

Conservation and Management of Wetlands in Punjab : Challenges and Opportunities

N.S.Tiwana, Neelima Jerath, S.K.Saxena and Vivek Sharma

Punjab State Council for Science & Technology, Sector 26, Chandigarh-110019

e-mail: nstiwana@hotmail.com, neelimakj@yahoo.co.uk

ABSTRACT

The present paper primarily brings out major threats to Ramsar sites of Punjab (Harike, Kanjli & Ropar) and the conservation measures being taken for their sustainable management. These wetlands have major threats from siltation, agriculture runoff, water pollution and infestation of weeds. Harike is receiving silt from degraded ravines in the catchments and is infested with water hyacinth due to water pollution in the Sutlej. Ropar is also facing problem of siltation from denuded hills with loose bound soil in its immediate catchments whereas Kanjli is facing problem of agriculture runoff from the adjoining fields and infestation of water hyacinth. Various conservation measures are being taken up by Punjab State Council for Science & Technology, the nodal agency for wetlands conservation in Punjab through active involvement of concerned departments. Catchment Area Treatment is being taken up at Harike and Ropar wetlands by various measures such as plantation, silt detention structures, masonry drop structures, crate wire structures, brushwood structures, loose stone structures, field bunding, and vegetative hedges, etc. For control of water hyacinth, mechanical and biological methods using conveyer belt systems and release of weevils have been adopted. Public awareness is also an integrated part of the conservation plan. Now, to control menace of water hyacinth and generation of livelihood for local population, collaboration of KIDS society, Kottapuram (Kerala) is being sought to train local artisans for preparing handicraft items from water hyacinth and other weeds. In Punjab, recently two more wetlands (Inter State wetland Ranjit Sagar in district Gurdaspur and Nangal lake in distt. Ropar) have been included in National wetlands conservation plan of MEF,GOI. Efforts are also being made to conserve five state wetlands namely Dholbaha in district Hoshiarpur, Keshopur Miani & Kahnuwan in district Gurdaspur, Mand Bharthala in district Nawanshahr and Jastarwal in district Amritsar. Keshopur Miani has been notified as 'Community reserve' by Deptt. of Forests & wildlife so as to conserve the same through active participation of local community.

INTRODUCTION

Punjab has 12 natural and 9 manmade wetlands (Table 1 & 2). Three major wetlands namely Harike, Kanjli and Ropar have been recognized as wetlands of International significance (Ramsar sites). Harike wetland, situated at 31°13'N 075°12'E covering 4100 ha area was included in the list of Ramsar sites in 1990 and subsequently Ropar wetland, situated at 31°01'N 076°30'E covering 1365ha area & Kanjli wetland, situated at 31°25'N 075°22'E covering 183ha area were also added in

the Ramsar list during 2002. These wetlands are important aquatic ecosystems in nature and are the critical habitats for waterfowl, fish and other flora and fauna. Harike wetland located at the confluence of two major rivers Sutlej and Beas is one of the largest wetlands in North India and also an important Bird Sanctuary. This wetland is very important source of water supply for the state of Punjab and Rajasthan. Kanjli wetland near Kapurthala located on Kali Bein (rechristened as Holy Bein) is extremely important from socio-religious and ecotourism point of view. This Bein is associated with Sri Guru Nanak Dev Ji. Ropar wetland located in the lap of Shivalik foothills on river Sutlej is also very important source of water supply through state's one of the oldest Sirhind Canal System. It also has historical significance as Maharaja Ranjit Singh signed a treaty with Lord William Bentick to mark the political dynamics of the then Punjab.

These wetlands are inhabited by diversity of flora and fauna including some rare and threatened plants and animals..

The major threats looming on these wetlands include the following:

- Severe problems of siltation in the reservoir leading to shrinkage of wetland area.
- The disturbance to the resident and migratory birds, illegal fishing and poaching of wildlife.
- Accidental outflows of pollutants from industries located in the vicinity affects water quality of wetlands.
- Inflow of pesticides and fertilizers as run off from agricultural fields and sewage from towns also affects water quality of wetlands.
- Invasion and growth of weeds in the wetland area is also a cause of concern.
- Lack of peoples cooperation due to their ignorance about wetland values and functions.

