Conserve and restore Chilika Lagoon ecosystem with its rich biodiversity and aquatic resources for the benefit of stakeholders, particularly local communities through participatory processes, research and ecologically sound management techniques for the present and future generations.

The Chilika Development Authority was created by the Forest and Environment Department, Government of Orissa vide Resolution No. 20369/F&E dated 20.11.1991. The Authority is a registered Society under the Orissa Societies Registration Act. The governing body consists of the Chief Minister of Orissa as the Chairman and the Minister of Environment, Science and Technology as the working Chairman. The members of the governing body are drawn from various State Government departments, NGOs and technical experts besides elected representatives.

To sustain and restore wetlands, their resources and biodiversity for future generations through research, information exchange and conservation activities worldwide.

Wetlands International is a non-profit organisation governed by a global Board comprised of member country delegates, wetland specialists and representatives of international organisations. Partnership is at the heart of Wetlands International, and strong links exist with other international conservation agencies such as IUCN, WWF and BirdLife International. Global and regional programmes are supported by over 120 government agencies, national NGOs, foundations, development agencies and private sector groups.

For further information please contact the appropriate office:

Chilika Development Authority
BJ-45, B.J.B. Nagar, Bhubaneswar - 751 014, Orissa, India
Fax : +91-674-434485 E-mail : ajitpattnaik@hotmail.com

Wetlands International - South Asia
A-127, Defence Colony, New Delhi-110024, India
Fax : +91-11-469 1557, 462 9906
E-mail : wisaind@del2.vsnl.net.in

Wetlands International - Asia Pacific
3A39, Block A, Kelana Centre Point
Jalan SS7/19, 47301, Petaling Jaya, Selangor, Malaysia
Fax : +60-3-704 6770
E-mail : wiap@wiap.nasionet.net
URL : http://ngo.asiapac.net/wetlands

"CHILKA" is the jointly-published newsletter of the Chilika Development Authority and Wetlands International - South Asia

© Chilika Development Authority & Wetlands International - South Asia

July 2000

CONTENTS

Conservation of Chilika - An Overview 3
Sustainable Development and Biodiversity 6
Conservation of Chilika Lagoon 9
Highlights of Activities of Chilika Development Authority 9
News Briefs 11
Diary Dates 12
Other Activities of Wetlands International - South Asia 12

Editorial Panel:
Wetlands International - South Asia : Dr. C.L. Trisal
Chilika Development Authority : A. K. Pattnaik
Wetlands International - South Asia : Robson Ivan

Design and Layout:
Robson Ivan, Rajagopal Singh, Ritesh Kumar, Kamal Dalakoti, K.L. Bhatt

Wetlands International Logo & Graphics for Concept Diagram Designed by Robson Ivan

For subscription information please contact:
Wetlands International - South Asia
A-127, Defence Colony, New Delhi-110024, India
Fax : +91-11-469 1557, 462 9906
E-mail : wisaind@del2.vsnl.net.in

For advertising information and rates please contact:
Dr. C. L. Trisal, Tel : +91-11-469 1294
A. K. Pattnaik, Tel : +91-674-434 044
Conservation of Chilika - An Overview

Chilika is the largest brackish water lagoon that sprawls along the east coast of India in the Mahanadi delta. It is a classical tidal lagoon created by a beach barrier that developed by the accretion of the coastal sediments following the stabilization of sea levels about 3000 to 4000 years ago. The lagoon was still a bay in the sixth century when it used to be a major port in India's eastern coast, with ships trading to Java, Malaysia and Sri Lanka.

The Chilika lagoon is identified as one of the hotspots of biodiversity in India. It is the largest wintering ground for migratory waterfowl in the country. Several rare, vulnerable and endangered species listed in the IUCN Red List of Threatened Animals inhabit the lagoon at least for part of their life cycles. The Chilika lagoon is a highly productive ecosystem with rich fishery resources. More than 100,000 fisher folk directly or indirectly depend upon the lagoon for their sustenance. Based on its unique biodiversity and socio-economic importance, India designated Chilika Lagoon as a Wetland of International Importance under the Ramsar Convention in 1981.

During the last few decades, the lagoon has been showing signs of deterioration mainly due to siltation and over exploitation of its resources. The gradual transformation of brackish water characteristics of the lagoon into fresh water, increase in freshwater weeds, decrease in fish productivity and changes in faunal diversity are quite apparent. The current status of the lagoon and measures adopted for its conservation and management are briefly outlined below.

General Features

The pear shaped lagoon has a maximum length of 64 km and an average width of 20 km. The water depth, in general, fluctuates between 50 cm to 3.7 m.

The water-spread area of the Lagoon varies between 906 - 1105 sq km during summer to monsoon. A 35 km long, narrow, outer channel connects the main lagoon to the Bay of Bengal, near the village Motto. The mouth connecting the channel to the sea is close to the northeastern end of the Lagoon. High tide near this inlet mouth drives in salt water through the channel during the dry months, from December to June. With the onset of the rains, the rivers falling into the northern zone are in spate, causing fresh water currents that gradually push the seawater out. As a result of these dynamics the inlet mouth constantly changes its position. The inlet channel is connected with Chilika at Magarmukh. The other connection with the Bay of Bengal is through Palur Canal on southeastern side.

Several islands are located in the Lagoon covering an area of 223 sq km, which include hills situated both inside the Lagoon and around the Lagoon. The major islands are Kaliji, Barakuda, Ghantasila, Chadhiehaga, Nalabana, etc. Bramagiri, Kasas and Krishnaprasad blocks of Puri district; Tangi and Chilika blocks of Khurda district; and Kalikote and Ganjam blocks of Ganjam district surround Chilika. Krishnaprasad is the largest block in the lagoon.

