

**Report  
on  
Visit to Chilika Lake, Orissa,  
a wetland included under the  
National Wetland Conservation and Management  
Programme of the Ministry of Environment and  
Forests.**

**24-26 June 2008**



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## **1. Context**

To enable Half Yearly Performance Review of the programmes of the Ministry of Environment & Forests, the Planning Commission, Government of India, on 13<sup>th</sup> June 2008 constituted an Expert Team (Appendix-1) to visit three wetlands viz. Wular Lake in J&K, Chilika Lake in Orissa and Vembanad Kol in Kerala, for assessing the status of implementation of the National Wetland Conservation and Management Programme (NWCMP).

## **2. Visit itinerary**

The Team comprising Dr.(Mrs.) Indrani Chandrasekharan, Advisor(E&F), Planning Commission, Dr. T. Balasubramanian, Director, CAS in Marine Biology, Annamalai University and Dr. V. Sampath, Ex-Advisor, MoES and UNDP Sr. National Consultant, visited Chilika lake and held discussions at the Wetland Research Centre of the Chilika Development Authority (CDA) at Chandraput during 24-26 June 2008. Details of presentations and discussions on 24<sup>th</sup> June , 2008 are at Appendix-2.

## **3. The Chilika .**



Chilika lagoon is situated on the east coast of India between 19<sup>o</sup> 54' North latitude and 85<sup>o</sup> 05' and 85<sup>o</sup> 38' east longitudes and extends from Southwest corner of Puri and Khurda districts to the adjoining Ganjam District in the state of Orissa. It is the largest brackish water lagoon in Asia with estuarine

character and the largest wintering ground for migratory water-fowls found on the Indian sub-continent. The area of the lagoon varies between 1165 and 906 sq. km during the monsoon and summer, respectively. The Lake itself can be broadly divided into four ecological sectors based on salinity and depth: the southern zone, central zone, northern zone and the outer channel. Numerous islands are present in the Lake, prominent among which are Mahisa, Berhampura, Nalabana, Kalijai, Somolo, Honeymoon, Breakfast and Birds islands, etc.

It is one of the biodiversity hot spots of the country, and some rare, vulnerable and endangered species listed in the IUCN Red List of threatened animals inhabit the Lake area for at least a part of their life cycle. This list includes a number of rare, threatened and endangered species such as Irrawady dolphins and the Barakudia limbless skink. The lagoon is a highly productive ecosystem with rich fishery resources. The rich fishing grounds sustain the livelihood of more than 2,00,000 fisherfolk who live in and around the Lake.

The Nalabana island inside Chilika Lagoon, spreads over an area of 15.53 sq.km. and was notified as a Wildlife Sanctuary in 1987 by the Government of Orissa. Based on its rich biodiversity and socio-economic importance, Chilika Lake was designated by the Government of India as a Ramsar Site in 1981, especially as an important Water-fowl habitat. It is also included in the list of Wetlands selected for intensive conservation and management by the Ministry of Environment and Forests, Government of India.

On the recommendation of the 12<sup>th</sup> Finance Commission, grant to the tune of Rs 30.00 crore has been sanctioned for Chilika. The Ministry of Environment and Forests under the CSS on Wetlands have also released Rs. 7.509 crore from the year 2000 till 2008. Details of yearwise allocation and components supported are at Appendix-2.

#### **4. Field visit**

On 25<sup>th</sup> June 2008, the Expert Team, the CEO, Addl.CE, and staff of CDA visited the Chilika lagoon, and traversed the entire stretch of the lagoon from Chandraput to the New Mouth and Satapada. The Team visited the Nalabana Bird Sanctuary, the Magarmukh area, the dredging sites, the New Mouth and the temple on **Kalijai** island.

The Team observed large number of stake nets (bamboo and nylon netting), in the lagoon, deployed very close to one another, for prawn fishing. The extensive exploitation might lead to reduced water circulation within the lake area and consequent deterioration in water quality.



***Prawn traps***

At Nalabana Islands the team sighted at close range, a large number of Flamingos and Pelicans and some small migratory birds. It was highly satisfying to note that some of the migratory birds like pelicans could be observed in sizeable numbers in the sanctuary area during the off season and a contractual field staff working in the project has honed his skills in identifying the local and migratory birds.