Table 1: Natural wetlands of Punjab

Name	District	Area (sq km)
Jastarwal Jheel	Amritsar	0.55
Kahnuwan Chhamb	Gurdaspur	1.28
Keshopur – miani Jheel	Gurdaspur	4.08
Mand Bharthala	Hoshiarpur	0.61
Aliwal Kotli	Amritsar	0.10
Bareta	Mansa	0.20
Narayangarh - Terkiana	Hoshiarpur	0.82
Sital Sagar	Hoshiarpur	20
Rababsar	Kapurthala	0.41
Lobana	Patiala	0.11
Lehal Kalan	Sangrur	0.20
Gobindgarh Khokhar	Sangrur	0.08

Table 2 : Manmade wetlands of Punjab

Name	District	Area (sq km)
Harike	Tarn Taran, Ferozepur & Kapurthala	41
Kanjli	Kapurthala	1.83
Ropar	Ropar	13.65
Ranjit Sagar (interstate wetland falling in Punjab, Himachal and J&K)	Gurdaspur	87
Hussainiwala Reservoir	Ferozepur	6.88
Nangal Lake	Ropar	4.0
Maili Dam	Hoshiarpur	0.72
Mangrowal Dam	Hoshiarpur	0.70
Dholbaha Dam	Hoshiarpur	1.32

The most serious problem to Harike and Ropar wetlands is siltation due to erosion from highly degraded catchment areas. Ecology of Harike is also threatened due to excessive growth of exotic weed – water hyacinth. Punjab State Council for Science & Technology, being nodal agency had initiated site-specific conservation and management programmes at Harike, Kanjli and Ropar wetlands in Punjab involving state executing departments. Ministry of Environment & Forests, Govt. of India is providing financial assistance for implementation of conservation programmes. At Harike Wetland, conservation programmes were initiated in 1987-88, at Kanjli in 1988-89 and at Ropar in 1996-97. Programmes being taken include afforestation of native tree species for habitat improvement, soil conservation to prevent siltation, conservation of wildlife and fisheries, weed control, water quality monitoring and public awareness at respective wetlands.

Two other wetlands subsequently were declared as National wetlands including Ranjit Sagar wetland located on river Ravi spread over in three states (Punjab, Himachal Pradesh and J&K) and Nangal lake in 2008.

Harike wetland (figure- 1) is a very important abode for the birds migrating from across the international frontiers. The wetland area is spread over in about 41 sq km. It supports more than 400 species of avifauna. It has, therefore, been notified by the Govt. of Punjab as Bird Sanctuary. The Wigeon, Common Teal, Pintail, Shoveller and Brahminy Ducks are commonly seen during winter season. Other birds such as Scape Duck, Falcated Teal, Whiteheaded Stiff-tailed Duck, Greylag Goose, Bar-headed Goose and Common Crane are regular winter visitors. The mammals found at Harike wetland include the smooth Indian otter, the jungle cat,

i) Harike wetland:



Fig. 1 : Harike Wetland

jackal, Indian wild boar and common mongoose. The reptiles found in this wetland include 7 species of turtle belonging to 6 genera. Trees such as *Acacia*, *Dalbergia*, *Prosopis*, etc usually found growing on elevated or occasionally flooded parts of the landscape. This wetland is, however, getting silted up as vast areas along the right side of river Beas falling under villages Chamba Kallan, Kamboh Dhaiwala, Kirrian and Harike. Vast area is seriously degraded with deep cuts due to formation of ravines over the years. Erosion in this area transfers heavy load of silt into Harike wetland. Consequently the storage capacity of Harike Lake has drastically reduced. Erosion from the immediate and far-off catchment areas, which is undulating, degraded and highly erosion prone is one of the major threats to Harike Wetland. Point sources of pollution are Buddha Nallah and East Bein. Eutrophication in the wetland has resulted infestation of water hyacinth in heavy amount and resulting in the choking of waterways. It is reported that there are 60 species of fish in Harike wetland.