Hydrology

Hydrology is the single most important factor governing the ecological processes and functions of the Chilika lagoon. The total catchment area of the lagoon is 4300 sq km out of which 3212 sq. km (74%) lies within Eastern Ghats and 1088 sq.Km (26%) within Mahanadi River system. The landuse pattern within the catchment area indicates substantial portion (30%) under forest cover, which is mostly degraded. The total surface fresh water inflow into the Lagoon has been estimated at 1760 MCM annually. The direct precipitation to the Lagoon contributes 147 MCM of water. The total evaporation loss from the Lagoon surface has been estimated at 1286 MCM. Orissa Remote Sensing Application Centre (ORSAC), 1988.

No reliable data on sediment inflow into the Lagoon is available. The sources of sediment inflow to the Lagoon includes sand blown from the coast, silt carried by the sea through the tidal action, rivers flowing from Eastern Ghats and Mahanadi flood plain area. Overall, 53 rivers and rivulets draining in the Chilika result in deposition of 30,65,000 tonnes of silt, the maximum contribution (89%) being from Mahanadi river system (Chilika Development Authority, 1994).

Water Quality

In general, lagoon water is alkaline with pH ranging from 7.1 to 9.6. The transparency values ranging from 9 to 155 cm, indicate high turbidity due to strong mixing of overlying water with sediments. Higher concentration level of phosphate phosphorus (0.4 ppm), nitrate nitrogen (1.35 ppm) and silicates (1.8 pp) have been recorded in the north and north-west part of the Lagoon where most of the rivers discharge into the lagoon bringing huge amounts of silt and nutrients. The dissolved oxygen values have been recorded between 3.3-18.9 mg/l.

The salinity concentration levels show remarkable variations, both temporally and spatially. A complex combination of freshwater discharge, evaporation, wind condition and tidal inflow of seawater govern the seasonal changes in salinity levels. Based on salinity, the lagoon is broadly divided into 4
zones: the southern zone, central zone, northern and the outer channel. During monsoon a large volume of freshwater enters the northern and central zones and passes through the outer channel into the Bay of Bengal. These three sectors contain freshwater and the current is strong enough to overcome tidal influx of seawater. The southern-sector remains relatively undisturbed because water renewal is much slower, and hence brackish water conditions prevail in this zone even during monsoon. However, during post monsoon period and in winter the northern winds help mixing of water in the southern sector with rest of the Lagoon, thus decreasing salinity in the southern sector. The northerly winds also cause intrusion of seawater into the outer channel. In the summer, water level of Chilika Lagoon reaches its lowest level and hence intrusion of salt water from sea through outer channel into the Lagoon increases. Wind induced mixing predominantly by southern winds causes a general increase in salinity of the central and northern sectors. However, the salinity in the southern sector does not rise appreciably.

Biodiversity

The spatial and temporal variations in salinity in combination with nutrient rich shallow warm water of the lagoon makes it a unique site rich in biodiversity. Indeed high species diversity and productivity of biological communities warrant the status of Chilika Lagoon as a Wetland of International Importance.

Kemp and Annadale carried out the pioneering work on faunal diversity of the Chilika Lagoon during 1915–1924. They have recorded their findings in 13 volumes published in the form of Memories of Indian Museum. This is the first comprehensive report on the faunal resources of Chilika Lagoon, which has not been further followed up in systematic manner. Several organizations and individuals have subsequently worked on different groups of plant and animal species, prominent among these include Central Inland Fisheries Research Institute, Zoological Survey of India and academic and research institutions in Orissa and Andhra Pradesh. These investigations have brought out information on various taxonomic groups of plants and animals in and around Chilika Lagoon.

Chilika supports some of the largest congregations of aquatic birds in the country, particularly during the winter. Flocks of migratory waterfowl arrive from as far as the Caspian Sea, Lagoon Balkal, Aral Sea, remote parts of Russia, Kirghiz steppes of Mongolia, Central and South East Asia, Ladakh and the Himalayas. In 1989-90 an estimated population of two million birds visited the Lagoon. As per the report of the Asian Waterfowl Census, Chilika Lagoon supported up to a million water birds in 1992. Normally the Lagoon hosts over 160 species of birds during the peak migratory season of which at least 97 are intercontinental migrants.

Chilika Lagoon is quite rich in ichthyofauna, both in terms of number of species and productivity. Chilika’s fish fauna consists of a mixture of marine, brackish water and freshwater species.

The Irrawaddy dolphin is an elusive species found in various parts of the Chilika Lagoon. About 60-70 dolphins have been reported by Dean and Saolink, (1991). The recent survey conducted by Chilika Development Authority and Wetlands International - South Asia indicates a total of 18 dolphins in the channel area and near Kalijai.

Dugong, which is listed as vulnerable species in the IUCN Red Data book (Groombridge, 1992) has been recorded at Chilika in the past but now is a rare or almost extinct species. The reasons for its demise are probably a combination of siltation and hunting. In addition, dugongs might have got entangled in nets as these have been placed at very high densities throughout the Lagoon.

Along with a variety of algae (22 species) there are 150 species of vascular plants in Chilika which show marked changes both in population and distributional pattern in different parts of the lagoon. Some of the islands are excellent sites for specialization and habitat for several endemic species reported from these islands. Some rare species, which were found earlier, have not established in the Lagoon.

Much of the Lagoon bottom is covered by aquatic weeds, dominated by Potamogoton pectinatus (78% of total macrophytic cover), followed by Najas indica (14%) and Halophila ovata (7%). Many rooted aquatic macrophytes are covered with a film of diatoms, and festooned with green algae and filamentous Cyanobacteria. Free-floating species such as water hyacinth, Pistia stratiotes and Azolla pinnata seasonally enter the Lagoon via the major rivers in the northern sector, but die rapidly, as their salt-tolerance is low.