During the field trip inside the lagoon, the team observed that the water quality along the channel leading to one of the watch towers for protection of the birds at Nalabana sanctuary area, was poor, as evidenced by the black colour of the water. There could be a number of reasons for this including constant churning of the silt in the area by the movement of the motorised boats and bringing out to the surface the humous/H<sub>2</sub>S, making the water anoxic.



During the cruise in the lagoon the team sighted a number of Irrawaddy dolphins; adults, sub-adults and calves, in a group of 3 to 10 at different locations. The dolphins seem to prefer some areas, particularly the Magarmukh, Satapada and the New mouth area of the lagoon.

The Team observed the desilting and dredging operation being carried out near the Magarmukh area by two crawl cat dredgers owned by CDA and interacted with the Engineer deployed by the contractor. The Team also talked to the engineering students/scholars of IIT, Chennai who were monitoring the desilting and dredging operation and quantifying the dredged material. The dredge spoil slurry is carried through a one-kilo metre long pipeline and discharged on an island created by dredge spoils with in the lagoon.

The Team visited the Visitors' Centre at Satapada. A number of tourists were at the Centre, admiring the murals, working models, photo – text panels, paintings, aquarium, bird diorama, and other exhibits. The Team appreciated the full skeleton of Irrawaddy dolphin, striped dolphin and finless porpoise, displayed in the Centre.

The Team then sailed to the New mouth area, which was informed that due to littoral drift, the old mouth of the lagoon had shifted 17 km leading to its closure in the late 1990s and to drastic change in the Chilika ecosystem. To restore the ecology and the resources of the Chilika lagoon, a new mouth was artificially opened in September 2000, after a detailed study by CWPRS, Pune. While the drift of the old mouth was of the order of 500 m annually, the drift of the new mouth is 100 m per annum and the CDA is confident that the present mouth will not get closed, due to the alternate accretion and erosion activity along Chilika coastline and the slow level of drift.

The Team then returned to retire for the day at Chandraput Research Centre, after traversing the entire cross section of Chilika lagoon by motor boat.

On 26<sup>th</sup> June 2008, the team visited Tangi, a village on the Northern sector of the Chilika lagoon, where extensive growth of the emergent weed Nalagrass (*Phragmites karka*) was observed. The weed was seen to grow to over 7-9 feet tall and the leaves and the hollow stem resembled the cane/bamboo. CDA informed, that the weed infested area of the lagoon, currently assessed using satellite imagery, is around 286 sq.km.

Since mechanical/physical removal by mowing, cutting or burning of the grass is extremely difficult, as it spreads through rhizome, application of a weedicide namely Glyphosate at a dose of 15 ml per litre of water is being practiced on a pilot scale for controlling the weed.



***Application of weedicide for controlling Nalagrass***

The CEO, CDA also informed that the green foliage turns brownish after 7 to 10 days of the application and has proved to be the most effective method for control of the abnoxious weed *Phragmitis* in the lagoon. The team returned to their respective work stations on the night of 26<sup>th</sup> June 2008.

## **5. Recommendations**

**1 Status of CDA:** Chilika Development Authority (CDA) has been constituted by a state GO and has not been empowered legally to enforce measures for conservation and protection of the resources of the lagoon and to apprehend violators of the rules and regulations applicable.

The Team, recommends that the CDA be registered as an autonomous body and recognized under a state or existing central ( section 3 (3) of E(P)A, 1986 ) or a new legislation with full powers for carrying out and implementing the various programmes for protecting and conserving the lake and its resources, enforcement of national rules concerning the wetland ecosystems and obligations under International Conventions. The State Government of Orissa may, consider recognizing CDA as the Institution in the State to conserve and manage all wetlands and sanctuaries including, the Bhitarkanika Marine Sanctuary and the National wetland sites viz; Kandariya, Kanariya and Daha.

**2. Notifying, Monitoring and Enforcement of Legislations:** Strict enforcement of the Orissa Marine Fishing Regulation Act, applicable to Chilika needs to be ensured by the Fishery Department. The draft Chilika Regulation Bill of 2002,, subsequently redrafted by CDA is yet to be passed by the State legislature. The CDA should pursue the matter with the State Government and ensure passing of the Bill. The MoEF, it is learnt ,is in the process of drafting the Wetland Conservation Act, which needs to be hastened.

### **3 Policy and guidelines**

An operational framework/guidelines to establish interagency co-ordination and working relationships should be put in place to ensure that management objectives are coordinated and mutually supportive. An overall policy that will provide a long-term vision and support for the future use, conservation and development of the lagoon, is necessary.

