar Takia	Mobarakpur (Maldah)	140
8	Konar	Kurpurgang (Maldah)	240
9	Madhaipur Beel	Maldah Town (Maldah)	100
10	Sanak Beel	Chandipur (Maldah)	200
11	Singsar	Chandipur (Maldah)	140
12	Kathambari Beel	Odhlabari (Jalpaiguri)	136
13	Buxigang-Nitiarap	Haldibari (Jalpaiguri)	1400
14	Chalua	Sitagram (Uttar Dinajpur)	140
15	Joula para	Madarihat (Jalpaiguri)	6096
16	Teesta Nadi	Mekhliligang (CoochBehar)	1800
17	Rasic Beel	Toofangang (CoochBehar)	9952

18	Talao Holyday Island	Namkhana (24-Parganas)	350
19	Sajna Khali	Gosaba (24-Parganas)	36236
20	Saltlake	Kolkata (24-Parganas)	3000
21	Lothian	Nankhana (24-Parganas)	3800
22	Land Thata Beel	Long Thata (Birbhum)	2000
Man Made -			
23	Kangsabati	Mukutmonipur(Bakura)	12400

Based on the total area, 24- Parganas (North and South together) holding first position for wetland but majority of the wetlands of this district are salt water or estuarine. Maldah holds second position. But, if we consider only fresh water wetlands it should be placed in first position and followed by other districts (Table 1.4).

Table 1.4: District wise distribution of wetlands in West Bengal

Sl. No.	District	Number	Type	Area (ha)
1.	24- Parganas (N & S)	1528	Fresh & Salt water	367900.74
2.	Maldah	562	Fresh water	29416.95
3.	Murshidabad	608	Fresh water	22076.89
4.	Medinipur	750	Fresh & Salt water	20807.00
5.	Puruliya	497	Fresh water	16804.89
6.	Birbhum	208	Fresh water	1741.56
7.	Nadia	446	Fresh water	12292.57
8.	West Dinajpur	493	Fresh water	10699.37
9.	Bankura	530	Fresh water	6913.6
10.	Barddhaman	630	Fresh water	6412.34
11.	Koch Behar	335	Fresh water	4930.51
12.	Howrah	112	Fresh water	1925.65
13.	Hoogly	184	Fresh water	1631.19
14.	Jalpaiguri	153	Fresh water	1089.99
15.	Darjeeling	44	Fresh water	271.79
16.	Kolkata	1	Fresh water	4.37
Total				504919.41

Out of 25 Ramsar sites of India only one East Calcutta wetland is situated within the boundary of this state. This is one highly disturbed wetland, mostly used for pisciculture. Its biodiversity appears to be highly affected due to accumulation of sewage water and other anthropological activities.

1.3.4. Wetland of Maldah

The district of Maldah lies in the East bank of the River Ganga and also blessed with a number of fresh water wetlands. Based on wetland areas it holds second position in the West Bengal after 24 Parganas (North & South) and hold first position based on inland fresh water natural Wetland. Maldah district holds first position based on the number as well as areas of wetlands in this State. According to Meenbarta (1998) maximum number of wetlands or water bodies present in this district. Census report data placed by Ministry of Environment and Forests, Government of India that 11 big fresh water wetlands, out of 23 in West Bengal, present in different blocks of this district (Wetlands of India-1990). The Majority of wetlands are *Palustrine* (floodplains, seasonal waterlogged, marsh) and *Lacustrine* (Lakes) and *Riverine* types.

Due to presence a very large number of wetland in this district of West Bengal, many historians called Maldah as the "*Lake district of Bengal*" (Sengupta, 1969). The district covers a total area of 3733 sq km, out of which 156.76 sq km area is occupied by water bodies of less than 10 hectares and 273.89 sq km areas covered by wetlands which are more than 10 hectares (Wetland of India, 1990). Other wetland type like mudflat, sandbanks, marshy lands and low lying areas covers 450.38 sq km, 78.52 sq km, 120.34 sq km and 47.27 sq km respectively, the total comes to 645 sq km (Raha *et al.*, 1994) of wetland. Recurring floods almost every year gradually increases the wetlands in this district.

The total 1076 sq km area that is almost 30 % area of the district is fallen under the wetlands. During monsoon all the wetlands forms single largest water body and covers almost 60 percent of the total land. This largest water body is directly or indirectly connected with the different river system like *Ganga, Pagla, Mahananda, Tangan, Punarbhaba, Chitola, Kalindri* etc.