CONSERVATION MEASURES

Survey of the wetland area has been taken up. The wetland area is spread over in about 41 sq km. Of this, 2269 acres are upland and 6904 acres are under water. Out of upland area, 853 acres area is marshy and 1416 acres are covered with a variety of plants. There are 31 villages in the wetland zone. To check the soil erosion, so far 723 ha area has been treated with vegetative structures, trenches, gully plugging, earthen/brushwood check dam, land terracing, etc. including 5 silt detention structures, 58 m long earthen check dam, 140 masonry drop structures

(figure- 2) & 14,373 m periphery bandh. Plantation has been done in 50 ha area of Harike Ecological Zone. Mainly native tree species have been planted as it helps in habitat improvement and ecological sustainability. 22845 rft fence and 200 demarcation pillars has been erected at strategic pockets of wetland to protect the area from excessive grazing and encroachment. Water quality mostly conforms to Class 'A' and 'B' but deteriorates to 'D' in June. Conveyor belt system (figure- 3) has been developed for mechanical removal of water hyacinth. Efforts are also being made to control water hyacinth biologically. So far more than 2 lac weevils (figure- 4) released at 22 locations in catchment drains. Fish seed ponds near Amritsar have been renovated to release fingerlings in wetland areas. Recently Govt. of Punjab has initiated a project "Cleaning of Buddha Nullah" involving Council which will reduce pollutants level considerably in Harike wetland. Various conservation measures taken up in the wetland have been shown in figure-5.