Threats

The denudation of the catchment area, construction of dams, barrages and other hydraulic structures and increasing anthropogenic pressures coupled with natural processes have led to degradation of the Chilika Lagoon. The specific problems of the Lagoon due to above causative factors are:

Degradation of catchment area - Erosion due to water and wind appears to be very much prevalent in the catchment of the Lagoon. Some of the important factors that contribute to the progress of accelerated erosion are over grazing, illicit felling, cultivation along the slopes, and clearance of vegetation over large areas for rehabilitation and agriculture purposes. About 0.365 million tons of sediment is pumped into the Lagoon through various rivers and rivulets.

Siltation - The rivers/rivulets bring in huge amounts of silt. The siltation has seriously affected the Lagoon area, which has shrunk from 824 sq km in 1972-73 to 790 sq km in 1986 as recorded by ORSAC during summer.

Choking of the inlet and outer channel - The cross section of the outer channel has also significantly reduced due to siltation formation, which leads to considerable hydraulic head loss and poor flushing. The summer depth has also reduced to 0.3 m at Magarmukh (Chilika Development Authority, 1998).

Decrease in salinity - It has been reported that salinity has decreased from 22.31 ppt in 1957-58, to 13.20 ppt in 1960-61, before stabilizing to a certain extent (Bandyopadhyay and Gopal, 1991). Since then it has decreased even further. The decrease in salinity levels has led to loss of some marine and brackish water fish species. WWF (1994) has reported loss of 5 of the sponge species recorded in Chilika Lagoon in 1915. Decrease in salinity levels and high siltation seem to be contributing the demise of these filter-feeding organisms.

Weed infestation - Analysis of satellite data has revealed that weed coverage has increased from 20 sq km to 398 sq km during 1973 to 1993.

Decline in fish landing - The decline in fish landing from 6000 metric tons in 1980 to 1641 metric tons in 1997–98 can be attributed to decrease in salinity and obstruction of the
migratory route of fish species and overfishing.

Pollution - Fish processing plants, effluents from chicken farms along the national high way, pesticides used in the agriculture farms and human wastes are chiefly responsible for nutrient loading in the Lagoon. Oil and oil distillates from motorboats also leak into the water thus contributing to pollution of the Lagoon.

Hunting - It has been reported that about 15000 - 20000 birds fall prey to poachers every year, although there is a ban on hunting throughout the year.

Conservation Measures

Realising the problem of Chilika Lagoon, Government of Orissa, constituted Chilika Development Authority in 1991, to formulate integrated resource management plan and conserve Lagoon ecosystem with its genetic diversity and undertake measures for management of the Lagoon in collaboration with various departments and institutions both within and outside the state. The main activities carried out are:

Catchment area treatment - Activities have been undertaken for plantation (980 ha), gully control (65 units), water harvesting structures (10 units), diversion weirs (5 units), barren hill plantation (343 ha), island plantation (32 ha), seeding distribution (87500 no.) and stream bank erosion control through vegetative measures (6 km) in the critical areas as identified by Chilika Development Authority with the help of ORSAC. These activities are implemented in collaboration with Soil Conservation Department of Orissa Government. The catchment treatment is carried out with the participation of the community on Joint Forestry Management (JFM) principle.

Habitat improvement of Nalabana Island - Plantation of Phragmites karka, construction of earthen mounds, renovation of creeks have been undertaken to augment the habitat improvement for waterfowl. These activities are being implemented in collaboration with the Wildlife Department of the State Government.

Weed Management - High weed infested areas in the Lagoon have been identified through remote sensing techniques involving ORSAC and National Remote Sensing Agency (NRSA). Orissa Renewable Energy Development Agency (OREDA) has developed an efficient model for generation of biogas using weeds harvested from the Chilika Lagoon. Accordingly three villages have been identified in the shore of weed-infested areas for installation of biogas plants for each household. On a pilot basis, 75 biogas plants have been installed by OREDA in Jatapatna and two other villages have been surveyed for further installation of biogas plants. It is also presumed that increase in salinity level through desilting in the outer channel and Magarmukh will restrict the growth of aquatic weeds.

Desilting of outer channel - Chilika Development Authority has engaged the services of National Institute of Oceanography (NIO), Goa for a detailed study of the wave climate of the Chilika Lagoon mouth, littoral drift, sedimentation and bathymetry of the outer channel, including environmental monitoring. The Central Water and Power Research Station (CWPRS), Pune, was commissioned for hydrological and two-dimensional mathematical model studies. Based on the findings of the model studies, CWPRS has formulated a dredging strategy. As per the recommendation of CWPRS, PUNE, the Ocean Engineering Centre of Indian Institute of Technology and Management, (IITM) Chennai, formulated the design of a site-specific dredger to undertake desilting of the outer channel. EIA studies are also being undertaken by NIO to assess the impact of the dredging on the Lagoon ecosystem. It is envisaged that the dredging of the channel will not only improve the water exchange and salinity influx but also help in flushing out the sediments and migration of species, including fish. 1.4 M cu m of silt has been removed to maintain a channel of 3100 m with a width of 200 m and a depth of 2.5 m. A 220 m long opening with a width of 100 m has been created on the sand spit along the outer channel. It is expected that this opening will increase salinity flux by 40% and the tidal flux by 45%. This will also help in discharging floodwater during monsoon and thus reduce water logging in the peripheral areas.

Generating Awareness - A wetland centre to generate awareness about the values and functions of Chilika Lagoon is being established at Satapada. The building of the center is nearing completion. The centre has been designed based on a visit to several wetland centres designed by various agencies in Hokaido and Tokyo in Japan. The Centre for Environmental Education, Ahmedabad was also consulted for inputs in designing, the exhibits and about the environmental awareness programmes.

