

CONSERVATION MEASURES TAKEN

The Ministry of Environment & Forests, Govt. of India (MoEF, GOI) selected Harike Wetland and Kanjli Wetlands for conservation and management. Subsequently, a State Level Steering Committee was constituted in 1987 to identify the problems of the area and initiate remedial measures. This Committee designated the Environment Division of Punjab State Council for Science & Technology for coordinating and implementing the Wetland Projects. The conservation and management measures so far taken at Kanjli Wetland with the assistance of MoEF, GOI are described as under:-

1. Survey, Mapping and Notification:

A detailed survey of Kanjli Wetland has been carried out and draft map as well as draft notification have been prepared by the Town & Country Planning Department. Draft notification has been submitted to the MoEF, GOI for issuing notification of this wetland as it is important that the Kanjli Wetland be notified as protected area under the Environment Protection Act, 1986.

2. Weed Control:

Water hyacinth is a major problem at Kanjli Wetlands and control of this weed needs to be taken up on priority basis. Excess of weed is seen to cover the entire water surface thus depriving the avian fauna of the very fact, which attracts them to these wetlands - a plentiful water availability. Besides, excessive transpiration by the plant also leads to enhanced water losses. However, this plant is also recognized as a water purifier due to its ability to absorb heavy metals from the water bodies. At the same time, its death and decay within the wetland can lead to re-entry of these chemicals in water further leading to eutrophication.

Excessive growth of water hyacinth in the West Bein and surrounding ponds thus pose a major ecological problem. Since the chemical method of weed removal is not desirable, manual method of weed control has been adopted. The experience of manual removal of this weed has, however, shown that plants reappear after every 3 to 4 months. Hence, weed clearance is required about 3 times in a year. Physical stoppage of this weed upstream of the main lake area has also not helped in bringing this weed under control. Efforts to gainfully utilise this weed for biogas generation also could not provide encouraging outcome. The weed control measures have been carried out by the Irrigation Department and district administration. District Police has also helped for cleaning the lake of this weed at times. During 2000-2001, Army cleared some part of the lake. Now it is planned to use conveyor belt system as a mechanical way to clear this weed.

3. Afforestation:

The wetlands of Punjab are perhaps not the perfect avian paradise though they attract large species of birds. There are perhaps not too many trees for birds to operate from. A good tree cover not only provides adequate space for nesting and roosting and food for some bird species but it also acts as lungs of the ecosystem. Further, it promotes understorey vegetation and helps in preventing siltation since roots of plants act as effective soil binders. Trees need to be grown not only around the ponded area but also on the small islands. Till date about 26 hec. area in Kanjli Wetland has been afforested with mixed indigenous species by the Forest Department. Work needs to be continued for plantation in both wetland zone as well as catchment areas to increase the tree cover.

4. Fencing:

The wetlands need to be protected from excessive grazing by cattle and encroachment by public for the preservation of important pockets providing habitat to wading birds. Encroachments need to be checked by the District Administration and unauthorised occupations removed. Till date 10880 Ln.Ft. fence has been erected around the Kanjli Wetland area by the Deptt. of Forests & Wildlife. It may be pointed out that the purpose of this fencing is not only to protect young plants but also to demarcate habitat for wading birds.

5. Monitoring of Pollution:

The external loading of nutrients is a decisive factor for determining the productivity of lake water. Overloading of lakes by nutrients can lead to eutrophication. For the restoration of wetland quality, preventive and curative steps are required to be undertaken. Hence, monitoring of water quality is an important activity because polluted water from some towns and industries enters into the Kali Bein. Besides, non-point pollution of farm chemicals from the catchment areas is another problem. The Punjab Pollution Control Board has already undertaken monitoring of water quality of Kanjli Wetland during 1991-92, 1992-93 and 1996-97 which shows that the water of this wetland generally conforms to class "B" as per designated best use. It however deteriorates to Class 'D' during December.