### **4. Financial resources and Infrastructure for CDA:**

Considering the importance of the lagoon including the livelihoods at stake, the State Government should allocate funds under plan and bear in full the

recurring cost of the CDA, under non-plan expenditure in the state budget during 2008-09 and from 2009-2010.

The CDA does not have a building of its own in Bhubneshwar. It is recommended that a sum of Rs 80 lakhs could be made available in the supplementary grant –proposal of the state to enable construction of a building with the understanding that land will be made available by the state and proposal and DPR will be received by August , 2008.

**5 Resource conservation:** Threats to the ecosystem and resources due to the motorised boats, stakenets, gill net and boat seine net need to be mitigated. A dolphin watching protocol should be developed to regulate speed limits, to fix a minimum distance of approach to the dolphins, to limit the number of vessels plying in the lagoon and installation of propeller guards in the outboard motors fixed in the boats.

**6 Valuation of the resources:** CDA should make a realistic assessment/valuation of all the assets including the craft and gear used inside the lagoon for fishing, the value of the resources harvested, the revenue realized by various activities within the lagoon vis-à-vis the funding support made by the various agencies for conserving and managing the lagoon ecosystem and its resources.

**7 Efforts for integrating the wetlands:** The CDA should make all out efforts to adopt and apply the concept of integrated wetland conservation and management in the Chilika lagoon by integrating all the activities such as livelihood, water use, plant use, animal use, cultural and ethical issues, community/stakeholder participatory approach, etc.

**8 Invasive species:** Noting that there is no record of the invasive species in the Chilika lagoon, it is recommended that CDA should during its regular inventory of the lagoon's biological parameters, collect information on invasive species, if any and create a repository of such organisms for future reference.

**9 Private sector involvement in the development of wetlands:** CDA should explore the possibility of involving private sector in promoting and developing eco-tourism in the lagoon, by giving it a special consideration.

**10 Incentives to ensure sustainable management:** At present there are no incentives provided to either the resource users or the conservation staff employed by CDA. For ensuring sustainable development and management of the Chilika lagoon and its resources, it is recommended that adequate incentives should be provided to the resource users and the CDA staff involved in policing the waters for wild life conservation and implementing/maintaining law and order inside the lagoon.

**11 Management Planning and Monitoring mechanism:** The Team was informed that the CDA is adopting an ecosystem based management plan for development, conservation and management of the Chilika resources. For monitoring the implementation of the development and management programmes, a Governing Body has been constituted with the Hon.'ble Chief Minister, Orissa as the Chairman, drawing members and experts from different disciplines.

Noting that there is no long-term strategic/perspective plan, the Team recommends that the CDA, apart from implementing an ecosystem based management plan, should evolve an adaptive plan for the next 4-5 years to begin with, with a long-term vision, policy and strategy for the next 10-15 years or up to the year 2020.

Since the Chilika lagoon is a wetland of international importance under Ramsar Convention, the CDA has an obligation to submit reports periodically to Ramsar. For this purpose, the Team recommends setting up of a mechanism for preparing and submitting the reports to Ramsar.

**12. Sharing of water, fish resources and water quality:** Chilika lagoon is not a source of primary water use – i.e., for drinking or irrigation. It is used only as a secondary source for fisheries, transport, tourism, etc. There is no legal mechanism to regulate or promote sharing of the water resources. Cooperative societies are allotted certain areas for fishing only and not for any other activity. The state government should formulate either guidelines or evolve a regulation.

In respect of water quality, it is recommended that the CDA should ensure proper exchange of water in the area by reducing the movement of motorised boats in the area and also by drastically reducing the number of fixed nets for shrimp trapping up to about 50-100 metre from the boundary of the sanctuary. This could help in improving the water circulation and water quality to some extent in the area

**13 Collaboration:** CDA is implementing a number of programmes in collaboration with other organisations. While welcoming the CDA's initiatives in collaborative programmes with national and international organisations, the Team noted that the collaboration with the academic institutions within Orissa, is rather weak. The Team recommends that CDA develop and implement joint collaborative programmes with leading academic institutions in Orissa viz. Fisheries College, Berhampur University, Utkal University, and others, for exchange of information, skill development, resource assessment, capacity building, data base development, etc.