The above activities under implementation are primarily concerned with ecological restoration of Chilika. The State Government of Orissa is concerned about conservation of the lagoon and protecting interests of traditional stakeholders living in and around Chilika and not to use it for commercial purposes. The Chilika Development Authority is further developing an action plan of integrating social, economic and ecological dimensions to promote sustainable development of the Lagoon. This will be carried out in collaboration with Wetlands International - South Asia and other concerned agencies at the national and international level.

A.K. Pattanaik
Chief Executive
Chilika Development Authority

Nalabana Wildlife Sanctuary

Nalabana covering an area of 15.53 sq km within Chilika was notified in 1973 as a Bird Sanctuary under the Wildlife Protection Act. Nalabana literally means “forest of reeds” that is covered with aquatic plants, predominant species being Phragmites karka. During monsoon, Nalabana is entirely under water with only reeds and watch-tower visible. With the onset of summer the island gradually emerges. At the beginning of the migratory season in October-November, long-legged waders and diving species are predominant. Subsequently, small wading species congregate on the island. Large flocks of flamingoes feeding in the shallow waters of the Lagoon is most fascinating. The Nalabana Bird Sanctuary is managed by the Wildlife Wing of the Forest Department. Chilika Development Authority supports the Wildlife Division for restoration and waterfowl conservation.
Sustainable Development and Biodiversity Conservation of Chilika Lagoon

Local communities have sustainably managed the Chilika Lagoon since centuries using traditional knowledge and techniques. However, during the last few decades, the lagoon is showing signs of degradation as it is quite apparent from high sedimentation rates, decrease in salinity concentration levels, prolific growth of aquatic weeds, decrease in fish productivity and overall shrinkage of wetland area. The two fundamental reasons for degradation of Chilika Lagoon are the physical changes and the human activities. The physical changes which are occurring in the wetland as a result of sedimentation changes pose a major threat to the sustainability of fisheries, wildlife and water quality of the wetland. The challenge is to balance, competing interests over the use and management of Lagoon resources and adopting cooperative approach at both government and community levels. The participatory processes for the management of the wetland should, therefore, attempt in developing mechanisms for effective coordination of government agencies, NGOs and local communities for strategic management of Lagoon resources, precise identification of pressures and integrated management for the benefit of stakeholders, particularly local communities, while ensuring conservation of Chilika lagoon.

A broad concept proposal has been formulated which emphasizes biodiversity conservation and sustainable development and utilization of wetland resources. The salient features of the project are outlined in the concept diagram and briefly discussed.

is the direct effect of alterations of hydrological regimes and rapid degradation of lagoon catchment. The second equally important reason is the increasing population in and around the lagoon, disregard for conservation and especially uncontrolled expansion of prawn culture into the Lagoon, which has aggravated the physical decline. Both these types of biodiversity while providing benefits to the stakeholder groups.

An integrated approach to ensure all round development including social, economic and institutional is required for sustainable development and utilization of Lagoon resources. The approach to be followed essentially involves assessment of Catchment Area Treatment.

A large forest area on the coastal side and around the Lagoon in the Eastern Ghats is highly degraded. There is an urgent need to intensify forestry and soil conservation programmes for soil erosion control. An innovative participatory approach needs to be developed after...
carrying out PRA exercises to understand needs of the community and adopting traditional techniques supplemented with technical inputs from experts.

Following are some alternatives which should be developed through participatory approach:

- Identification of critical zones in catchment area prone to soil erosion.
- Assessment of land use and land capability features.
- Checking soil erosion by taking up adequate and effective soil conservation measures while augmenting timber, fuel, fodder and other forest produce by afforestation of appropriate species and aiding regeneration.
- Controlling soil erosion by small scale engineering measures like contour bunding, vegetative check dams, bamboo spur and boulder sausage.
- Reducing pressure on forest by facilitating use of fuel-efficient means such as smokeless/improved chullahs, biogas plants etc.

Based on a preliminary analysis of the data collected through hydrological monitoring, it is estimated that rivers/ri vaults discharging into northern part of the Lagoon contribute more than 78% of silt. The floodplain wetlands in this area act as a buffer for entry of silt into the Lagoon. The approach in this area should be to regenerate natural wetland area which under severe pressure due to settlements and agriculture developments.

Water Management

Water management in Chilika Lagoon is very complex as it has an interface of both freshwater and sea water. The critical issues are optimization of salinity gradient, enhancing water holding capacity, water quality improvement and flood mitigation. Chilika Development Authority in collaboration with Wetlands International - South Asia is implementing a project on Hydro biological Monitoring Action Plan for Chilika Lagoon under which data is being collected on various hydrological and biological parameters. Based on detailed hydrological studies assessment will be made about water allocation to the wetland from Mahanadi for maintaining wetland processes and functions. Restoration of salinity gradient needs to be attempted on hydrological monitoring of streams and water exchange between Bay of Bengal and Chilika Lagoon.

The decrease in salinity gradient has been chiefly implicated to lack of communication between the wetland and sea due to choking of mouth and siltation of outer channel including Magarmukh. Chilika Development Authority has undertaken activities to enhance water flow from sea to the lagoon through dredging process. This is a curative measure, which is perhaps necessary under the present conditions to remove the silt accumulated over a period of time. The problem essentially lies in flushing out of sediments of the Lagoon by maintaining an appropriate flow regime from Mahanadi distributaries. This aspect has mostly been ignored. The specific action to be implemented for restoration of salinity regimes are:

- Assessment of freshwater inflow from Mahanadi River system, including ground water
- Assessment of inflow/outflow of saline water from Lagoon mouth at Magarmukh and outlet at outer channel
- Estimation of water balance based on inflow, outflow regimes
- Evaluation of the impacts of barrages and dams in the upstream of the Lagoon in flushing pattern and sedimentation process
- Monitoring salinity regimes at strategic points of the Lagoon to understand the factors governing salinity concentration levels
- Monitoring of silt load in the lagoon from various rivers/ri vaults
- Water demand for various uses like agriculture, fisheries, wildlife and plant resources should be precisely assessed for maintenance of ecological processes
- Measures to enhance salinity gradient through engineering measures like desilting by dredging