Very recent statistics as per satellite data estimated by the IW MED that total wetland area of Maldah is 29416.95 hectares, which is 7.88% of total geographical area (Bhattacharyya *et al.*, 2000). This area reduces to 6844.53 hectares during pre monsoon and covers 15191.58 hectares in post monsoon season. Out of total wetland area 28750.68 hectares *i.e* 97.73 % of total wetland area is natural whereas 665.78 hectares that is 2.23% area are manmade. Detail information about the wetlands of Maldah describes in Table 1.5 and 1.6. The most abundant natural wetlands are seasonal waterlogged (no. 235) wetlands that contribute 20956.49 hectares area are present in this district of West Bengal.

The wetlands are locally called as *Beel* or *Beeloth, Dighi, Khal* etc. The most of the wetlands are natural in origin and originated due to river sifting. Except the Natural wetland there are some artificial

manmade water bodies located here and among them few are hundreds of years old. The wetlands of Maldah can be divided into the following types based on their origin:

1. Marshes and floodplains of *Barind* region along with small lakes and ponds.
2. Marshes and seasonally flooded Wetlands of *Tal* region.
3. Marshes and seasonally flooded wetlands of *Diara* region along with few lakes.

Table 1.5: Wetland Type and their areas in Maldah district of West Bengal

Nature of Wetland		Different Classes of Wetland	Number	Area (ha)
INLAND	Natural	Pond	22	2760.79
		Cut off Meanders/ Ox bow Lake	190	2986.8
		Marsh/ Swamp	20	2047.09
		Waterlogged seasonal	235	20956
	Manmade	Reservoir	4	34.86
		Tanks	90	613.07
		Waterlogged	1	17.85
		Ash pond	-	-
Total			562	29416.95

Out of several wetlands 17 wetlands are larger i.e. over 100 hectores out of which 11 are seasonal waterlogged and detailed statistics are given in Table:1.6.

Table 1.6: Size – class distribution of wetlands in the Maldah district of West Bengal

Nature of Wetland		Different Classes of Wetland	Up to 10 ha	>10-25 ha	>25 -100 ha	>100 ha
INLAND	Natural	Ponds	11	3	7	1
		Cut off Meanders/ Ox bow Lakes	112	49	27	2
		Marsh/ Swamp	3	5	9	3
		Waterlogged seasonal	147	49	28	11
	Manmade	Reservoir	3	1	-	-
		Tanks	80	7	3	-

		Waterlogged	-	1	-	-
		Ash pond	-	-	-	-
Total			356	115	74	17

1.4. Importance of Wetlands

For their usefulness wetlands are often referred as '*Wealth lands*'. Wetlands fulfilling various needs of human being as well as greatly affects the environment which keeps our beloved habitat suitable for our survival. Wetlands are maintaining the world's ecosystem from the very beginning and are still continuing.

Wetlands are also termed as Kidney of the earth that can filter the ground water. The complete hydrological cycle of the earth is regulated or maintained by the wetland system. The stored water of every wetland passes through the bottom soil into the underground aquifers (a rock deposit that contain water) by filtering naturally. The natural filtering is unique during it the total nutrient of the water absorbed by the different strata of soil. Through this procedure groundwater became recharged. The ground water taken out by human through the wells or it may be flowing laterally until it rises to the surface of another wetlands. In this way recharge and discharge of ground water is maintained by different wetlands of this blue planet.

Flood controlling is another good function of wetlands. These areas during monsoon or heavy rain play a very important role to store the excess rainwater due to its low laying topography, to avoid flood and, thereby, saving human habitation, agricultural field with crops etc.

All the wetlands of the world are the mixture of abiotic (water, soil) and biotic (plants and animals) components. The availability of high level of nutrient in such water gradually forms a very good floral and faunal composition in wetlands. It is true that first life, which may be simple or complex, developed in water that gives us the role of water in life of any living organism. It is determined that wetlands are the very rich units, which supports largest biodiversity of the word just after tropical rainforests.

The wetlands are very rich in nutrients, which are coming from natural pollutant and agricultural runoff. Wetland reduces this by serving as pools where sediment can settle. The aquatic plants in their different metabolic pathways help to maintain the water quality of wetlands through the utilization of excessive nutrients. Water cycle and periodical flood maintain the nutrient concentration of wetlands.

