

WETLANDS OF PUNJAB

INTRODUCTION

Wetlands are the ecosystems infused with aquatic, semi-aquatic as well as terrestrial characteristics. They are influenced to varying degrees by both terrestrial and aquatic habitats. They differ widely in character due to local and regional differences in climate, soils, topography, hydrology, water chemistry, vegetation and other factors. Depth and duration of inundation, a key defining force, can differ greatly between types of wetlands and can vary from year to year within a single wetland type (Ramachandran et al., 2005).

As per the definition adopted at Ramsar Convention (Ramsar, Iran, 1971) "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 six meters". Wetlands due to their biological, ecological, socio-cultural and economic values form an important component of environment. They are among the world's most productive ecosystem and provide habitat and support diverse range of biodiversity.

Box1: The Ramsar Convention on Wetlands

The Ramsar Convention on Wetlands is one of the oldest intergovernmental treaty that symbolize the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the "wise use", or sustainable use, of all of the wetlands in their territories. The convention was signed on February 2, 1971 in a place called Ramsar in Iran. Since then, February 2nd is celebrated as "World Wetlands Day". It marks the date of signing of the convention on wetlands.

Table: 1. Criteria for Identifying Wetlands of International Importance

<p>Group A of the Criteria Sites containing representative, rare or unique wetland types</p>		<p>Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near natural wetland type found within the appropriate biogeographic region.</p>
<p>Group B of the Criteria Sites of International importance for biological diversity</p>	<p>Criteria based on species and ecological</p>	<p>Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.</p> <p>Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal conserving species important for maintaining the biological diversity of particular biogeographic region.</p> <p>Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.</p>
	<p>Specific Criteria based on water birds</p>	<p>Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more water birds.</p> <p>Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of water bird.</p>
	<p>Specific Criteria based on Fish</p>	<p>Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.</p> <p>Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.</p>
	<p>Specific Criteria based on other taxa</p>	<p>Criterion 9: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland dependent non-avian animal species</p>

Source: www.ramsar.org

CLASSIFICATION OF WETLAND TYPE

Classification of wetland type currently in use, was adopted by the Conference of the Parties in 1990 at the Ramsar. It divides wetlands into three main categories, namely:

- Marine and coastal wetlands
- Inland wetlands
- Man-made wetlands

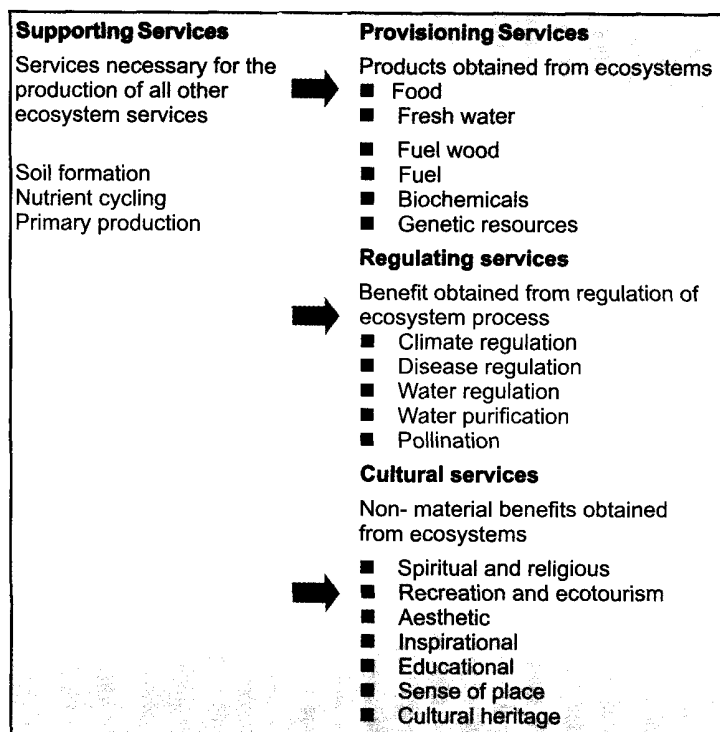
VALUES AND FUNCTIONS OF WETLANDS

Wetlands are the integral part of larger landscapes providing incredible benefits to human beings at no cost. Wetlands are unique and vital ecological resource and play an important role through contributing to the national economy and, thus need to be conserved.

In economic terms, values of wetlands can be categorised into direct and indirect benefits.

- **Direct benefits** include; water supply, fisheries, agriculture, energy resource, wildlife resource, transport, recreation and tourism, supporting a vast diversity of flora, fauna and cultural heritage.
- **Indirect benefits** include; improved water quality (including drinking water) by intercepting surface runoff and removing or retaining its nutrients, processing organic wastes and reducing sediment before it reaches open water.

Box 2. Ecosystem Services Provided by Wetlands



Source: Millenium Ecosystem Assessment, 2003. *Ecosystem and Human Well-being; A framework for Assessment*. Inland Press, Washington, D.C.

GLOBAL SCENARIO OF WETLANDS

According to an estimate, wetlands occupied nearly 6.4% area of the earth's surface, 30% of which is made up of bogs, 26% fens, 20% swamps, about 15% flood plains, etc. (IUCN, 1999 and Mitch and Gosselink, 2002). About half the global wetland area has been lost (Zedler and Kercher, 2005) and the amount of fresh water on earth is also very small compared to seawater, of which 69.6% is locked up in the continental ice, 30.1% in underground aquifers, and 0.26% in rivers and lakes. Lakes in particular occupy less than 0.007% of the world's fresh water (UNEP 1994). At the earth's surface, fresh water forms the habitat of large number of species. Wetlands with a share of 0.0001 % among the global water sources include swamps, marshes, bogs and similar areas and are an important and vital component of the ecosystem (IUCN, 1996). Presently, there are 1886 designated wetland sites of international importance, covering an area of 185,156,612 hectares (www.ramsar.org.com as on March 05, 2010).

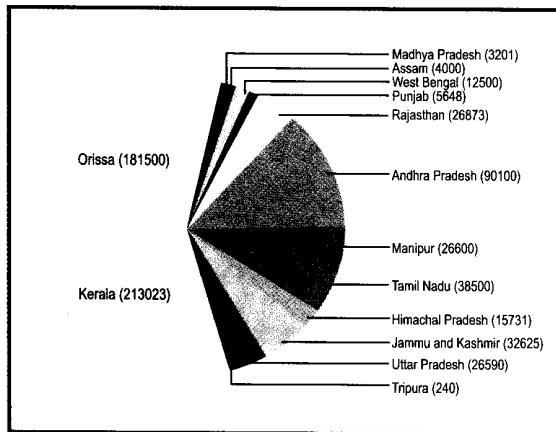
INDIAN SCENARIO OF WETLANDS

Wetlands in India are distributed in different geographical regions ranging from Himalayas to Deccan plateau. The variability in climatic conditions and changing topography is responsible for the significant diversity in wetlands. They are classified into different types based on their origin, vegetation, nutrient status and thermal characteristics like glaciatic wetlands, tectonic wetlands, oxbow wetlands, lagoons, crater wetlands, saltwater wetlands, urban wetlands, ponds/tanks, reservoirs, mangroves, coral reefs and creeks (MoEF, 2007).