PPCB has recommended the following measures :

- i) Intensive afforestation activity is required to prevent the seepage and runoffs from the nearby field. A rich tree cover besides, acting as lungs of the ecosystem will provide adequate space for nesting of some birds species too.
- ii) Weed clearing, manually or by dredging, is frequently required.

- iii) Steps should be taken to prevent the people from making the lake a dumping site.
- iii) proper level of water must be maintained in the reservoir to save the biotic life of the lake in acute summers.
- iv) Deforestation should be strictly prohibited (in catchment along the Kali Bein).
- v) The villages along Kali Bein feeding Kanjli lake must not discharge their sullage into the Kali Bein. The Village Panchayats may use Karnal Technology for use of sullage for irrigation purposes.
- vi) The farmers be educated to use least amounts of fertilizers and pesticides and as far as possible switch over to bio-fertilizers and bio-pesticides.

The extent of water hyacinth in the lake is an indicator that eutrophication has increased over the years especially due to use of farm chemicals in the nearby fields.

What is needed now in view of recommendations of the Board is to continue the detailed study of the cause and extent of pollution in the river water feeding the lakes and plugging the factors responsible for deterioration of water quality.

6. Public Awareness :

The Council has been carrying out public awareness activity by involving NGOs and other departments. Posters, pamphlets and other information material have been published and distributed and educational hoardings have been installed at site. Seminars and meetings are organised from time to time.

**CONSERVATION MEASURES PROPOSED BUT NOT
YET IMPLEMENTED**

The values of wetlands in landscape and their benefits for human kind are increasingly recognized yet economic development continues to destroy or degrade wetland systems. It is accepted that wetlands are functioning in a larger ecological entity. Their management and conservation programmes must, therefore, address to the entire system processes functioning in the landscape as a whole to ensure maintaining the sustainability. Various factors has to be taken into account for both short and long term measures to prevent any further loss and improve their ecological character. A truly holistic approach needs to be implemented after optimising all the system qualities. Efforts to conserve Kanjli Wetland, which is one of national wetlands, have been continuing for the last few years. It is, however, observed that intensive efforts need to be made to restore the ecological character of this wetland. PSCST, therefore, proposes to continue conservation measures at Kanjli Wetland in coordination with various executing departments in the State. Details of all the activities are given below:

1. Afforestation :

Tree cover in wetland area provides suitable microhabitats for diversity of fauna. Besides, the spawning of fish takes place preferably under the shade of trees in aquatic ecosystem. However, the status of tree cover in wetland area is dwindling. Thus efforts are needed to balance the ecosystem by providing more greenery by way of planting diverse kinds of native trees like species of *Acacia*, *Terminalia*, *Syzygium*, *Salix*, *Pongamia*, *Morus*, *Azadirachta*, *Casuarina*, *Delonix*, etc. To extend the area under green cover around the Kanjli Wetland, the Deptt. of Forest and Wildlife, Punjab plans to take up plantation in another 10 hectare area during next five years at a cost of Rs. 7.00 lac.

2. Wildlife Conservation :

Wetlands are the important repositories of the diversity of wild genetic resources extremely important from long-term ecological point of view. But as the wetlands are shrinking the biological resources are also under stress. The wildlife at Kanjli Wetland is also suffering loss due to one reason or the other. To conserve wildlife resources the Wildlife Deptt., Punjab proposes to take up conservation measures like protection of the area by repairing damaged fence already erected around the wetland and by erecting barriers. Besides, the Deptt. plans to put up some wooden nests to facilitate the multiplication of birds. To avoid disturbance to the wildlife it is also planned to put up wooden hideouts for the explorers of nature/wetland. These activities shall require an assistance to the tune of Rs. 6.35 lac.