Fig. 2 : Masonary Drop Structure



Fig. 3 : Conveyor Belt System

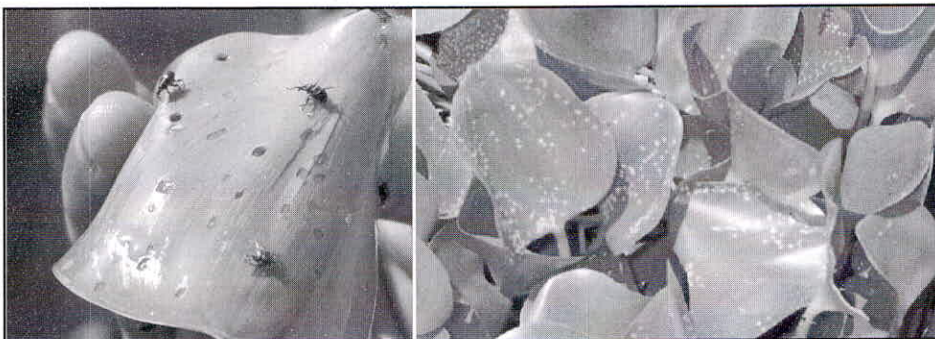


Fig. 4 : Biological control of water hyacinth

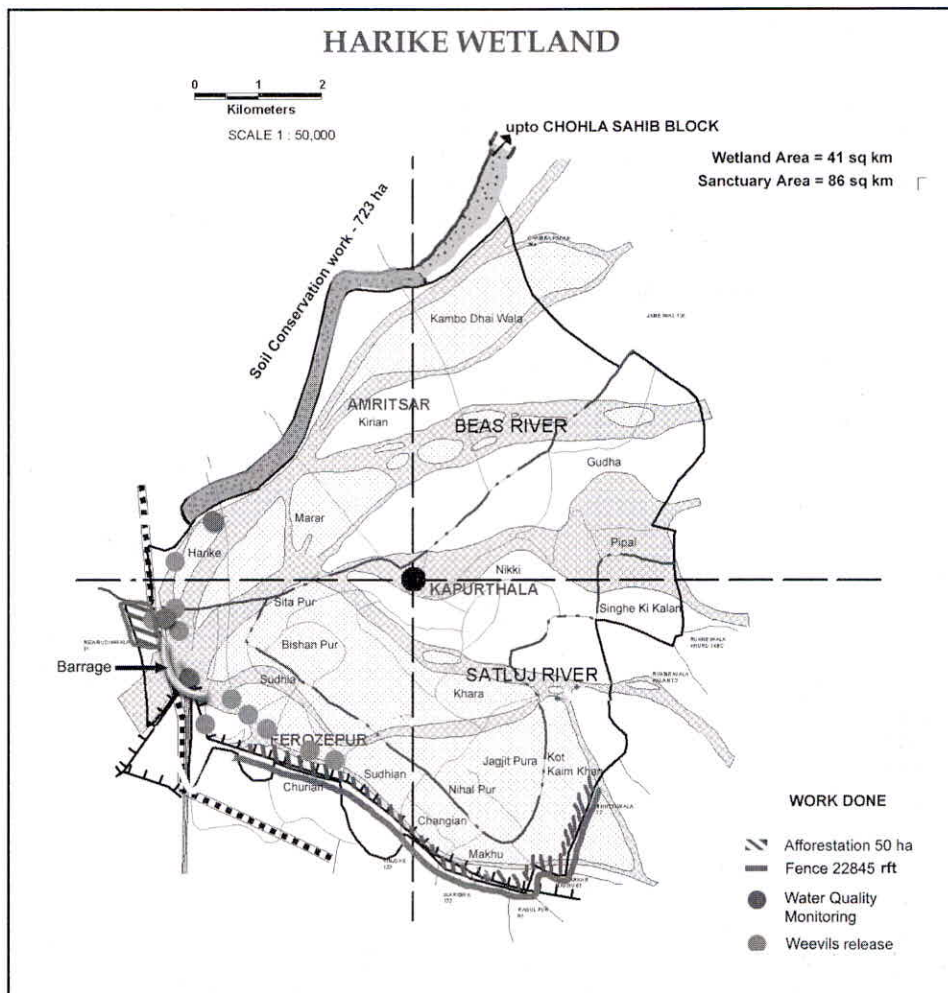


Fig. 5 : Conservation measures at Harike wetland

ii) Ropar wetland

Ropar wetland (figure- 6) came into formation in the year 1882 with the construction of a small head works. The area surrounding Ropar wetland is hilly in the north west and plain in the south and south east. The surrounding area is mostly under private occupation and is cultivated. Agricultural crops like wheat, rice, sugarcane, sorghum, etc are grown in the farm lands.

The adjoining hills are sparsely covered with plants and are exposed to intensive grazing. Small streams and choes that empty into Ropar wetland are very important from ecological point of view. Since this wetland is located right by the side of badly damaged and absolutely eroded Shivalik foothills, a large amount of silt and nutrients gets transported into the wetland every year. The excessive siltation is not only



Fig. 6 : Ropar Wetland

reducing the capacity of the lake to hold water but also is damaging its ecology. 55 species of fish and 318 species of birds have been reported from this area. Scaly anteater, Sambar and Hog deer included in the Schedule-I of the Wildlife (Protection) Act, 1972 are present in this area. Migratory birds such as Rudy Shelduck, Northern Pintail, Common Teal, Mallard, Gadwall, Eurasian Wigeon, Northern Shoveler, Pochards (Red Crested, Common and Tufted) use the reservoir as their winter home. Plants *Acacia*, *Dalbergia*, *Delonix*, *Salix*, *Syzgium*, *Zizyphus*, *Ipomoea*, *Cyprus*, etc. and medicinal plants like *Withania somnifera*, *Adhatoda vesica*, *Boerhavia diffusa*, etc. commonly occur in this area.