India has about 67,429 wetlands, covering an area of about 4.1 million hectares. Out of these, 1.5 million hectares area (2,175 wetlands) comes under natural and 2.6 million hectares area (65,254 wetlands) comes under man made category and mangroves occupying an estimated 0.45 million hectares (IUCN, 1990).

The Directory of Indian Wetlands and Asian Wetland Bureau records 147 sites in India out of which 68 are protected under the National Protected Area Network by the Wildlife Protection Act, 1972 (Howes, 1995). Though accurate results on wetland loss in India are not available, the Wildlife Institute of India conducted a survey on these aspects which revealed that 70–80 percent of individual fresh water marshes and lakes in the Gangetic flood plains have been lost in the last few decades. Only 50 percent of India's wetlands are remaining that are being lost at a rate of 2-3% every year (www.sdnp.nic.in). Presently, there are 25 wetlands of international importance (Ramsar sites) in India, covering an area of 677,131 hectares (Fig.1).

Fig.1. State wise Area (ha) of Ramsar Sites in India



Source : MoEF, 2007

STATUS OF WETLANDS IN PUNJAB

The State of Punjab has been left with less than 1% of the area under wetlands. About 30 wetlands, most of which are of natural origin were reported to occur in the State although some (for example, Rahon De Chhamb and Bhupinder Sagar) have already lost their wetland characteristics (Ladhar, 1995). Therefore, in order to ensure sustainable development, one of the key propositions is to prioritize

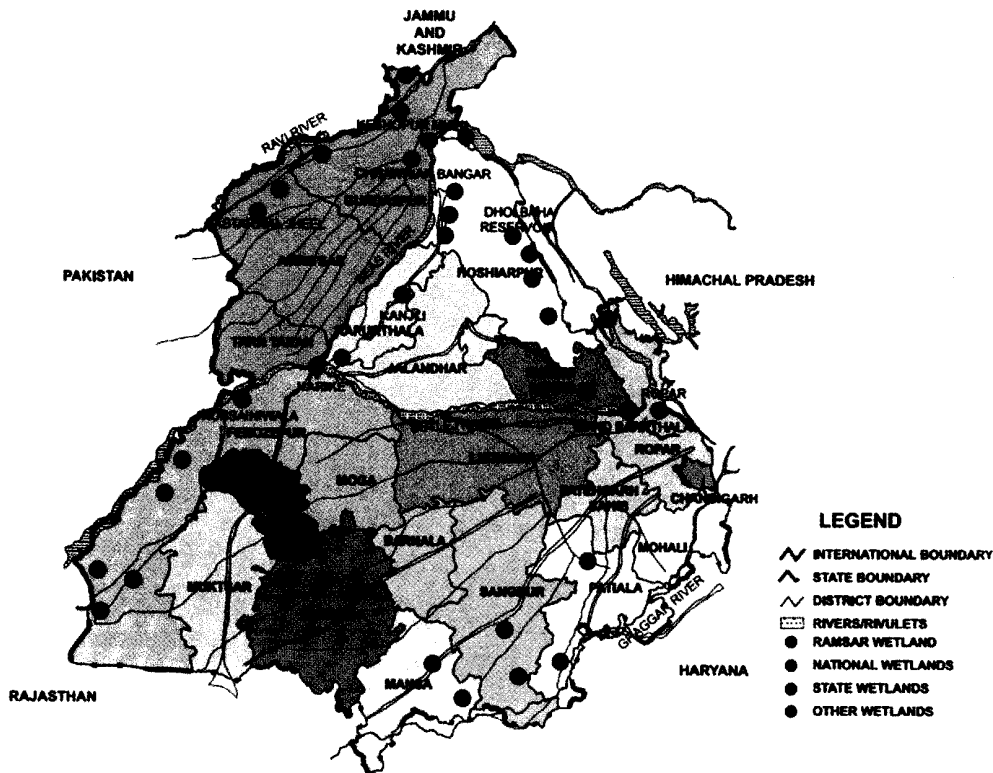
conservation of wetlands and their scientific restoration by systematically understanding the mechanisms involved in the evolution and degradation of wetland ecology.

Punjab has 12 natural wetlands and 8 manmade wetlands (Fig 2). Out of these, 3 have been declared as Ramsar sites (Harike, Kanjli and Ropar) and 2 declared as National wetlands (Ranjit Sagar and Nangal).

These wetlands provide habitat to diverse flora and fauna including some rare and globally threatened bird species. These wetlands have emerged as fine waterfowl habitats with Harike wetland also been declared an IBA (important bird area) site for BNHS. These wetlands attract thousands of migratory birds from various parts of the world during winters.

The State of Punjab has also bestowed status of 'Wildlife Sanctuaries' to Harike and Nangal under Wildlife (Protection) Act, 1972. Due to changes in land-use patterns over the time in the catchments of wetlands and changing environmental pressures, there is a visible impact on the number of birds visiting these wetlands. Habitats have been disturbed through contamination, draining and disruption of natural hydrology, and farming and other anthropogenic pressures. With this, wetlands that provide important benefits for local populations (protection against floods, fisheries, tourism etc.) had come under great threat.

Fig. 2. Location Map of Wetlands in Punjab



The Punjab Wetlands can be categorized into following types according to their importance:

- Wetlands of International Importance (termed as Ramsar sites)
- National wetlands
- State wetlands
- Other identified wetlands

A) Wetlands of International Importance In Punjab

There are following three Ramsar sites in the State, covering a total area of 56.48 sq.km (Table 2):

Table 2. Ramsar sites in Punjab

S.No.	Name	District boundaries	Area (sq km)	Type of Wetland
1.	Harike	TarnTaran, Ferozepur & Kapurthala	41	Man-made wetland
2.	Kanjli	Kapurthala	1.83	Man-made wetland
3.	Ropar	Ropar	13.65	Man-made wetland

1) HARIKE WETLAND

The Harike wetland is one of the largest freshwater wetlands in Northern India (Fig. 3 & 4) and spreads into the three districts of Ferozepur, Kapurthala and Tatan Taran in the State of Punjab. It is located between 31° 13' N latitude and 75° 12' E longitude. It came into existence in 1952 with the construction of barrage at confluence of Sutlej & Beas rivers in Punjab.

Fig. 3 A View of Harike Wetland



It was declared wetland of National importance in 1987 & was included as a Ramsar site no. 462 (i.e. in the List of Wetlands of international importance amongst the 25 Indian Ramsar Sites) in 1990. The Govt. of Punjab had also declared Harike wetland as a wildlife sanctuary in 1982. This is a Man-made, riverine, lacustrine wetland. The total wetland area under land use is 29600 ha and its category-wise land use in 2006 is shown in Fig. 5.