A large population lives in and around Chilika which discharge sewage directly into the lagoon. The sanitary conditions, in general are not satisfactory resulting in entry of human and other wastes directly into the lagoon. The concentration levels of key nutrients like phosphorus and nitrogen during recent years have considerably increased and pose threat of further eutrophication of the lagoon. In addition, large quantities of pesticides used in the agriculture fields are washed into the lagoon. This is also seriously threatening the human health and incidences of water borne diseases have been reported. For improvement of water quality following are proposed:

- Monitoring of water quality parameters at critical zones and determining the key factors responsible for eutrophication.
- Developing water quality models to predict long-term changes and interventions
- Controlling of inflow of human and other wastes at source by adopting preventing measures.

Flooding mitigation is another major issue to be addressed based on identification of flood prone areas and flood forecasting studies.

Biodiversity Conservation

A comprehensive study on faunal diversity of Chilika Lagoon was carried out by Zoological Survey of India during 1915 to 1924. Since then lot of reports have emerged dealing with various taxonomic groups of plants and animals. However, no systematic survey of biodiversity has been carried out as is clear through various reports, which give fragmentary and sometime contradictory status of flora and fauna. There is an urgent need to have a thorough inventory of plant and animal resources in the lagoon both in quantitative and qualitative terms. Along with the biodiversity inventory, the status of various species needs to be thoroughly assessed.

Habitat degradation seems to be responsible for decline in the diversity and population of avifauna, dolphins, fishes and other species. The following aspects need special consideration:
Survey and assessment of flora and fauna using remote sensing and GIS techniques with emphasis on changes in Lagoon area, zonation, vegetation cover and faunal distribution.

Assessment of biodiversity including species composition, population, distribution and productivity pattern and their relationship with changing salinity regimes and other abiotic and biotic factors.

Identification of endangered/threatened/endemic species of plants and animals.

Identification of threats to sensitive species and their control measures.

Management of Nalabana Bird Sanctuary based on study of avifauna, their migratory patterns, population structure, feeding habits, habitat characteristics and responses to various anthropogenic pressures.

Conservation of dolphin based on its population structure, breeding pattern and various threats confronting this species such as increased weed growth, siltation and human pressures.

Sustainable Resource Development

Assessment of resources and their utilization pattern is essential to develop strategies for sustainable resource development. Fisheries constitute an important resource base of Chilika Lagoon. More than 27,500 traditional fishermen directly depend on fish resources of the Lagoon for their sustenance. However, during last few decades the lagoon is under considerable pressure due to entry of non-fishermen who have adopted new methods to exploit the fish resources and have undertaken culture fisheries particularly prawn culture all along the periphery of the Lagoon. In the shallow regions of the lagoon occupying approximately 25% of Chilika, prawn culture is practiced which has adverse impacts not only on water quality but also on the capture fisheries. This has led to serious conflicts among the traditional fishermen and non-fishermen due to different methods of fish practices. Changes in salinity regimes, increase in siltation and overfishing has led to decrease in fish yield. Populations of several marine and brackish water fish species have declined for last more than two decades. The natural recruitment of marine/brackish water species is hampered due to obstruction as a result of siltation, over fishing around the Lagoon mouth and Palur Canal, which connects the Bay of Bengal.

The changes in salinity regimes and siltation have led to the prolific growth of freshwater weeds. Employing biological control and mechanical means is an approach to the management of freshwater and exotic species. The weeds can be used for generation of biogas, pulp etc.

Chilika Lagoon has a great tourism potential due to its scenic beauty. Wetlands International - South Asia has published the guidelines for ecotourism development in Chilika Lake in 1998. The development of ecotourism could be pursued after developing strategies for their implementation.

Community Participation and Development

The participation of local communities is crucial in planning and management of Chilika Lagoon. Ensuring participation of all stakeholders requires understanding of their needs and sharing of authority and responsibility for resource management according to arrangements, which are understood and agreed by all parties. The process is lengthy and requires long-term commitment from all concerned stakeholder groups. The ultimate objective of co-management is empowerment of impoverished majority, prompting equity in the access to and control of resources, greater involvement of women, sustainability and system orientation.

Institutional Development and Capacity Building

There are several departments in the Government of Orissa, including revenue, agriculture, fisheries, forestry, wildlife, tourism and rural development, which are concerned about the management of Chilika Lagoon resources. All these departments have adopted sectoral policies to achieve their goals. A cross-sectoral approach needs to be developed to coordinated activities of various departments for sustainable development of Chilika Lagoon and its resources. This needs further strengthening of Chilika Development Authority which should develop appropriate programmes for various sectors in consultation with concerned State Government departments.

There is an urgent need for capacity building at all levels including community-based organizations, research institutions and State Government agencies. This could be achieved through infrastructure development and training programmes.

To sum up, biodiversity conservation is critical to the maintenance of ecological processes, functions and economic development of stakeholders particularly local communities. An integrated approach linking Lagoon catchment, water management, community development, biodiversity conservation and sustainable utilisation of its resources would ensure stability of the ecosystem and provide benefits to the local communities. Sustainable fisheries development, utilisation of plant resources and ecotourism are some of the potential areas which can provide economic incentives to the people dependent on Chilika.