Conservation measures

Survey of the wetland area has been taken up. Out of 1365 ha area of Ropar wetland about 800 ha area is under river and reservoir. About 30 ha area is under woodland called "Sadabarat forest". There are 12 villages adjoining this wetland. Degraded catchments of 329 ha have been treated with construction of nine silt detention earthen structure (figure- 7) and 37 nos. loose stone structures to prevent silt inflow into the lake. Afforestation has been done in about 80 ha area in Garbagha, Katli, Khwaspura, Sadabart and Dargashah. 12000 rft barbed wire and chain-link fencing has been done to protect certain strategic areas of the wetland which are rich in wildlife. Water quality varies from Class 'A' to 'D' at different locations during different seasons. Nutrient contribution is from agriculture runoffs, sewage of Anandpur Sahib & Kiratpur Sahib towns and effluents from Nangal. Various conservation measures taken up in the wetland have been shown in figure- 8.



Fig. 7 : Silt detention earthen structure

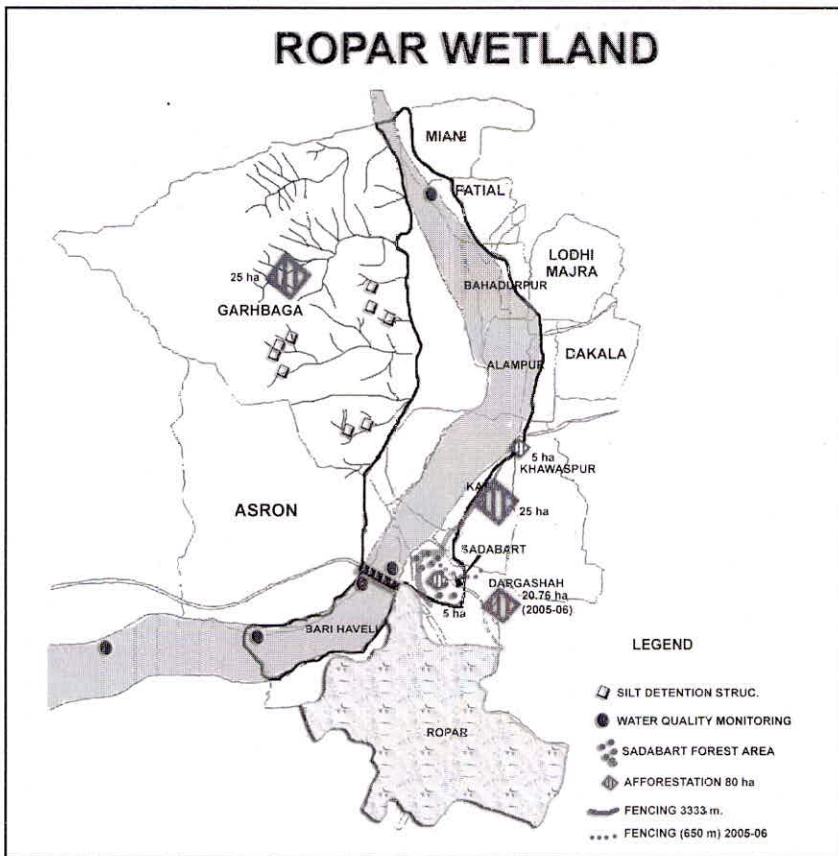


Fig. 8 : Conservation measures at Ropar wetland

iii) Kanjli wetland

Kanjli wetland (figure- 9) located near Kapurthala on Kali Bein is extremely important for its hydro-ecological and socio-religious values. It extends from National Highway No. 1 (Grand Trunk Road) bridge at Subhanpur upto Kanjli Head Regulator on Kapurthala-Subhanpur Road covering an area of 183 ha. The area is spread over 12 villages. Being a part of rivulet Kali Bein it has unique socio religious importance. As the major area is under agriculture, excessive inflow of agro chemicals leads to eutrophication problem in the wetland. 4 mammals, 90 species of birds, 35 species of fish have been reported in the area.