Fig. 4 Layout Map of Harike Wetland

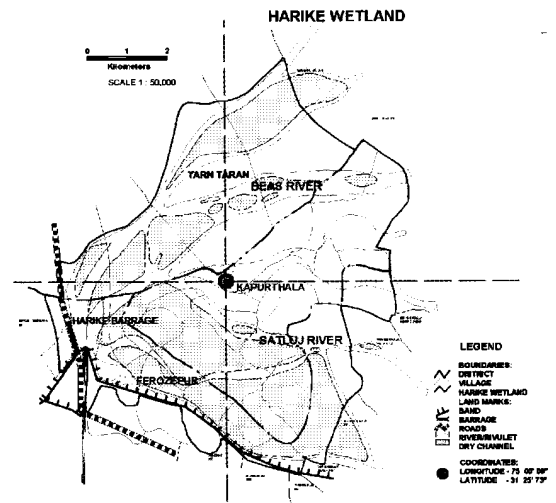
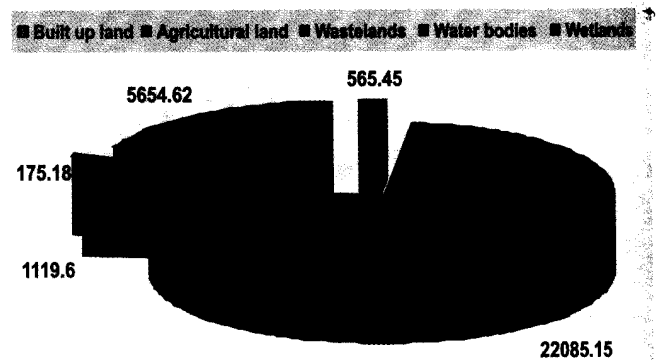


Fig. 5. Harike Catchments under Various Land Use Categories



Source: PRSC Report, 2009

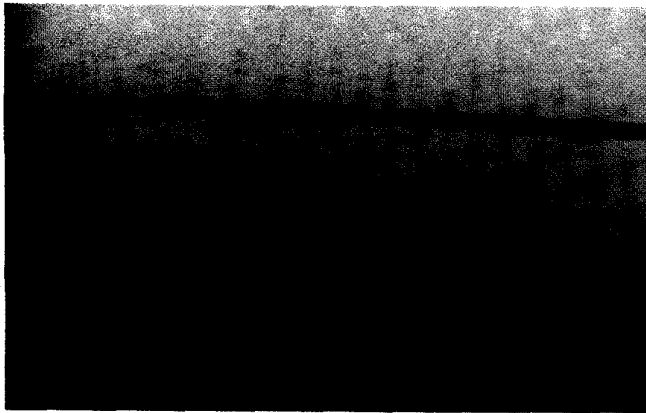
Importance:

- Harike wetland is an important habitat for the water fowls migrating from across the international frontiers. It supports about 360 species of avifauna. It serves as a wintering site for more than 20,000 water fowls. It is IBA (Important Bird Area) site of BNHS and it has also been notified as Wildlife Sanctuary.
- This wetland also supports about 50 indigenous species of fishes, 7 species of turtles, 4 species of snakes, 6 taxa of amphibians, 189 taxa of invertebrates and 38 taxa of plants have been reported to occur at Harike.
- This wetland is a part of major reservoir in the plains of Punjab providing irrigation & drinking water supply to south-west Punjab & Rajasthan through Ferozepur and Rajasthan feeder canals.

Major Threats:

- **Weed Growth:** Excessive growth of macrophytes and weeds like Water hyacinth (*Eichhornia crassipes*) is a major threat to aquatic biodiversity. This is due to discharge of waste water from catchment towns & industries through Buddha Nalah.
- **Siltation:** Deposition of silt eroded from far off hill catchments and from immediate catchment areas has reduced the pond area.
- **Encroachment:** Encroachment of wetland area for agricultural purposes pose threat to wetland's biodiversity.
- **Grazing:** Unabated grazing in the catchments of wetland zones is a threat to wetland ecology.

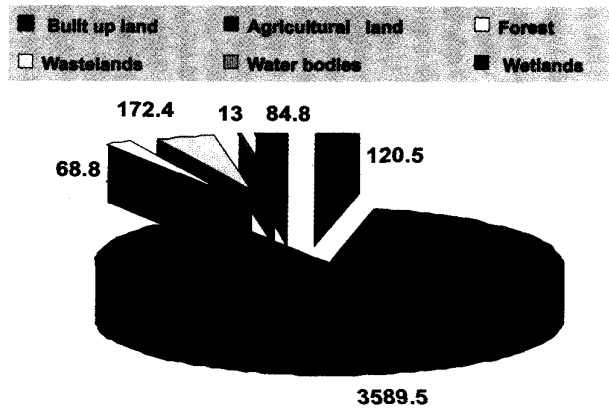
Fig. 6. A View of Kanjli Wetland



2) KANJLI WETLAND

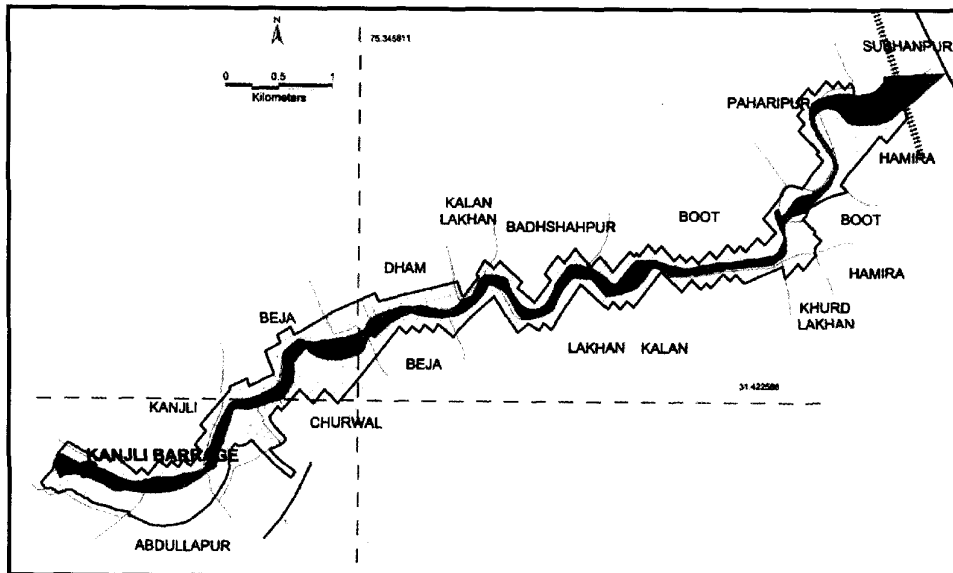
Kanjli wetland came into existence with the construction of head regulator in the rivulet Kali Bein (Holy Bein) in 1970 and is located at 31°25'N latitude and 075°22'E longitude, about 4 Km from the city of Kapurthala. Kanjli wetland was designated as a wetland of National Importance in 1988 & Ramsar Site (No. 1160) in February 2002. It is spread over 12 villages, covering an area of 183 ha (Fig. 6 & 7). It is a man made fresh water riverine system. Kali Bein (Holy Bein) on which Kanjli wetland is located is ultimately joins Harike wetland downstream after covering a distance of about 20 kms. The total area under land use is 5150.0 ha under various categories (Fig. 8).