C. L. Trisal
Director
Wetlands International-South Asia

India Joins
Wetlands International

India officially became the 58th participating government in Wetlands International’s Advisory Council in May 2000. The focal agency for India is the Ministry of Environment and Forests. India has nominated two national delegates as members of this Advisory Council.
Highlights of Activities of Chilika Development Authority

Hydrobiological Monitoring Action Plan for Chilika Lake

Chilika Development Authority in collaboration with Wetlands International – South Asia is implementing a project on Hydrobiological Monitoring Action Plan for Chilika Lake supported by World Bank. The goal of the project is to monitor changes in hydrological regimes and the water quality of the Chilika Lake and develop measures for water resources management. The specific objectives of the project include identification of key hydrological parameters, installation of hydrological equipment, monitoring changes in hydrological regimes and developing hydrological model for restoration of salinity gradient. The project also envisages assessment of water quality and biodiversity along with hydrology for management interventions.

A team of experts, including C. L. Trisal, E. J. James, A.V. Raman, P. Chandermohan, S. S. Pattnaik and A. I. Pattnaik, carried out a survey of the project area in December 1999. Based on the survey and discussions with the concerned agencies, Project Management Plan was prepared which outlined the activities to be carried out under the project. The following activities have been carried out so far:

- Overall 49 stations have been established in and around the Lake for water quality analysis. Water samples will also be collected from all the stream gauging stations.
- Samples for various biological parameters will be collected from all the 49 stations identified for water quality sampling covering macrophytes, phytoplankton, zooplankton, fish fauna, crabs, prawns, freshwater and marine water invertebrates and benthic fauna.
- Environmental Education and Awareness Programme for the Stakeholders of Chilika Lagoon - Pallishree, a local NGO from Chilika Lagoon area has been provided financial support by JFGE to generate awareness to the local community of Krushna Prasad block located on southeastern portion of the Chilika Lagoon. The project is implemented in close collaboration with Chilika Development Authority. The main objective of the project is to build capacity of the community based organisations, volunteers, people representatives, grass root level NGOs and others for the wise use of lagoon resources.
- Participatory Rural Appraisal (PRA) exercises have been carried out in 20 villages to understand the relationship of the communities with the Lagoon and their problems due to degradation of the lagoon ecosystem. Based on analysis of the information obtained from PRA, suitable awareness packages will be developed to generate environmental education and awareness to different stakeholders. This will be further discussed in the Expert Group meeting to be held in September 2000 to finalize the module for environmental educational and awareness development.

Ecotourism Development in Chilika Lake - The project on Ecotourism Development undertaken by Wetlands International – South Asia in collaboration with Chilika Development Authority has recently been completed. The main emphasis of the project was to develop guidelines and impart training to the concerned stakeholders for ecotourism development in Chilika Lake.

Wim Giesen, a consultant was engaged to provide an update on various issues and their impacts on the biodiversity and other resources of Chilika Lake.

A workshop inviting 21 participants representing government and non-government agencies was held in June 1998 at Bhubaneswar. Based on further surveys and consultation with Chilika Development Authority, recommendations, NGOs and concerned government agencies, Guidelines for Ecotourism Development in Chilika Lagoon were prepared. Wetlands International – South Asia published these guidelines in 1998. These guidelines were also circulated in the International Workshop on Chilika held at Bhubaneswar in December 1998. A draft manual on ecotourism has been prepared and will be published soon.

Wetland Centre (Visitor’s Interpretation Centre)

Chilika Development Authority has procured a strategic site for setting up of a Wetland Centre at Satpada from where visitors have a panoramic view of the Chilika Lagoon. The planning for construction of building for wetland centre was finalized after the visit of Chief Executive, Chilika Development Authority, and Director, Wetlands International – South Asia in April to various wetland centres in India. Centre for Environment Education, Ahmedabad was involved in the development of exhibits and environmental education, other training material and awareness. The Wetland Centre will have the following facilities:

- An auditorium with multi-media facilities
- An aquarium
- A museum
- A laboratory
- An observatory for bird watching

The awareness center will serve as a gate-
way to the Chilika for the tourists. Before visiting various sites in Chilika, they will have an opportunity to have basic understanding of the Chilika eco-system. The awareness Centre will also serve to generate awareness to the School children for whom regular programmes will be conducted. It will also serve as a venue for grass-root level training and organizing workshops.

Research Centre on wetland management at Balugaon

Chilika Development Authority in collaboration with Wetlands International – South Asia has developed the design and concept of the Wetland Research Centre at Balugaon. Infrastructure of the research centre of wetland management at Balugaon include:

- Laboratory with insitu modern research facilities on wetlands
- Library
- Conference/seminar hall
- Auditorium
- Facilities for experimentation
- Observatory
- Interpretation centre for visitors
- Scientists' hostel

Socio Economic Survey of Communities in and around Chilika

Nabakrushna Choudhury Centre for Development Studies(NCCDS), Orissa has carried out a study on the socio-economic status of the villages in and around Chilika lagoon, sponsored by the Chilika Development Authority. The report broadly covers the socio economic profile, environmental issues and impacts of various policies on the fishing community.

Overall 30 sample villages covering 277 households were identified out of 137 fishermen villages for detailed studies on demographic features, occupational patterns, infrastructural facilities, sanitary conditions and dependence of the local communities on Chilika Lagoon.

The report submitted by NCCDS is under review. However, based on the preliminary analysis highlights of the project findings are:

- The sample villages have a significant scheduled caste and scheduled tribe population indicating a substantial population of traditional fishermen.

They are further segregated into sub castes as Keutas, Kandarasa, Khatas, Tiaras, Nolias and Kartias. These sub castes show regions of clustering, for example the northeastern villages are dominated by Keutas, the southeast and the southern regions by Kandarasa. The basic amenities in general in all the sample villages are poor.

- Fishing is practiced by both fishermen and non-fishermen communities, the former primarily engaged in capture fisheries and the latter involved in culture fisheries. A non-fishing household on an average is better placed than a fishing household in terms of overall income, possession of consumer durables and other assets. The per capita income and expenditure estimates indicate that a member of a non-fishing household is a net saver. There are more pronounced variations within the sub castes of the fishing communities. The Nolias have the highest per capita income while the Kartias have the lowest. Both the fishing as well as non-fishing communities spend 60-65% of their income on food. The income of a fishing community household from culture sources are much lower than that of a non-fishing community.