Fig. 9 : Kanjli Wetland

Migratory birds such as Great Crested Grebe, Brahminy, Pintail, Common Teal, Mallard, Gadwall, Wigeon, Blue Winged Teal, Shoveller, Redcrested Pochard and Common Pochard visit this wetland during winter. Plants *Acacia*, *Albezzia*, *Azadirachta*, *Dalbergia*, *Delonix*, *Salix*, *Zizyphus*, etc. commonly occur in the area. Aquatic plants include *Hydrilla*, *Vallisneria*, *Potamogeton*, *Phragmites* and insectivorous plant *Utricularia* (figure- 10). Polluting sources are sewage from Towns – Tanda Urmur, Bhulath, etc. adding coliform to the Bein water. Due to pollutants from point as well as non-point sources the wetland is suffering from eutrophication. Water hyacinth (an exotic aquatic weed) is harming the ecosystem by way of choking the waterways, exerting adverse impact on aquatic flora and fauna including detraction of migratory birds.

CONSERVATION MEASURES

Survey of wetland area has been taken up. Entire area surrounding Kanjli wetland is privately owned and is under agriculture. About 17588 rft fence has been erected

at strategic pockets of wetland to protect the area from excessive grazing and encroachment. Afforestation has been done in about 39 ha area along the kachcha bandh and near Kanjli barrage. Water quality conforms to Class 'B' but deteriorates to 'D' during certain months when inflow of water decreases considerably. Eutrophication in the wetland has resulted in infestation of water hyacinth. Two conveyor belt system, one motorboat, tractor & trolley in use for manual and mechanical removal. Efforts are also being made to control water hyacinth biologically. So far 26,700 weevils released at 7 locations in the Kanjli Lake and Kali (Holy)Bein. To reduce infestation of water hyacinth weed in the wetland, inflow of water was enhanced to 200 cusecs from Mukerian Hydrel Channel through siphon action which is further being increased to 500 cusecs. Facilities at Fish Seed Farm at Bir Shikargah, Kapurthala have been strengthened to produce fish seed in 40 tanks (hatchery/rearing/ stocking, etc.) for release in wetland areas. An environmental library has also been set up at Kanjli Lake for education of general public. Various conservation measures taken up in the wetland have been shown in figure- 11.



Figure- 10 : Utricularia (Insectivorous Plants)