Fig. 8. Kanjli Catchment under Various Land Use Categories



Source: PRSC Report, 2009

Fig 7. Layout Map of Kanjli Wetland



Importance:

- The Kanjli wetland attracts a large number of resident and migratory birds. About 90 species of birds have been reported. Some common migratory birds of Kanjli wetland include various species of waterfowl such as white eyed pochard, wigeon, tufted pochard, common teal, large whistling teal, pintail, mallard, shoveller etc. About 35 fish species have been reported such as *Catla catla*, *Channa marulius*, *C. striatus*, *Cirrhinus mrigala*, *Labeo calbasu*, *L. rohita* etc.
- This wetland is also important for many species of plants which are ecologically significant. Insectivorous plant *Utricularia sp.*, pollutant managers *Phragmites sp.*, Typha etc. are noteworthy species found in this wetland.
- It has unique socio- religious importance due to its association with Revered Saint Guru Nanak Dev Ji.

Major Threats:

- **Reduced Inflow:** The inflow of water in the wetland is considerably low from Mukerian Hydrel Channel which needs to be enhanced for reducing eutrophication.
- **Weed infestation:** Inflow of pollutants from nearby towns and agricultural runoff cause excessive weed growth due to eutrophication which is reducing inflow of water current in the wetland.
- **Grazing:** Grazing and deforestation in catchment areas cause soil erosion and habitat loss.
- **Encroachment:** Encroachments along the banks is also an important threat to the wetland.

3) ROPAR WETLAND

Ropar lake came into existence after construction of barrage at Satluj River near Ropar city in 1887(Fig. 9 & 10). It is located at 31°01'N latitude and 076°30'E longitude. It was declared as wetland of National importance in 1996. Consequently, in 2002, this wetland was declared as Ramsar site (no. 1161) in February 2002.

Fig. 9. A View of Ropar Wetland



The wetland covers a total area of 13.65 sq km including 8 sq km area of wetland under water. The conservation measures were initiated in 1998. It may be categorized as a man-made freshwater riverine and lacustrine wetland. Total area under various land use categories is shown in Fig 11.

Fig. 10. Layout Map of Ropar Wetland

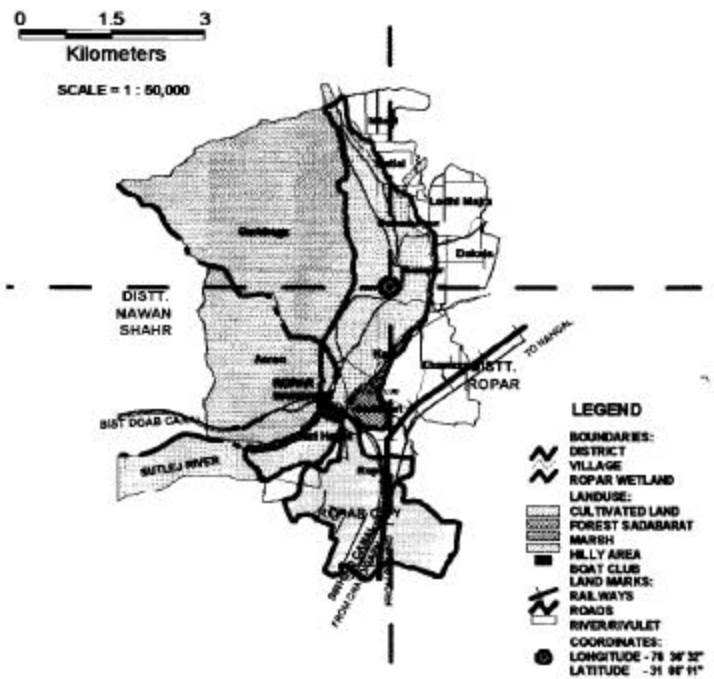
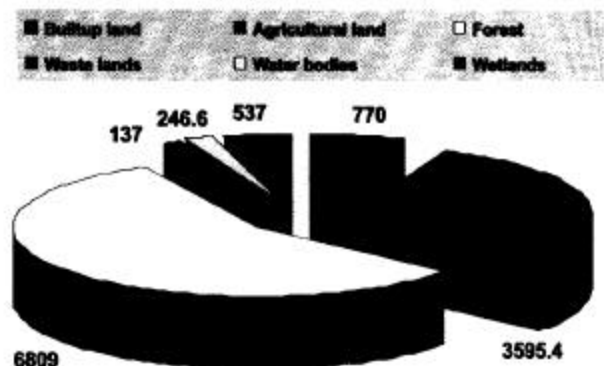


Fig. 11. Area (ha) under Various Land Use Categories in the Ropar Catchment



Source: Tiwana et al 2005

Importance:

- 55 species of fish & 318 species of birds have been reported from this wetland area.. It serves as an important habitat for Pangolin, Sambar & Hog deer and for some threatened species in the Shivalik foothills like scaly ant eater, Python etc. It is also an important staging ground for migratory waterfowl.
- The reservoir formed with the construction of barrage over river Satluj serves in recharging ground water and is an important source of water for distant areas through Sirhind and Bist Doab canals. It helps in protection from floods and also in improvement of water quality.
- Ropar area has its distinct place in history since Anglo - Sikh relations and territories were defined by an agreement between Maharaja Ranjit Singh and Lord William Bentinck in October, 1831 under the shade of an old Ficus tree on the bank of Suttlej.
- Due to its tremendous recreational value, a number of bird watchers and nature lovers visit the area.

Major Threats:

- **Siltation:** Ropar wetland is facing severe problems of siltation from the adjoining barren and dried hills which need immediate treatment and greening; otherwise it may lead to shrinkage of wetland area.
- **Industrial Pollution:** Fertilizer plant at Nangal and Thermal Power Plant at Ropar are mainly responsible for water quality degradation of this ecosystem. Inflow of chemical pollutants like agrochemical residues run off, industrial effluents and sewage from adjoining towns in the upper reaches like Nangal, Naya Nangal, Anandpur Sahib, Kiratpur Sahib, need assessment and control measures.