The wetlands support different types of macro and micro-animals like birds, fishes, reptiles, amphibians, protozoa etc. Among them birds are very important. They choose wetlands for their food (fish, snake, rhizome of different macrophytes), for breeding, over wintering and seasonal migration.

These areas also be a house of different migratory and domicile birds regarding their threatened status. It is estimated (Cook, C.D.K., 1996) that about 20% of the known species of life rely directly or indirectly on wetlands for their survival, as these are their primary and/or important seasonal habitats.

The excessive wild plant productions of wetland support the rural economy. The poor people living in nearby areas of wetland, i.e. surrounding villages collect many wild plants for their daily use as food, fodder, thatching, medicine etc. and also sold in local markets. Along with the plants several species of fishes, mollusks are also used as food.

The marshy and floodplain areas are generally used for agricultural activities due to their high water potentiality. These areas are generally used for paddy cultivation along with jute, makhana (*Euryale ferox*), mustard etc.

The wetlands are the storehouses of genetic resources of different species. These areas support several wild varieties of cultivated and economically important plants. The most important crop of the world is rice and its several wild species is generally grown on wetland areas. This natural gene bank can help with necessary genes to produce new and improved quality crop varieties through advance biological practices.

1.4.1. Importance of Aquatic Macrophytes on Wetland

These are the habitats of various types of vegetation like algae, fungi, bryophyte, pteridophytes and most important group angiosperms. These plants, growing in the wetlands are called aquatic and/or wetland plants that can also termed as hydrophytes (Warming & Raunkair, 1934).

The vegetation of wetland makes it so beautiful and rich in biodiversity as well as healthy and fresh ecosystem. As other ecosystems, the floral elements are primary producers or energy assimilator that synthesis food by photosynthesis in wetland ecosystem. The output of photosynthesis actually increases the nutrient status wetland soil and water. Based on these output, food chain, food web and energy flow of such ecosystem are regulated.

Some phytoplanktons and submerged aquatic macrophytes are the good food for fishes and other aquatic animals. Fishes eat seeds, leaves, and rootstock of different aquatic plants. Fishes choose roots of floating plant for breeding or releasing eggs. Seeds, leaves, rootstock are also taken as food by different migratory wetland birds.

The seasonal rainfall and regular flooding increase the soil erosion causing filling of wetlands, thereby loosing the depth of water. The shoreline erosion is controlled by the adventitious and densely anastomose root system of grasses and sedges.

Few species of wild submerged and marshland plants are use as ornamental for house hold aquariums along with different colourfull fishes.

1.5. Wetlands in Danger

When we understand the importance of wetland that already was disappear of its 50 percent. In USA the rate of wetland loss is maximum i.e. 85 percent. People of last century or 5 decades back, treat the wetlands as *wasteland* and misuse them in various ways like agricultural activities or developmental works causing of such a great loss. Many research works find out several causes behind the wetland loss. The causes are of two types:

A. One is anthropological which includes excessive agricultural activity, urbanization, pollution, artificially filling up, excessive tourism load etc. and B. natural causes. The rapid increases of population are creating a heavy load on wetlands because it has been seen that most of the wetland areas are filling-off in favour of the extension of human settlements. Due to over population the industry and related pollution are dramatically increases that create pressure on wetland and its ecosystem as it is for forest areas. But forest area are always treated as government property of every country and conservation strategies had been made from very early stage where as wetland conservation strategies had not been prepared by government of not a single county like forest. That particular negligence is the main cause of such drastic loss.

Wetlands of every country of the world always are used in bad manners from the very beginning. It is always used as sink for sewage discharge from urban and rural areas, chemicals from factory, various poisonous metals from different atomic power station etc. This process is steel being continued in various countries of the world.

B. On the other hand, it is degraded by natural activity like siltation, eutrophication, reduction of dept due to the accumulation of excessive amount decayed macrophytes etc. The excessive nutrient from agricultural runoff and existing plant for decades the water is polluted. These situation induced growth of huge algal bloom creating euthropication, which destroy the healthy wetland ecosystem.

All these factors are responsible for converting the wetlands into non-wetland areas rapidly. As per Narayanan (1992) nearly one hector area of wetland becomes degraded at the tick of every minute of the clock from this blue planet.