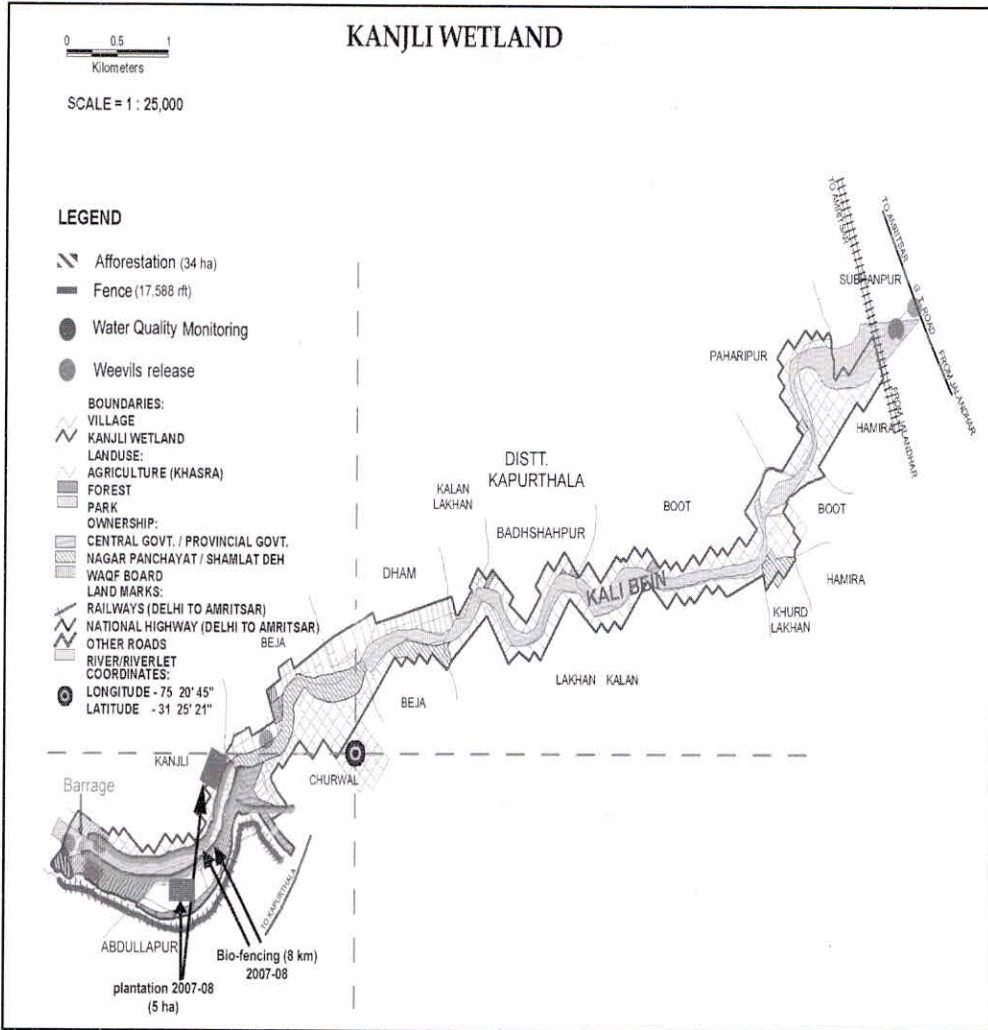


Fig. 11 : Conservation measures at Kanjli wetland

Restoration of Ecology of Kali Bein

Kanjli is part of Sacred Kali Bein which is known to be associated with Guru Nanak. Due to inflow of sewage/sullage water from neighbouring towns and villages and runoff from agricultural fields, laden with chemical fertilizers and pesticides, the Bein was losing its pristine ecology. Excessive growth of water hyacinth and other aquatic weeds was affecting ecology & environment of Kanjli wetland adversely. On persuasion of Council, Govt. of Punjab took a bold initiative in June, 06 to restore ecology of Kali Bein (rechristened as Holy Bein). with the active help of Govt. departments and people's participation through Seechewal Trust. Salient features of the project are as follows:

- Under the project, waste water falling into the Bein from villages and urban areas has been stopped and diverted for irrigation purpose after treatment. In each village two sets of ponds are being constructed for holding/treatment of sullage and storm water separately. The villages will be provided underground sewerage.
- Similarly sullage waters falling into the Bein from 7 towns namely Kapurthala, Sultanpur Lodhi, Bhulath, Begowal, Dasuya, Tanda Urmur and Mukerian has also been stopped from entering into Bein. Sewage treatment plants have been set up at Kapurthala and Sultanpur lodhi and efforts are on for rest of towns.
- The capacity of barrage is being enhanced for releasing 500 cusecs of water from Mukerian Hydel Channel (the existing capacity 200 cusecs).
- The Forest Deptt. is working towards providing bio-fence/life giving margins comprising trees, shrubs, grasses on 30 mtr. width, on both sides of Kali Bein.
- Farmers are being persuaded to take up plantation of fruit and medicinal plants and organic farming in the entire catchment. Nurseries are also being set up for supply of fruit tree, medicinal plants to the farmers and vetiver grass for its use in treatment of sullage water and biofencing. Five additional lakes/wetlands are planned to be developed along the Bein to harness eco-religious tourism potential.

It is a unique example of Eco-restoration by Govt agencies in partnership with local people.

CONSERVATION OF OTHER WETLANDS

Ranjit Sagar Wetland

Ministry of Environment & Forests, Govt. of India has included Ranjit Sagar under national wetland conservation programme in 2006. Ranjit Sagar Dam 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. It is spread over an area of 87.60 sq km. falling in three states of Punjab, Himachal Pradesh and J&K. Benefits of this reservoir include flood control, assured irrigation water supply and hydroelectricity generation. The major threats to this wetland are siltation from catchment area (hilly slopes), water pollution from discharge of sullage, sewage and industrial effluents from adjacent villages/towns. The three states are preparing joint action plan for conservation of this wetland.