**14. Institutional mechanism and capacity:** The Team was informed that out of the sanctioned strength of 40 regular staff, presently only 18 posts are filled. Considering the vastness of the wetland, the diverse use of the resources and the stakeholders involved, the conservation and management issues involved, the Team *recommends that the State Government consider filling up all vacant positions and create adequate number of regular posts, fill them up on priority basis and build their capacity.*

**15 Weed management:** Over 200 sq.km of the lagoon area in the northern sector is infested with nalagrass, the Team recommends that this weed which appears to have high fibre content and bamboo like, should be put to use, for production of paper and card board. CDA should explore the possibility of inviting paper mill industries to visit and study the feasibility of using this weed for paper making and set up a viable industrial unit in the vicinity of Balugaon – to begin with on pilot scale to be scaled up in the future, if the unit becomes economically viable.

**16 Socio-economic issues of fishers:** Illiteracy among the fishing community which depends on the Chilika resources for their livelihood and lack of active engagement of youth are areas of major concern which needs to be addressed, if we have to educate the fishers on sustainable use of the resources including human resource. It is therefore, recommended that CDA should adopt one or two villages along the periphery of Chilika and introduce measures for improving the socio-economic status of the local community and converting them into model villages for emulation in other coastal villages. To begin with the CDA may take steps for providing both informal and formal education to select members of the fisher community including youth, old aged and women and also provide some scholarship to deserving pupil/students who pursue higher studies.

**17. Inventory and Assessment:** The physico-chemical parameters recorded in the Chilika lagoon, particularly the pH values, dissolved oxygen concentration, BOD and COD are of concern.

The Team recommends that CDA ensure data quality, for which the water quality analysis be got done through a MoEF recognised laboratory or the Orissa State Pollution Control Board. Noting that the physico-chemical parameters monitored by CDA did not include heavy metals, particularly Mercury (as it is observed as one of the major heavy metal pollutants recorded from the nearby Rushikulya estuary), the Team recommends that CDA measure mercury and other heavy metal concentrations at select points in the lagoon. The biological parameters could include microbial pollution as well, as the microbial load in certain portions of the lagoon, could be high owing to eutrophication, very high density of fixed traps for shrimp fishery and poor water circulation.

**18. Disaster Management: During the Super cyclone , Chilika lake served as refuge to passing /stationed vessels and sheltered the coastal population. Considering that** Coastal Orissa is always threatened by natural calamities like cyclones and storm surge, besides erosion and accretion of its coastline, importance of the Chilika lagoon, for its bio-resources, biodiversity and as shelter for the coastal community which depends on the lagoon for their food and livelihood security needs to be recognized by the state. The Team therefore, recommends that the CDA and the Government of Orissa should take adequate measures to manage the Chilika lagoon to protect the coastal community from natural disasters.

**19. Cultural values:** Chilika is part of Orissa folklore and is revered by the locals. Temples like , the Kalijai situated on an island in the lagoon is considered to be the abode of the Goddess Kalijai. The temple of Lord Varuna located on Barunkuda island; Nabahragha –an ancient deity located near Berhampur village near the outer channel, Choubar shiva temple near village Alupatna and Bhabakundaleswar temple of Lord Shiva at Manikpatna (as per historical evidence, there was a port which was used for trade with the Far-East) along the outer channel and a Mosque at Manikpatna are venerated due to the legend and considered sacred. The Team recommends that while protecting and conserving the Chilika and its resources, adequate care be taken of the cultural heritages.

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## Details of discussion

### Presentation by CEO

Dr. Sudarsan Panda, Chief Executive Officer (CEO) of CDA made a power point presentation on the salient features of the Chilika Lake – the largest brackishwater lagoon of India. In his presentation he highlighted the importance of this wetland as one of the prime wintering grounds for migratory water-fowl found anywhere in the Indian sub-continent, a hot-spot of biodiversity of some rare, vulnerable and endangered aquatic flora and fauna, an abode for the Irrawaddy dolphin, and a highly productive ecosystem with rich fishery resources providing food and livelihood security for over 64000 fisher families comprising a population of over 2 lakh fishers.

The main management problems highlighted by the CEO, CDA included siltation, changes in salinity regime of the lake in the northern, central and southern sectors of the lake, increase in invasive species, dense growth of Nalagrass (*Phragmatis karka*) in the northern sector of the lagoon, eutrophication, aquaculture activities, excessive extraction of bio-resources and an overall loss of biodiversity, leading to degradation of lagoon's ecosystem. Chilika was included in the Montreux Record – a threatened list of Ramsar site – in 1993.