- Primary Fishermen Co-operative Society (PFCS) was formed to protect the fishing rights of the poor fishermen, who were being threatened by monopolistic forces of non-fishermen. The majority of the PFCSs could not succeed due to inadequate capital, lack of support from government, inefficient administration and various other reasons. Subsequently, the fishermen have turned to the commission agents functioning on behalf of bigger tradesmen from Bengal and other regions. The commission agents force the fishermen to sell the entire catch to them at prices 10 - 20% lower than the market. In addition, they also take 10% of the entire catch as their share. The PFCSs need to be strengthened to counter the operations of these commission agents.

- The local fishing community had traditionally held the fishing rights until the last two decades, whereby due to the operation of lease policies, they have been marginalized. Prior to 1991, the lease policies were entirely meant to protect the rights of traditional fishermen in the Lagoon area, and also to control culture fishing. The lease policy of 1991 set to divide the entire Lagoon area into capture and culture, and created means to legalize the presence of non-fishing community in these areas. But, the failure to create a strong institutional structure to support these policies lead to conflicts between the fishing and non-fishing communities. The excessive shrimp farming at the same time did a lot of harm to the ecology of the Lagoon. The Supreme Court, in the ruling of 1996, formally banned shrimp farming in areas within 1000 meters of the Lagoon and directed the government to create an authority to control shrimp farming.

Dolphin Conservation

A major attraction for the visitors to the Chilika is the Irrawaddy dolphin. The local fishermen attach high value to this species and no direct killing was reported earlier. However, during last few years 15 dolphins were reportedly killed. In February 1999, two carcasses were found floating in the vicinity of the Kali temple. One of the carcasses was of a newly born calf which is now kept in the Museum of Chilika Development Authority. Dolphins are also facing threat due to siltation, reduction in availability of food, use of small mesh sized nets and prawn culture.

Wetlands International – South Asia and Chilika Development Authority conducted a survey of Chilika from 9 to 11 June, 2000 to develop an action plan for conservation of Irrawaddy dolphin in Chilika. Dr. R.K. Sinha, an expert on dolphins was specially invited to advise on the research programme and assist in developing an action plan. A population of 18 dolphins was sighted during the survey out of which 12 were present in the outer channel and 6 in Nalabana Bird Sanctuary area. The local residents at Kali temple and near Rambo in southern sector of the Lagoon confirmed sightings in other areas. The dolphins are reported to be present throughout the Lagoon except in the northern sector where the water is shallow.
Visit of Xth Finance Commission to Chilika Lagoon

The Chairman, Eleventh Finance Commission Prof. A. M. Khursro, along with four members of the committee Mr. N.C. Jain, Mr. J. C. Jetly, Dr. Amarendra Bagchi and Mr. T. N.Srivastava visited the Chilika Lagoon in February 1999 to review the progress of the eco-restoration work carried out for preservation of the Lagoon.

They were apprised of the progress of implementation of activities and a memorandum was submitted by Chilika Development Authority through Government of Orissa for continuance of the grant for preservation of this unique ecosystem from Special Problem Grant.

The Commission expressed satisfaction over the progress of the work. They were greatly concerned about the ecological problems of the lagoon due to various pressures.

World Wetlands Day – 2000

Chilika Development Authority celebrated World Wetlands Day on 2 February, 2000 at Satpada in Chilika Lagoon. A boat rally was organised at Satpada in collaboration with the Dolphin Boat Association. The rally was flagged off from Satpada, with more than 150 boatmen participating in the rally holding various placards to save Chilika ecosystem. The rally was terminated at village Choubar along the outer channel where a meeting was held. The stakeholders from the nearby villages highlighted the problems of the Chilika Lagoon and suggested various measures that can be taken for restoration of the Lagoon.

Chief Minister’s Review of Chilika Development Authority

The Hon’ble Chief Minister of Orissa Mr. Naveen Patnaik reviewed the progress of work carried out by Chilika Development Authority on 2 May, 2000. The Chief Executive, Chilika Development Authority, made a presentation on the approach followed and the activities undertaken for conservation and wise use of the Chilika. While expressing satisfaction over the implementation of work done by Chilika Development Authority, he advised that a holistic long-term action plan should be developed for sustainable development of Chilika Lake. The action plan should help providing benefits to the local communities while ensuring conservation of the ecosystem.

Eco-design Workshop

Chief Executive, Chilika Development Authority and Director. Wetlands International – South Asia attended a workshop on Eco-design, held at Sapporo, Japan and made presentations on Chilika and overview of status of wetlands in India. They also visited Ramsar sites designated by Japan and 8 wetland centres/interpretation centres. The visit to these centres and discussions with concerned agencies of Japan helped Chilika Development Authority to formulate basic concept and broad outline of interpretation centre.

Visit of Members of Ramsar Centre Japan to Chilika

Ms. Reiko Nakamura and Mr. T. Musha from Ramsar Centre Japan visited Chilika Lagoon from 16 – 18 February 2000. They visited Interpretation Centre at Satpada, Nalaban Bird Sanctuary and a few island villages.