Nangal wetland

Nangal reservoir came up as a major hydroelectric project in 1961 by constructing barrage over river Sutlej at Nangal for providing irrigation water to the distant areas which include parts of Punjab & Haryana and to produce electricity. It is spread over an area of 400 ha. In 2008, it has been included under national wetland conservation programme of MEF, GOI. The major threats to the wetland are silt depositions due to erosion of denuded hills in the immediate and upper catchments during rains and water

pollution from agriculture runoffs & wastes from cremation ground. It is an important bird habitat and adequate public awareness need to be created for conservation of biodiversity in the area.

State wetlands

There are five wetlands designated as wetlands of State importance owing to their ecological importance namely Keshopur-Miani Jheel, Kahnuwan Chhamb, Jastarwal Jheel, Mand Bharthala and Dholbaha Reservoir.

The major threats to these wetlands are :-

- Lack of public awareness towards their responsibility for conservation of these ecosystems.
- Encroachments of wetland area.
- Drainage of wetlands for irrigation.
- Indiscriminate discharge of domestic and industrial effluents and intensive use of agro chemicals severely affecting the wetland flora and fauna.
- Deteriorating water quality
- Siltation of wetlands due to erosion caused by loss of vegetative cover particularly around Dholbaha.

Efforts are being made to conserve these wetlands with financial assistance of state govt. and involving NGOs and general public. Keshopur-Miani has been declared as community reserve by deptt. of Forests & Wildlife in 2007. Council has published booklets on important features of these wetlands for public awareness.

Public awareness on Wetlands

For education and awareness, 6 books -Plants of Harike wetland- a field guide, Fish biodiversity in wetlands of Punjab, Punjab vich jalgaah di sambhal, Harike Lake, Ropar Wetland and Kanjli wetland have been published. To sensitize general public, World wetland day (figure- 12) is celebrated every year and awareness programmes are held with the help of local NGOs and schools. Council has also published booklets on important features of state wetlands for public awareness.

The Council also implemented the UNDP-GEF project on wetlands for creating public awareness on the importance of wetlands and need for their conservation. Under the project, Council organized nine training programmes for capacity building of NGOs and teachers. These institutions were also provided financial assistance for organizing 54 public awareness camps in villages adjoining Harike, Kanjli and Ropar wetlands for creating mass awareness. A CD on importance of wetlands in Punjab has also been prepared which is being used by NGOs & schools for educating general public and students.

In addition to above activities, some selected NGOs working at grass roots level,

especially in the villages adjoining wetlands were also provided financial and technical help to initiate following community action programs (figure- 13, 14, 15)

Model wetlands in schools

- Plant Biodiversity Corner
- Promotion of Organic Farming
- Making handmade paper from water hyacinth and other weeds.

Village resource mapping and biodiversity registers.



Fig. 12: World Wetlands Day celebrations



Fig. 13 : Handmade paper from water hyacinth



Fig. 14 : School Wetland

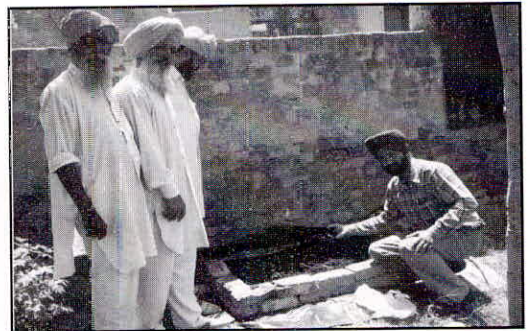


Fig. 15 : Vermicomposting

Efforts are being made to strengthen local NGOs to take up action programs having livelihood benefits for the local community through utilization of water hyacinth and other bio mass for preparation of handicraft items/handbags with the help of KIDS, Kottapuram, Kerala.

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