Recent experiments in some western countries shows that landing of some important birds in wetlands also depends upon the clues and signatures supporting the occurrence of some related birds in that habitat. Since the birds are important ecological components of any ecosystem the results of such experiments may help in artificially encouraging the landing of birds. Punjab State Council for Science & Technology, therefore, proposes to install suitable number of plastic birds initially at Ropar and Kanjli Wetland marshes. For this purpose Rs. 1,00,000/- will be required.

3. Control and Management of Water Hyacinth

Kanjli Wetland is infested with the worlds worst weed i.e. water hyacinth. So far the manual operations have been adopted to bring this weed under control. However, the lake get reinfested with this weed within no time. To safeguard the ecological character of this ecosystem it is planned to take up integrated measures of both physical removal by using conveyor belt mechanical system and control through biological means. The aim of this activity is to establish sustainable long term capacity for maintaining control of water hyacinth. The control programme would rely on manual method for rapid short term control in restricted areas, and biological agents for long term control. The biological control programme would initially rely on release of two weevil species that have been found effective world wide and have already been imported, reared and released in Harike Ecosystem. These species of weevils are *Neochetina bruchi* and *N. eichorniae* which are complimentary in their action. The possibility would also be explored for supplementing the weevils later by releases of moth *Sameodes albiquittalis* if found appropriate. At present no funding estimates are indicated under this project separately as the Comprehensive Proposal for control of water hyacinth from catchment drains of Harike Wetland have already been included under Harike Wetland project. However, to take up physical removal of weed from Kanjli ecosystem area an amount of Rs. 9.50 lacs shall be required for five years.

4. Water Quality Monitoring :

Punjab Pollution Control Board has studied the water and sludge quality of Kanjli Wetland area and has reported that water of this lake generally conforms to Class 'B'. But the quality degrades even to Class 'D' sometimes. Recommendation of the studies have been included in previous pages. One of the important recommendations is to keep vigil on the level of pollution for which the regular monitoring of the lake water must be continued. This shall help to elucidate the nature and dynamics of the lake ecosystem on long term basis. PPCB proposes to continue the water quality monitoring programme during the next five years for which an estimated amount of Rs. 16.00 lacs shall be required.

5. Conservation of Fisheries :

The importance of wetlands has also been linked to the productivity of fish species. Besides, the diversity of fish available in particular ecosystem determines the ecological status and functional values of that particular ecosystem. While the reports shows that their are 17 species of fish existing in the lake water of Kanjli but the degrading water quality may exterminate most or even all of these species in the times to come if curative measures are not initiated. Therefore, a programme aiming at restoring and sustaining the survival of all the species available in this lake has been planned. The programme would address the continuing pressure by introducing more fish species in the lake but would do so by avoiding the unforeseen effects of exotic introductions. With this view the Deptt. of Fisheries would take up necessary steps at Kanjli Wetland for which estimated amount of Rs. 24.95 lacs shall be required.

5. Research Studies :

This programme aims to provide information on the ecology of the lake and its catchment, the biology of its flora and fauna, the impact of environmental factors on the lake system and socio-economic implications of the use of lakes resources. Research programmes oriented in this direction shall contribute towards improved ecological efficiency, greater biodiversity, and ecological balance in the lake system. To analyse the biotic components, foodchain sequence in our wetlands and potential threats to these places and their components, and to make long-term conservation strategies, the research studies on aquatic ecosystems of Punjab are being promoted by the State Science & Technology Department. Certain future programmes for wetland conservation will definitely depend upon the research database. Studies on biodiversity of this wetland and limnological parameters besides habitat characteristics and economic valuation of Kanjli Wetland resources are priority areas of research as are described hereunder:-

- a) Hydrology & productivity: Detailed studies need to be carried out to study the impact of this wetland on hydrogeology of the area. Economic productivity linked with this issue needs to be evaluated and projected.
- b) Fisheries & sustainable use of wild life Population: Due to heavy pressure on the wetland areas on account of various factors like encroachment for agriculture, pollution, etc. the impact on faunal populations is catastrophic. It is clear that unless solid argument based on hard scientific data is presented for maintenance of these sites, this effort is likely to continue. Hence the need of investigation in this area. The fisheries research programme would have five sub-programmes: Studies of fish biology and biodiversity conservation, aquaculture, socio-economics, database establishment and fish stock assessment.