Dr. Panda explained the measures taken by CDA after it was set up in 1992 for restoration of the lake and its resources, which included the preparation of a catchment treatment plan using Remote sensing and GIS, adoption of a participatory approach for watershed management, capacity building through training and human resource development; hydrological interventions which included opening of a new mouth, desiltation of the lead channel, carrying out an environmental impact assessment before and after opening of the new mouth, monitoring the physico-chemical and biological parameters of the lake, etc; habitat evaluation of Chilika Lagoon with special reference to birds as bio-indicators; management of plant and fishery resources; development of a communication infrastructure/network for the people living along the

lake embankment; socio-economic issues; research, education, training and awareness.

Some of the other points highlighted by him in his presentation are as follows:

*a. Biodiversity:*

Phytoplankton	- 399 Sp.
Algae	- 22 Sp.
Plants (27% Of State's Flora; 8 Rare & 11 Endemic Sp.)	- 720 Sp.
Zooplankton	- 170 Sp.
Protozoa	- 61 Sp.
Porifera	- 7 Sp.
Coelenterates	- 7 Sp.
Nematodes	- 37 Sp.
Mollusca	- 136 Sp.
Annelids	- 31 Sp.
Crustacea	- 28 Sp.
Decapoda	- 34 Sp.
Echinodermata	- 5 Sp.
Protochordata	- 1 Sp.
Fish	- 268 Sp.
Amphibians	- 7 Sp.
Reptile	- 30 Sp.
Birds	- 225 Sp.
Mammals	- 18 Sp.



***New Mouth***

*b. Management Issues*

- Complex ecosystem, multitude stake holders
  - Open use of the common property resources
  - Shrinkage of water spread area of the Lagoon due to siltation
  - Decrease in Salinity
  - Decrease in the fish yield/ diversity
  - Unauthorized encroachment for shrimp culture
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- Proliferation of invasive species
  - Loss of biodiversity
  - Adverse impact on the economic condition of the people depending on the lagoon's resources for sustenance.

c. *Organisational aspects*

Chief Minister of Orissa is the Chairman of the Governing Body and the Working Chairman is the Minister for Environment, Orissa. The Members include the Local representatives, Secretaries from the Stakeholder Departments of Govt. of Orissa, experts from premier institutes of the country, and representative from fishermen federation, Orissa.

d. *Restoration Strategy*

- Key targeted studies to understand the complex ecosystem and to trace out the root cause of degradation
- Adaptive restoration plan with ecosystem approach.
- An ecosystem approach to restore the ecological integrity and functionality of the lagoon through wide consultative process.
- The strategy adopted was a more ecologically beneficial hydrologic regime
- Integration of the watershed in the management of the lagoon with micro watershed as a functional ecological unit with community participation.
- Extensive out reach programme to generate awareness about the values and functions of the wetland.

e. *CDA's Strategic partnership*

- International Organisations
- National Organisations
- State Government Organisations
- Non-Governmental Organisations
- Research Institutions
- Community Organisations

f. *Salinity levels*

- Average salinity of Chilika lake during 1957-58 was 22.31 ppt which decreased to a level of 8.50 ppt in 1999-2000 prior to opening of the new mouth.
- After the opening of the new mouth there has been a gradual increase in the average salinity which presently is around 13.40 ppt.
- While in the northern sector freshwater conditions prevail, in the central part water is brackish and in the southern sector the water is saline.
- Reduction in salinity levels is likely to have an adverse impact on the biodiversity as well as the fisheries of Chilika.



*g. Hydrological interventions*



***Dredger in operation***

- Opening of a new mouth artificially on 23<sup>rd</sup> September 2000, which reduced the length of outflow channel by 18 km.
- Desilting and maintenance dredging of the outer channel near Magarmukh and Palur canal. A lead channel of 200 m width over a length of 3.2 km was developed.

*h. Impact of desiltation and new mouth*

- Increase in average salinity level to 14 ppt in December 2000 at Satapada against 3-4 ppt over the previous decade.
- Increase in tidal flux by 45%.
- Improvement in sediment flux.
- Quick discharge of flood water
- Decrease in invasive species.
- Facilitation of the auto-recruitment of fish and shrimp species as well as juvenile crabs into the lagoon.
- 48 species of fish, 4 species of prawn and 6 species of crabs - new record for Chilika after opening of the mouth.