CHILIKI WEBSITE

The Chilika Development Authority maintains a website of its own at http://www.chilika.com. The website is designed and hosted by AIOI and ISTI Inc. USA. This site contains detailed information on the Lagoon including its origin, history, biodiversity, issues confronting the Lagoon, measures taken by the Government of Orissa and the Chilika Development Authority. The site also documents various studies and research conducted on the Lagoon. A photo gallery is currently under preparation. The site will be constantly updated.
Other Activities of
Wetlands International - South Asia
SEAP Project on Wetlands of Gujarat

A report on Phase I of the project on State Environment Action Plan (SEAP) of Gujarat Wetlands has been recently prepared by Wetlands International - South Asia which highlights the current status of wetlands in the region and problems encountered by them. Based on the prioritization of the problems, 15 wetlands have been identified which include some major wetlands such as the Great Rann of Kachchh, Little Rann of Kachchh, Marine National Park and Nalsarovar. The main thrust of the project in Phase II is to develop collaborative approaches with local communities to understand the specific problems and traditional methods used by them for the management of identified wetlands. Strategies will be formulated to undertake conservation measures of the selected wetlands.

Study on Yamuna Floodplain

The floodplain wetlands of river Yamuna in Delhi stretch under serious pressure due to rapid urbanization. Several action plans developed by various agencies to restore the water quality have, in general, ignored the role of floodplain wetland systems that provide several benefits due to their natural functioning. In this context, a study has been undertaken by Wetlands International - South Asia involving students of Delhi University and School of Planning and Architecture. The main emphasis in the study is assessment of the impacts of urbanization on floodplain wetlands and consequently, loss of benefits in terms of flood control, recharging of aquifers, pollution control and overall loss of biodiversity. This will provide the basis for advocacy of conservation of floodplain wetlands.

MoU with Barkatullah University, Bhopal

A Memorandum of Understanding has been signed between Wetlands International - South Asia and Barkatullah University, Bhopal to carry out collaborative research work on wetlands.

Conservation of Harike Wetland

Wetlands International - South Asia, in collaboration with Guru Nanak Dev University, Amritsar and Barkatullah University, Bhopal has carried out a study on conservation of Harike Wetland. Four students from Barkatullah University worked on this project and carried out studies on hydrology, limnology, biodiversity and fishery aspects of the wetland. Guru Nanak Dev University provided facilities to conduct the studies. The main objective of the project is to develop action plan for sustainable management of Harike. Wetlands International - South Asia is developing further collaborative research programmes with Guru Nanak Dev University for conservation of Harike wetland involving various faculties of the University.

Sustainable Development and Water Resources Management of Loktak Lake

Wetlands International South Asia and Loktak Development Authority are jointly implementing a project on Sustainable Development and Water Resources Management of Loktak Lake. Several initiatives have been developed through this project which have a great relevance for promoting conservation and wise use of other wetlands in India. Water management, community participation and sustainable fisheries development are some of the areas in which elaborate processes have been developed through consultations with national and international experts. Capacity building through training workshops has proved extremely useful to impart training to technical staff of various government and non-government agencies. Wetlands International - South Asia is playing a catalytic role to network organisations for sharing experiences and information.

Diary Dates 2000

July 3-21
International Training Course on Facilitation Skills for Community Forestry Extension
Bangkok, Thailand
Contact: Dr. Somrak Sukwong, Executive Director, Regional Community Forestry Training Centre (RECFTC), Kasetsart University, Rama 6, Bangkok 10900, Thailand.
Tel: +66 2 490 5700; Fax: +66 2 561 4980.
Email: recftc@kasu.ac.th
URL: http://www.recftc.org

August 7-10
World Forestry Exhibition 2000
Kuala Lumpur, Malaysia
Organised by the Forest Research Institute Malaysia (FRIM) and Reed Exhibitions Sdn Bhd, in conjunction with the 10th IFOR World Congress 2000.
Contact: Steven Thong, Reed Exhibitions Sdn Bhd, Suite 312, Block A, Phileo Damansara 1, Off Jalan Damansara, 46350 Petaling Jaya, Malaysia.
Tel: +603 756 6820/6820; Fax: +603 730 1800; Email: infocol@re.com.my
For more information on the 10th IFOR 2000, contact: IFOR 2000 Congress Secretariat, TEL: +603 6372 1335/632 2554; Fax: +603 636 5687/632 7703; Email: info@for2000.com.my
URL: http://www.forestry.gov.my/ifor2000

August 25-30
Workshop on Hydrological Modelling, Reservoir Operation and Flood Mitigation Management of Loktak Lake
Manipur, India
For more information and application forms, contact: Wetlands International - South Asia (CA), 210, 2nd Floor, Defence Colony, New Delhi - 110 04, India.
Tel: +91 11 2699 156; Fax: +91 11 2250 200; Email: wipaldial@rediffmail.com
URL: http:

September 5-8
International Workshop on Development and Management of Floodplains and Wetlands
Selangor, Malaysia
Jointly organized by the International Research and Training Centre on Erosion and Sedimentation (RTCES), International Hydrological Programme (IHP) and Wetlands International Malaysia Programme.
Contact: Ms. Seri Chinn, RTCES 2000, RTCES,
PO Box 304, Seapex Centre, Tel: +60 3 418 1337; Fax: +60 3 418 1117; Email: serichinn@rediffmail.com

October 16-19
International Conference on Migratory Waterbird and Wetland Conservation in the Asia Pacific, and Associated Meetings of the Wetlands International Migratory Waterbird Conservation Committee and three Waterbird Networks Working Groups
Calinaga, Japan
Contact: Dr. Tatsuro Nishiyama, Interim Executive Director, Wetlands International - Asia Pacific,
Tel: +81 50 704 6720; Fax: +81 50 704 6722.
Email: tat@wetlands.net

November 27-29
Lagoon 2000 - Symposium on Restoration of Lagoons and Wetlands
Bangalore, India
Contact: Dr. T.V. Ramachandra, Centre for Ecological Sciences, Indian Institute of Science, Bangalore 560 012, India.
Tel: +91 80 360 1429; Fax: +91 80 360 0825.
Email: cessa@iisc.ernet.in
URL: http://www.wetlands.net/lagoon2000/conference.html