B) WETLANDS OF NATIONAL IMPORTANCE IN PUNJAB

There are two national wetlands in Punjab covering a total area of 91 sq.km:

1) RANJIT SAGAR

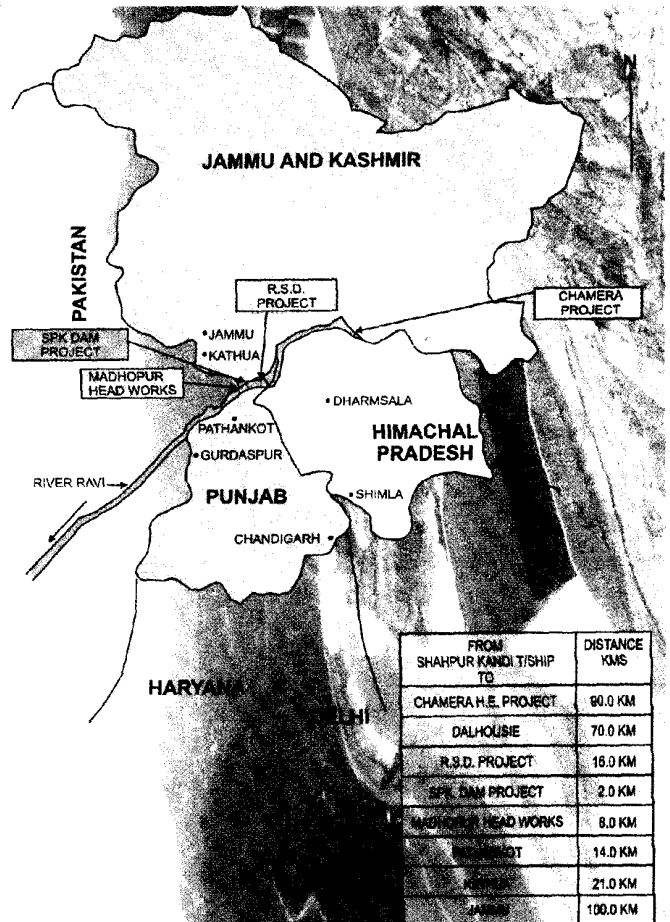
Ranjit Sagar located on river Ravi about 24 km upstream of Madhopur Headworks in Gurdaspur district is a manmade, riverine and lacustrine wetland with fresh water ecology (Fig.12 & 13). It lies at an altitude of about 540 msl at 32° 26' 30" N Latitude and 75° 43' 30"E Longitude and is spread over an area of 87.60 sq km (Kumar *et al.*, 2006). The area of different states falling

under reservoir is Punjab (3%), Himachal Pradesh (82%) and J&K (15%). Ministry of Environment & Forests, Govt. of India has included Ranjit Sagar under national wetland conservation programme at the instance of Hon'ble Governor of Punjab in 2006.

Fig.12. A View of Ranjit Sagar



Fig. 13. Location Map of Ranjit Sagar Dam



Importance:

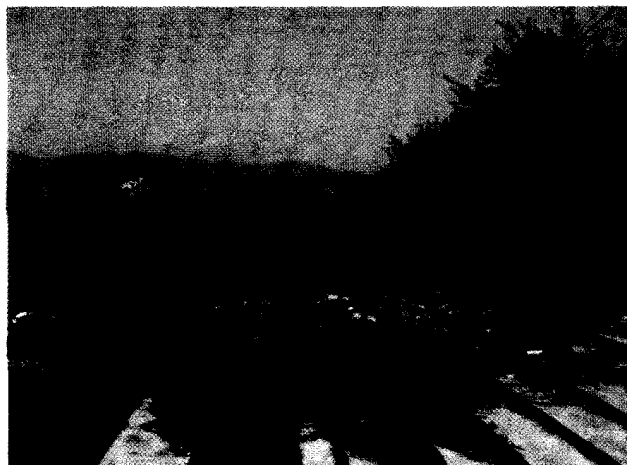
- Support many kinds of fish species such as *Tor putitora* (Mahseer), *Labeo rohita*, *Puntius ticto*, *P. sarana*, *P. sophore*, *Catla catla*, *Cirrhinus mrigala*, *Wallago attu*, *Colisa fasciatus*, *Ambassis nama*, *Channa punctatus*, *C. marulius*, *Notopterus notopterus*, *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *Heteropneustes fossilis*, *Garra gotyla*, *Aorichthys seenghala*, etc.
- Provides habitat and feeding facilities to the local wildlife and migratory fauna. This area used to be the home of Sarus cranes, Damsel cranes, Neelgai, Barking deer etc.
- The birds reported at this wetland include cormorants, king-fishers, large egret, spotbill duck, pintail, bar headed goose, tufted duck and many other ducks.

Major Threats:

This ecological zone is facing various threats of natural and demographic origins:

- **Pollution:** Inflow of nutrients from agriculture fields, sewage of villages and towns located in the upstream areas are a cause of concern.
- **Soil Erosion:** The surrounding areas are erosion prone shivalik hills.
- **Habitat Destruction:** Deforestation, grazing and forest fires are also serious cause of concern.
- **Weed infestation:** Profuse growth of terrestrial weeds like *Lantana camara* and *Parthenium hysterophorus* in the catchments is affecting soil properties and promote erosion of hilly catchments.

Fig. 14. A View of Nangal Wetland



2) NANGAL WETLAND

The Nangal dam has been constructed across the river Satluj, about 13 kilometres downstream of Bhakhra dam and it forms a 6 kilometre long artificial lake popularly called Nangal Lake (Fig. 14 & 15). It is located at 31.37° N latitude and 76.38° E longitude. This reservoir is used as a backup in case Bhakra dam fluctuates due to heavy rain by storing water of the Satluj river.

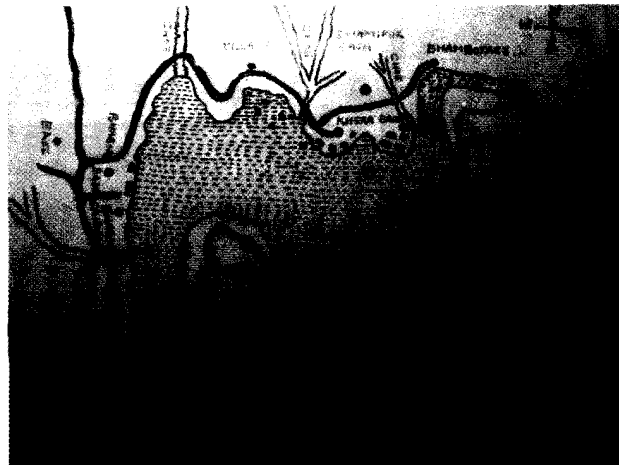
Nangal Wetland has been declared as a Wildlife Sanctuary in August 10, 2009. It was notified as protected forests by Punjab Government in 1964 and spreads over an area of 289.69 ha covering six villages of Tehsil Anandpur Sahib. The influx of birds, both local and migratory, in this border area of Punjab and Himachal Pradesh has been on the rise for the past many years. Besides the resident birds, including the red jungle fowl, large Indian parakeet, Indian cuckoo, bank myna, wood shrike, yellow-eyed babbler and the crested bunting, one can watch a large number of birds from far-off hills roosting and feeding in the area.