***Mullet landings from Chilika lagoon***



***Crab landings from Chilika lagoon***

- Eight fold increase in total annual fish and shrimp landings.
- Increase in monthly family income of fishermen by Rs.5000 – Rs. 10,000 after opening of the new mouth.
- Financial return from capture fishery increased from Rs. 50 crore in 2001-02 to Rs 77.23 crore in 2004-05 with export earnings contributing to Rs. 37.80 crore. In 2005-06 it was Rs. 67.53 crore.
- Reduction in the coverage of invasive species and increase in the weed-free area from 333 sq.km to 505 sq.km.



***Halophila ovalis***

- Increase in the Dolphin habitat from 25.91 sq. km to 183 sq.km.
- Increase in seaweed area from 22.32 sq.km in May 2000 to 86.84 sq.km in June 2004.
- Increase in the bio-geographical population – exceeded 1% in case of 30 species; over 50% for Gadwal and over 70% for the uncommon large whistling duck.

*i. Monitoring & Assessment*

- Interventions are evaluated, refined, and supported by a strong continuous input, in form of a multi-agency research, targeted studies to develop performance measures and a comprehensive in-house close monitoring of key components.
- A set of biological and physical parameters most appropriate to the lagoon's ecosystem identified and used in implementation of the management initiatives and evaluation of the impact of these interventions on restoring ecological integrity of the lagoon.
- Use of GIS and Remote sensing tool for monitoring.

*j. Adverse impact of shrimp culture*



- Highly productive and sensitive shoreline ecosystem is altered due to artificial enclosure.
- Nursery and the feeding grounds of fish, prawn and crabs are adversely affected.
- Sea grass meadows are damaged.
- Obstruction of the migratory routes.

- Demand for shrimp post-larvae is encouraging juvenile poaching.
- Fixed engines (nets/traps) prevent the free flow of sediment and water.

*k. Measures for increasing fish production*

- Regulation of fishery activities as per the provision of Orissa Marine Fisheries Regulation Act (OMFRA).
- Complete ban on shrimp culture.
- Routine surveillance by the Task Force.
- Practicing Responsible Fishery Practices.
- Legislation on regulation of fishery in Chilika.

*l. Acoustic Survey of Irrawaddy Dolphins in Chilika Lagoon*

- For the first time, operation of these systems and application of this new methodology for the conservation of isolated Irrawaddy dolphin population of Chilika lagoon is being introduced.
- Telemetric data collection set up with installation stations proposed at 18 locations. Automatic monitoring stations proposed at 4 locations.

*m. Micro planning*

- Micro-plan blended with local indigenous knowledge and appropriate experts' input, for optimum utilization of the natural resources in a sustainable manner is formulated at community level.
- For the involvement of community and sustainability, it is ensured that watershed community share a part of the cost of the treatment towards the watershed development fund which would be utilised for post-project maintenance and improvement of watershed assets.
- The watershed association and the user groups have been able to efficiently implement the micro-plan in consultation with the community.

**Presentation by Addl. Chief Executive**

Shri Chittaranjan Mishra, Additional Chief Executive made a presentation on the achievements under the CSS of MoEF for Conservation and Management of Chilika Lagoon and the programmes under the Special Problem Grants under 12<sup>th</sup> Finance Commission. Highlights of the major achievements under different components of these projects are given below.

**1. Special problem grants recommended by 12<sup>th</sup> Finance Commission**

***a. Catchment treatment***

- For integrated management of the catchment areas of Chilika Lagoon, treatment plan has been prepared using the latest IRS-1C, 1D Satellite data.



***Catchment treatment through Plantation***

- Catchment treatment carried out through management of micro-watersheds in the western catchment through people's participation.
- Catchment treatment through block plantations, rehabilitation of degraded forests have been undertaken through Khurda Division of State Forest Department and also by CDA.

- Six micro-watershed projects taken up in the western catchment areas of the lagoon. About 4333 ha in 3 districts covered under this programme.
- Under Community Development programme 4 health camps for animals and humans and 12 capacity building through training were held.
- Under Work component, 32 loose boulder check dams were constructed; 5 ponds were renovated; one new pond excavated, one water harvesting structure was built.
- Under forestry activities RDF created in 325 ha and Miscellaneous block plantation in 25 ha.
- Under horticulture plantation cashew, mango, pineapple and coconut planted over 110 ha and over 4555 saplings of these fruit varieties distributed.
- Under the component backyard plantations – 2500 Moringa planted.
- Basmati cultivation and vegetable cultivation by SHGs introduced.
- For pisciculture two water harvesting structures and 4 ponds constructed.
- Communication facility – village and forest roads laid.