- c) Traditional human use : Wetland conservation practices can be successful only if its social impact is conducive to its use by the people inhabiting around that ecosystem. It is, therefore, important that social impact analysis of developmental versus conservation projects be carried out alongwith environmental impact analysis of various human activities initiated in the wetland area.
- d) Flora & Fauna : Detailed taxonomic studies of plant and animal species of this wetland need to be carried out. This will also help to identify the endemic species, if any, of this region which will invite particular attention for conservation.

A corpus amount of Rs. 10.00 lac for five years will be required for conducting these studies. The research projects can be initiated depending upon the availability of funds.

7. Economic Valuation of Wetland Resources :

Wetlands are as yet least understood or even misunderstood ecosystems from the productivity values and functional points of view in the State. These are being quickly reclaimed under the name of reformation. Both manmade and natural wetland places in Punjab are under severe threats. Although Harike Wetland has been listed as one of the six Indian Ramsar sites of international significance and Kanjli and Ropar Wetlands are of national significance and PSCST has also recognized five more wetlands of state importance, still environmental deterioration of wetlands is on the peak. This has been despite all concerted efforts of the state and union government for their conservation and management to ensure their sustainability so that the Society can derive wide-range benefits from them. Since the environment is simply incomplete without wetlands which provide livelihood on diverse counts, it is extremely essential to understand the role of wetlands in general and each of its components in particular, their ecological functions and values not wetlands as units but in respect of their contributions to agriculture, forestry, recreation etc. for effective integration of such understanding into the overall planning process.

A three-stage wetland valuation approach may be generally applied to completely understand the exact role and values of any wetland. These three steps for evaluation of wetland resources and sustainable development may be described as 'General, Ecological and Economic Analysis', 'Detailed Parameter Analysis' and 'Specialised Issue Analysis' of each wetland ecosystem. Functional values of wetland ecosystems shall involve assessment of 'Life Support Functions' with respect to their critical/vital position and status, 'Social/cultural functions' with respect to recreational, asthetic heritage, educational values etc., productivity functions with respect to subsistence and commercial outputs and other functions like future roles/values in long range aspects.

Various management aspects shall directly be related to the wetland values/functions and the anthropogenic threats to such ecosystems. So a comprehensive analysis of the systems and environmental impacts is required to be undertaken for planning suitable measures including involvement of general public.

Under General Analysis, the following aspects will be covered :-

- Biological components with respect to importance of wetland wildlife including waterfowl, plant species rarity/scarcity etc. and its rating.
- Hydrological components including water status, erosion & its control, flood impact etc.
- Productivity potential with respect to direct value products.
- Social aspects like local or state heritage.
- Overall rating of wetland significance.

Under Detailed Parameter Analysis, each of the life support, socio cultural and production values will further be critically fractionated and evaluated in terms of their exact values and potential with respect to future needs of the system. Different steps adopted by international organisations will be adopted and followed for this purpose.

As regards specialised analysis, specific working matrices will be followed as recommended by North American Wetland Conservation Council to evaluate use and non-use values, option values, existence values. etc.

For undertaking the economic valuation of resources of Kanjli and Ropar Wetlands and five State level wetlands of Punjab, intensive studies shall be conducted for which an estimated expenditure of Rs. 15.00lac shall be required

8. Public Awareness :

Conservation and Management of wetland ecosystem can best be ensured if the public participates in these programmes. It is possible if the public is aware about the importance of such eco-systems. Awareness can be created through mass-media, educational material, camps etc. Voluntary Organizations can play an important role in translating scientific ideas to public opinion. The informed general public can then become a potent force in developing sound wetland management policies. The public awareness activities would require funds amounting to Rs. 13.75 lac during next five years.