This sanctuary is an important habitat for some threatened species like the scaly anteater and python.

Importance:

- Nangal Lake is an important source of fresh water for Punjab, Haryana and Rajasthan.
- Provide habitat for migratory and resident birds, insects, reptiles, amphibians and water plants.
- People take holy bath during important days as Amavasya and Baisakhi.
- Worth visiting place for nature lovers, environmentalists, bird watchers, scientists and general public for educational and recreational purposes.

Fig. 15 Location Map of Nangal Dam



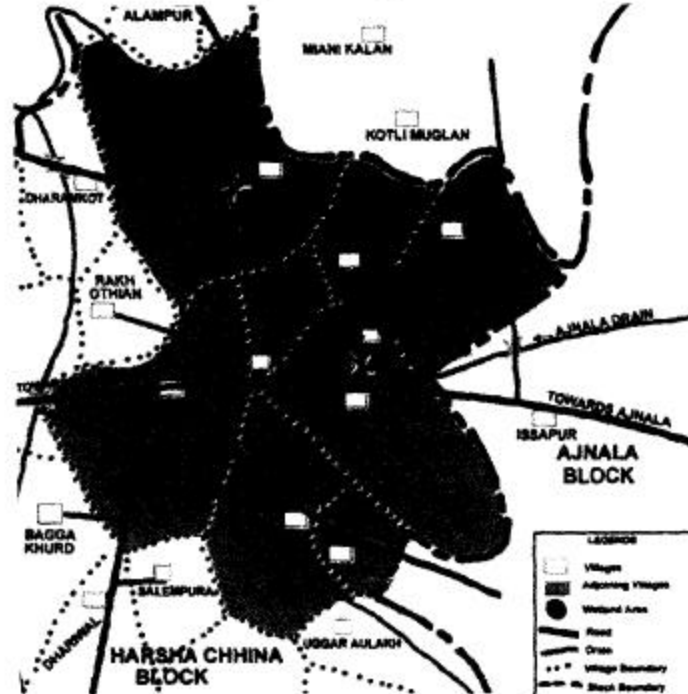
Major Threats:

- **Soil erosion:** Hills around Nangal Lake are prone to soil erosion due to sparse vegetative cover.
- **Agricultural activities:** A few agricultural fields are very close to lake. Agricultural runoff from fields is also contributing to water pollution.
- **Mining of sand and stones:** Mining of sand and stone boulders is causing further degradation of choe bed topography and overall ecosystem.
- **Grazing:** Grazing in the wetland area leading to soil erosion and habitat loss.
- **Weed infestation:** *Lantana* and *Parthenium* has invaded the natural vegetation as well as near by fields.
- **Illegal collection of wood/ forest resources:** Nearby inhabitants go to the forest to collect fire wood and they remove the large clones of *Saccharum* and *Arundo* grasses for fire and making roofs of houses.

Fig. 16. A View of Jastarwal Wetland



Fig. 17. Map showing Jastarwal Wetland



C) State Wetlands in Punjab

There are sixteen small wetlands in Punjab. Out of these, five wetlands namely Jastarwal Jheel, Kahnuwan Chhamb, Keshopur-Miani Jheel, Mand Bharthala and Dholbaha Reservoir have been designated as wetlands of State importance owing to their ecological importance. Further, Keshopur-Miani Jheel has also been declared as India's first community reserve. The summarized detail has been given in the Table 3.

Table 3. State Wetlands in Punjab

Name	District	Area (sq km)	Type of Wetland
Jastarwal Jheel	Amritsar	0.55	Natural
Kahnuwan Chhamb	Gurdaspur	1.28	Natural
Keshopur miani Jheel	Gurdaspur	4.08	Natural
Mand Bharthala	Nawanshahr (Shahid Bhagat Singh Nagar)	0.61	Natural
Dholbaha Resvior	Hoshiarpur	1.32	Man-made

1) JASTARWAL WETLAND

Jastarwal wetland is situated in the Block Harcha Chhina near Ajnala Township in the District Amritsar (Fig 16 & 17). It is located at 31°48' 19.3" N latitude and 74°42' 40.5" E longitude at an altitude of 208 msl and is spread over an area of 103 acres. This is a low-lying site near village Jastarwal.

This wetland lies along the flood plain of river Ravi. This area is locally called Bet Ravi. It stretches between the Ravi to the west and its tributary Sakki Nala to the east. Thus, it becomes a tract of the upper Bari Doab. The Ravi flood plain is a low lying and water logged tract due to flooding which is uneven at some places. It contains abandoned courses of the river, patches of marshy land and thickly growing grass. The existing soil is a light reddish-yellow loam, locally called as *maira*. There are no hills within the limits of this area and nothing of the nature of rock or stone has been observed. The formation is distinctly alluvial.

Importance:

- This wetland is very important from *lotus* cultivation point of view. *Nelumbium nucifera* is the main crop of this wetland and is grown for the vegetable locally called Bhae and Kaul Chapani.
- This wetland also serves as an important ground water recharging system during monsoon.

2) KAHNUWAN CHHAMB WETLAND

Kahnuwan Chhamb wetland is situated in District Gurdaspur (Fig. 18 & 19). It is located at 31°57' 08.2" N latitude and 075°26' 40.7" E longitude at an altitude of 234 msl and is spread over an area of 1000 acres. The Kahnuwan Chhamb is comparatively low lying and falls in the area of villages Kahnuwan, Dalla Goria, Mann, Chopra, Chhawarian Bangar, Kotli Sainia, Beri, Khushalpur, Badhai, Shee Bhatti, Ghorewah and Pherochechi. Kahnuwan wetland is a peatland wetland. Kahnuwan Chhamb is situated in the Bari Doab area between the Beas and Ravi rivers and presents the general features of Punjab plains. Earlier the Chhamb was spread over an area of 6916 acres. However, major part of this Chhamb has been reclaimed for agriculture.