***b. Plantation programmes***

- 2<sup>nd</sup> year maintenance for 210 ha block plantations in six sites undertaken.
- Natural regeneration with gap planting 200 seedlings/ha over 100 ha in two sites over degraded forest land undertaken.

***c. Fishery Resource Development***

- Total fish landings during 2007-2008 from Chilika was 10051.26 tonnes comprising 6610.23 tonnes of finfish, 3298.08 tonnes of

shrimps and 143.05 tonnes of crabs, as compared to 1745.75 tonnes in 1999-2000.

- ***“Pilot project of Crab Fattening in Chilika lagoon by the local women SHGs as a means of livelihood enhancement”*** is being carried out in village Mahinsa and Gangadharapur of Puri District.
- A **Fish Atlas**, giving details of fish species available in Chilika lagoon being prepared.
- To regulate fishing activities and to remove unauthorised encroachments and enclosure for prawn culture, a Task Force has been created under the Collectors of Puri, Khurda and Ganjam districts.
- For overall development of fishery resources and preparation of Fishery Resources Management Plan, a JICA-CDA technical cooperation project for conservation and wise use of natural resources of Chilika lagoon through community participation is being implemented.

**d. Biodiversity conservation & wise use of natural resources**

*i. Dolphin Survey & Research*

- Of the total world population of 900 Irrawaddy dolphins, 138 are in the Chilika lagoon as per 2008 annual census.



***Irrawaddy dolphin***

- Advanced version of A-Tag data logger (electronic sensors) developed by Japanese scientists deployed for counting dolphins in Chilika lagoon for the first time with close collaboration with IIT-Delhi, WWF-India & State Wildlife wing.
- Systematic studies/research on this species of dolphin being carried out from 2003 onwards.

- A dolphin protection squad established under the Chilika Wildlife Division for protecting and conserving them in the outer channel.
- Sensitisation workshops for fishers and boatmen on conservation of dolphins being conducted.

*ii. Conservation of Birds*

- Nalabana island inside Chilika Lagoon, spreading over 15.53 sq.km. area an abode of avifauna and a paradise for winter migratory birds notified as a Wildlife Sanctuary in 1987 by the Govt. of Orissa.



***Flamingos at Nalabana***



***A flock of birds at Nalabana***

- 8.928 lakh birds observed in the lagoon of which more than 4 lakh birds seen in Nalabana Wildlife Sanctuary.
- Population of Gadwalls, Northern pintails, Northern Shovellers more than one lakh and that of Eurasian wigeon, common pochard, common coot more than 50,000.
- Other bird congregation sites are Badagotha, Tuagamhari, Tinimuhani, Mangalajodi, Nairi, Soran and Kalupadaghata.
- Preparation of a Bird Atlas for Chilika is on progress.
- Restoration and improvement of Nalabana ecosystem, setting up of anti-poaching squads, engagement of bird watchers and rescue centres for ailing birds, etc., initiated.

***e. Improvement of water exchange and salinity gradient***

- Massive desiltation is done through dredging by two crawl cat dredgers, which has helped in migration of dolphins, fishes, shrimp & crabs.
- Over 6.15 lakh cu.m dredging carried out during 2007-08 in Magarmukh channel, Balugaon channel and ferry route.
- Environment Impact Assessment and sediment core analysis is being done.
- Bathymetric study of entire lagoon completed.
- Excavation of Palur Canal initiated to facilitate water exchange and migration of fish.

***f. Socio-economic improvement***

- Construction of community hall at Balabhadrapur and Bichhanapalli.
- Construction of landing centres at Barahampura and Keshpur.
- Saline embankment at Gabakunda and Kharibandha
- Environment Awareness Centre at Bhusandapur.
- Extension of approach road to Alupatna.
- Community fish drying yard at Pathara.

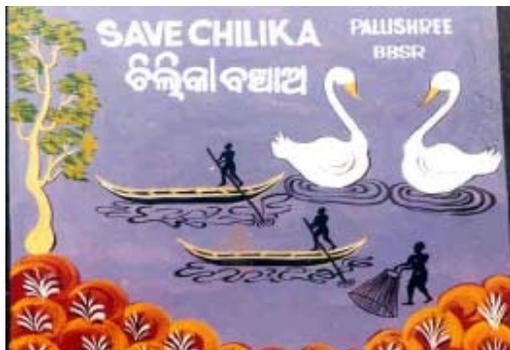
- Approach road to Gournagapatna with protection wall.
- Excavation of creeks at Nuapada, Kalupadaghata (Jaganathapurpatna).
- Solar street light systems provided in 20 island villages/remote human habitations.

**g. Wetland research, training, monitoring & assessment**

- Wetland Research & Training Centre at Chandraput, an institute first of its kind in India, developed with 10<sup>th</sup> Finance Commission Grants in the year 2002.
- Facilities provide excellent opportunities for *in-situ* advanced research in the field of Wetland management.
- Research undertaken includes monitoring of physico-chemical and biological characteristics of Chilika, sediment transport, biodiversity, fisheries resource assessment, crab fishery, biology of Irrawaddy dolphins, etc.

**h. Outreach programmes**

- For wise use of lagoon resources and to safeguard the interests of local communities different training and awareness activities were undertaken under outreach programme.
- Seventeen Training programmes and Workshops were held between March 2007 and February 2008 on various aspects of wetland conservation and management, resource conservation, capacity building, dolphin and bird census, biodiversity conservation, etc., for participants from within and outside the country including officials, school teachers, NGOs and stakeholders at grass root level.



- An Eco-park at Satapada is being developed over an area of 1.72 acres with 315 metre perimeter. Model of Irrawaddy Dolphin, sculptures, swings, Chips Mural, Signages, Sand sculpture area, etc. are provided for the amusement and recreation of tourists, students and people of the locality.

- At the Visitors' Centre, Satapada, facilities like signages, Photo text panels, Working models, Life size models, Interactive sound system, Touch screens, Paintings, Aquaria, Bird diorama, auditorium and Children's play area have been upgraded.



***Visitors' Centre at Satapada***

- A massive environmental education programme on environmental protection of Chilika lagoon for school children covering 101 secondary schools initiated.

***i. Development of Communication network***

- A bridge over Palur canal and another bridge over a channel of Chilika lake in village Poisana have been constructed by CDA facilitating road communication to the villages of Krushnaprasad block up to Jahnikuda.
- Approach road to the fish landing centres and improvement of village roads specially for the fishermen villages located in inaccessible areas are undertaken.
- Ferry services carrying vehicles and people are in operation between Satapada and Jahnikuda, benefiting more than 70,000 people

**2 CSS of MoEF on Conservation & Management of Chilika Lake**

Action plan for Integrated Sustainable Management of Chilika lagoon with an objective to achieve the sustainability and participatory planning for conservation and wise use of the natural resources of Chilika lagoon with active participation of local community, was sanctioned by MoEF, Govt. of India during 2007-08 at an estimated budget outlay of Rs. 90 lakh. The components of the project are: (a) Catchment treatment with plantations, (b) Community development such as desiltation/renovation of ponds, drinking water supply and provision of solar lights, (c) Bio-diversity conservation, (d) weed control and (e) Environment education and awareness.

Catchment treatment work (Block plantation and Gap planting) is being implemented in 289 ha.

### **3 *Micro watershed projects under Integrated Wetland Development Programme-II.***

- Ten nos. of micro-watershed projects covering a total area of 8434.49 ha., in Banapur Block of Khurda District have been taken up in the western catchment areas, with MoRD funding support.
- Horticultural plantations over 648.72 acre., agricultural crop over 29 acre, and afforestation plantation over 53 acre carried out. Four dug wells and 5 water harvesting systems were also set up in these watersheds.
- Out of Rs. 133.20 lakh received as financial support from IRDA, Rs. 79.42 lakh has been spent leaving an unspent balance of Rs. 53.78 lakh at the end of the financial year 2007-08.

### **4 *Celebration of World Wetland Day 2008***

- World Wetlands Day-2008 was celebrated on 2nd February 2008 at Rambha in the southern shore of Chilika Lagoon.

### **5 *Research & other publications***

- Nine papers were published and three papers in print/accepted for publication.
- Publications from CDA during 2007-08 are:
  - Wise use of Natural Resources of Chilika lagoon (ICEF) - Booklet
  - Chilika A Ramasar Site – Brochure
  - Brochure for stakeholder for Chilika (In Oriya)
  - Chilika Atlas (ICEF)
  - Save Chilika map