Fig. 18. A View of Kahnuwan Wetland



Fig. 19. Location Map of Kahnuwan Wetland

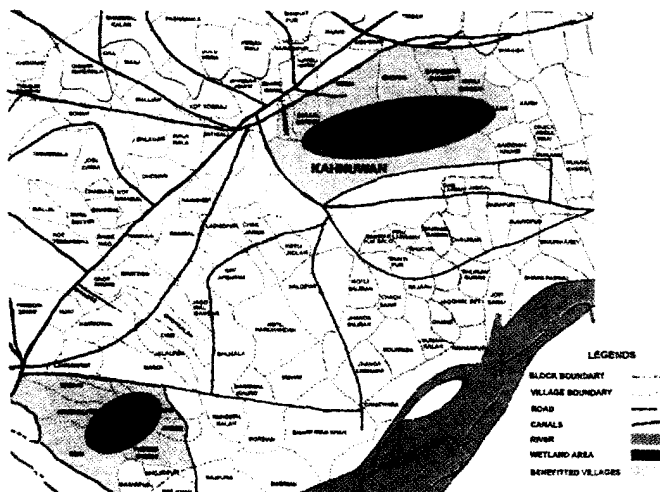


Fig 20. A View of Keshopur Miani

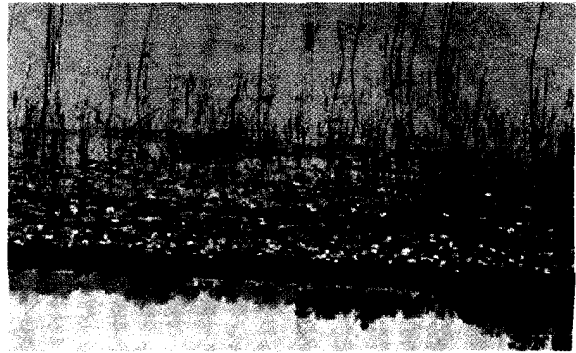
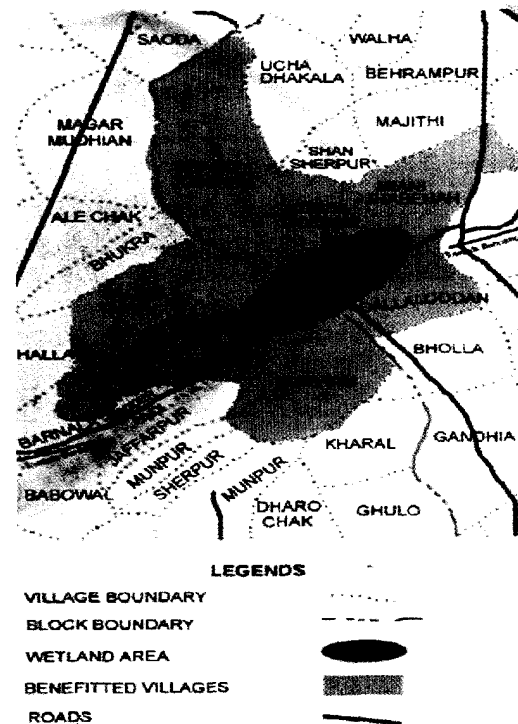


Fig. 21. Location Map of Keshopur Miani Wetland

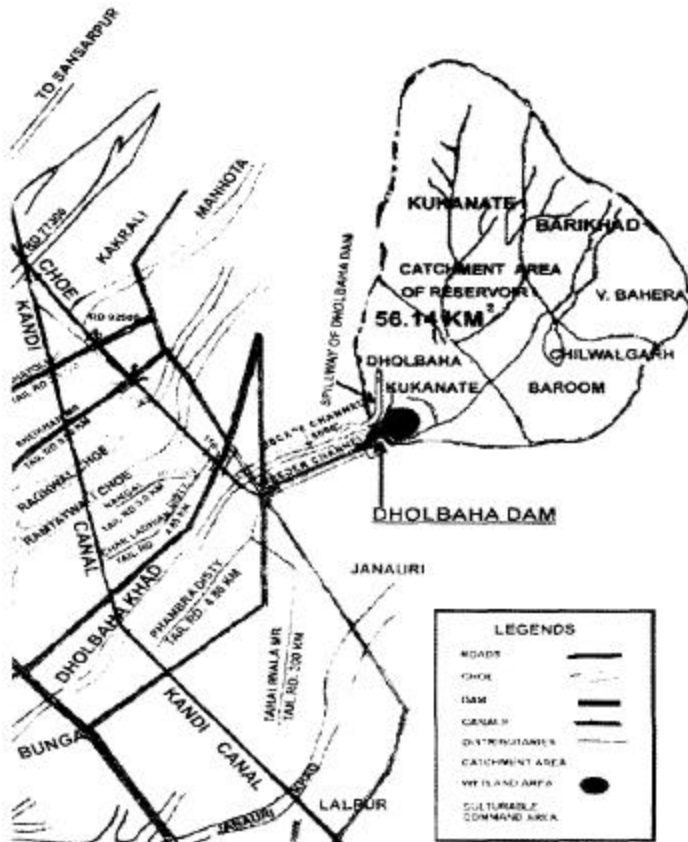


3) KESHOPUR MIANI WETLAND

Keshopur Chhamb is located in the area of villages Keshopur, Miani-Jhamela, Bhago Kawan, Sadhu Chakk, Barnala, Alechak & Magar Mudian of district Gurdaspur at 32°05' 16.3" N latitude and 75°24' 24.2" E longitude (Fig. 20 & 21). The area of Keshopur Chhamb falls under Bari Doab area between the Beas and Ravi rivers and presents the ordinary features of Punjab plains. The area of Keshopur Chhamb is comparatively low lying and situated at an elevation of 245m above sea level. Earlier the Chhamb was spread over an area of 692 ha. However, major part of this Chhamb has been reclaimed for agriculture. Most part of the Chhamb was panchayati land. Some area of the Chhamb has been developed as fish ponds of large and smaller sizes at different locations of the wetland.

dam has been constructed on Dholbaha choe downstream of confluence of Kukanete and Bahera Khads and is at a distance of about ½ km upstream of Dholbaha village. This flood control cum irrigation multipurpose project has been constructed with the World Bank under Kandi watershed and area Development Programme.

Fig. 25. Dholbaha Catchment Area and Irrigation Distribution System



Importance:

- Refugia for rare and endangered species like North Asiatic merlin, Barilius barna, B. vagra, Puntius conchoniuis, P. phutunio, P.ticto, etc.
- This wetland is a good source of fisheries and many people are involved in fishing activities.
- Forest products like fuel wood for domestic use, fodder for cattle and medicinal plants like Amla, Lasura, Harrar, Jamun, Katha, Neem, etc. are found in abundance.
- Due to assured sustenance irrigation, agricultural activities played a major role in the upliftment of the people of this area.

Major Threats to State Wetlands:

- **Encroachment:** Local people living around these wetlands have converted the land around wetland into farm land for growing traditional crops for getting more income.
- **Water pollution:** Pollution coming from agriculture runoff is a major threat to these wetlands.
- **Extraction of water:** The local farmers draw water from wetlands to irrigate their fields which is causing drying up of wetlands.
- **Soil erosion and Land reclamation:** Soil erosion is influenced by many ways in these wetlands areas like destruction of pasture lands, cutting of plants and reclaiming of land for agricultural purposes. Silt sedimentation has considerably reduced water holding capacity.

C) OTHER IDENTIFIED WETANDS IN PUNJAB

There are eight wetlands of other importance covering an area of 30.22 sq km and distributed over seven districts i.e. Amritsar, Mansa, Hoshiarpur, Kapurthala, Patiala, Sangrur and Ferozepur of Punjab State (Table 4).

Table 4. Other Identified Wetlands in Punjab

Name	District	Area (sq km)	Type of Wetland
Aliwal Kotli	Amritsar	0.10	Natural
Bareta	Mansa	0.20	Natural
Narayangarh Terkiana	Hoshiarpur	0.82	Natural
Sital Sagar	Hoshiarpur	20	Natural
Rababsar	Kapurthala	0.41	Natural
Lobana	Patiala	0.11	Natural
Lehal Kalan	Sangrur	0.20	Natural
Gobindgarh Khokhar	Sangrur	0.08	Natural
Hussalnawala Reservoir	Ferozepur	6.88	Man-made
Maili Dam	Hoshiarpur	0.72	Man-made
Mangrowal Dam	Hoshiarpur	0.70	Man-made
Total Area		30.22	

WETLAND CONSERVATION AND MANAGEMENT INITIATIVES IN PUNJAB:

Punjab State Council for Science & Technology is coordinating agency for implementation of National Wetland Conservation Programme of Ministry of Environment & Forests, Govt. in the State of Punjab with active involvement of various executing departments (Fig.26). The conservation initiatives undertaken are as follows:

I) Harike Wetland:

Conservation measures were initiated in Harike wetland in 1987-88. Activities taken up include survey and mapping, plantation (71.5ha), fencing (22845 rft), construction of mounds (192), shallow water ponds (15), demarcation pillars (200) and watch towers (2). 393 ha catchment area has been treated with vegetative structures, trenches, gully plugging, land terracing, etc. Soil conservation measures also include construction of earthen check dam (58 m long), earthen field bund (50km), earthen silt detention structures (5 no.), stream bank protection with vegetative structure (42 km), masonry drop structures (166 no.) & periphery bandh (14,373 m). Soil conservation work has been completed in 34 out of 54 ravines in immediate catchments. As reported by deptt. of soil conservation, silt inflow of about 30,000 metric ton (about 6" soil deposits) has been abated due to the soil conservation measures taken.

About 85 acre area has been improved and is being used for agriculture. Land value has increased substantially which resulted in socio-economic upliftment of farmers. Remote sensing studies have been done with the help of Punjab Remote Sensing Centre.

Water pollution is major problem which results in infestation by water hyacinth. The wetland has six Conveyor belt systems for mechanical removal of water hyacinth. Biological control of water hyacinth is being undertaken by IPRI using weevils. More than two lac weevils have been released at 13 locations in catchment drains. IPRI has also constructed glass house for multiplication and release of weevils during winter. Other activities include water quality monitoring, camps on promotion of organic farming, public awareness, wetland education centres in schools, awareness kiosks & hoardings, etc. Council and Forests Department are jointly promoting handicraft from water hyacinth as a livelihood activity by active involvement of an NGO.

II) Ropar Wetland:

Conservation measures were initiated in Ropar wetland in 1996-97. Activities taken up include-survey & mapping, plantation (80 ha) and fencing (12000 rft). Apart from this artificial nests (50 no.) have also been installed at strategic locations.

Department of Soil Conservation has treated 121 ha degraded catchments by constructing 11 silt detention earthen structure and 37 nos. loose stone structures to prevent soil from flowing into the lake. Other activities include water quality monitoring, remote sensing studies, camps on promotion of organic farming, public awareness, wetland education centres in schools, etc.

III) Kanjli Wetland:

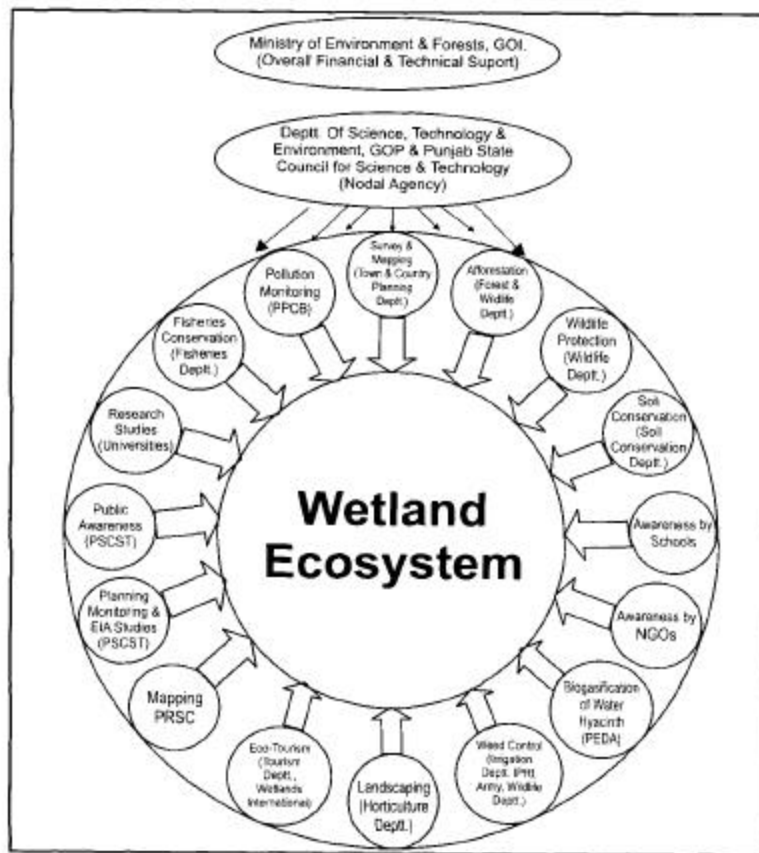
Conservation measures were initiated in Kanjli wetland in 1988-89. Activities taken up include- survey & mapping, plantation (39 ha) and fencing (17588 rft.).

Eutrophication is a major problem which resulted in growth of water hyacinth weed in some pockets of wetland. For manual and mechanical removal of water hyacinth, two conveyor belt systems, one motorboat, tractor & trolley have been procured. For biological control of water hyacinth, weevils (56,200 no.) have also been released at 7 locations in Kanjli Lake and Holy Bein. Other activities include water quality monitoring, remote sensing studies, camps on promotion of organic farming, public awareness/livelihood activities, wetland education centres in schools and renovation of interpretation centre, etc.

IV) Nangal Wetland:

Ministry of Environment & Forests, Govt. of India has included Nangal lake under national wetland conservation programme in 2008. Activities taken up include- pre-plantation operations (advanced work) for 100ha area, stream bank protection with vegetative measures (3700 rmt), signboards/signage depicting importance of Nangal wetland for community awareness, promoting organic farming in the catchments so as to reduce agro-chemical runoff into the wetland and setting up of awareness/interpretation centre at Nangal wetland

Fig. 26. Multi Disciplinary Approach for Conservation and Management of Wetlands in Punjab.



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