REPORT ON THE EXPERT GROUP MEETING

TO DEVELOP INDICATORS TO ASSESS COASTAL ECOSYSTEM HEALTH

Organized by
Chilika Development Authority (CDA)
and
National Centre for Sustainable Coastal Management (NCSCM)
Ministry of Environment and Forests, Government of India

in partnership with

Institute for Ocean Management, Anna University, Chennai
United Nations Environment Programme (UNEP)
Bay of Bengal Large Marine Ecosystem Project (BOBLME)
and other partners of the
UNEP/GEF Global foundations for reducing nutrient enrichment and oxygen depletion from land based pollution, in support of Global Nutrient Cycle Project.

June 2012

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Introduction and background

Chilka Lake is a brackish water lagoon, spread over the three districts (Puri, Khurda and Ganjam) of Orissa state on the east coast of India, at the mouth of the Daya River, flowing into the Bay of Bengal, covering an area of over 1,100 km^2. It is the largest coastal lagoon in India and the second largest lagoon in the World. It is the largest wintering ground for migratory birds on the Indian sub-continent. The lake is home to a number of threatened species of plants and animals. In 1981, Chilika Lake was designated the first Indian wetland of international importance under the Ramsar Convention.

The lake is an ecosystem with large fishery resources. The highly productive Chilika lagoon eco-system with its rich fishery resources sustains the livelihood for many fisher men who live in and near the Lagoon. According to some estimate it sustains more than 150,000 fisher–folk living in 132 villages on the shore and islands. The water spread area of the Lagoon ranges between 1165 to 906 km^2 during the monsoon and summer respectively. A 32 km long, narrow, outer channel connects the lagoon to the Bay of Bengal. Three hydrological subsystems control the hydrology of the lake. The land based system comprises distributaries of the Mahanadi River on the northern side, 52 river channels from the western side and the Bay of Bengal on the eastern side. Two of the three southern branches of the Mahanadi River that trifurcates at Cuttack, feed the lake. 61% (850 cubic metres per second (30,000 cu ft/s) of the total fresh water inflow into the lake is contributed by these two branches.

For the sustainable management of the Chilka lake, the Chilika Development Authority (CDA), a parastatal body has been created under the administrative jurisdiction of the Ministry of Forest and Environment, Government of Odisha, India. The CDA is mandated among others; to protect the Lake ecosystem with all its genetic diversity; to formulate the management plan for integrated resource management and wise use of the lake's resources by the community depending on it; to execute multidimensional and multidisciplinary developmental activities either itself or through other agencies and to collaborate with various national and international institutions for development of the lake.

Given the dynamic nature of wetland ecosystems, Chilika is also open to influence from several natural and human factors taking place within the Mahanadi River Basin as well as the coastal processes within the Bay of Bengal. It was therefore considered important to develop a plan for or better understanding of the ecosystem linkages and its health and how the Chilika ecosystem needs to be managed. Given this perspective, to make informed choices and allocating scarce

resources to their most productive use, the CDA entered into dialogues with various partners and also joined Global partnership on Nutrient Management (GPNM), which among others was advocating for application of "ecosystem health report card" as a tool to monitor among others the impacts of nutrients load into coastal waters.

This pilot initiative to develop and use the 'ecosystems health report card' in Chilika lake, has been supported by the United Nations Environment Programme (UNEP), Bay of Bengal Large Marine Ecosystem Project (BOBLME), Institute for Ocean Management, Anna University, Chennai India; National Centre for Sustainable Coastal Management (NCSCM), Ministry of Environment and Forests, Government of India and other partners within the framework of the UNEP/GEF Global foundations for reducing nutrient enrichment and oxygen depletion from land based pollution, in support of Global Nutrient Cycle.

The Expert Group Workshop

The Chilika Development Authority (CDA), Government of Odisha, India with technical inputs from the Institute for Ocean Management, Anna University, Chennai and National Centre for Sustainable Coastal Management (NCSCM), India organized an expert group meeting and an inception workshop, to develop indicators and values for establishing ecological thresholds in determining the coastal ecosystem health report card. This three day workshop was held from 25th to 27th June, 2012 at the Wetland Research & Training Centre, of Chilika Development Authority (see Annex 1 for the agenda).

The Inception workshop and the Expert Group Meeting were inaugurated by Dr. Anjan Datta, Programme Officer, UNEP on 25th June, 2012. The prime focus of the workshop was to integrate and assemble the different stakeholders in the coastal management in a common platform to deliberate on the ecosystem health. The agenda of the technical sessions of the workshop are given in Annexure I. The workshop was attended by thirty participants from ten leading organisations of international, regional and national importance and also by the non-governmental organisations and representatives of the Primary Fisherman Cooperative Societies (PFCS). The list of the participants is given in Annex 2.

The deliberations included six technical sessions with 16 papers on related issues in Lake Management. Besides the technical session; there was an exclusive participatory session on the stakeholder's response; which was participated by the grass root level local NGOs and members of the PFCS.

The tools for assessment of nutrients load into the Chilika Lake vis-a-vis the tools for the health report card was elaborately discussed for arriving on the essential parameters for the report card assessment by the scientists from the National Centre for Sustainable Coastal Management. The use of similar monitoring tools and experiences of Manila Bay was presented by Mr. Robert Jara, Programme Officer, Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) who are working among others to restore the health of the Manila Bay, Philippines, while Ms. Adelina, C. Santos Borja, Officer-in-charge of Resource Management and Development Department of Laguna Lake Development Authority, Philippines shared their experiences of nutrient management in Laguna de Bay and discussed on the need for such monitoring tools in respect of Laguna de Bay. Prof. Bijoy Mishra of Harvard University/NASA, USA provided valuable feedback on the various presentations and was also very generous to share his ideas on the way forward particularly issues that should be attended to in the development of the management plan.

In technical sessions of this expert group meeting, there was a broad consensus that human impacts now dominate the global nitrogen cycle. Over the last century the world has changed massive change in the global nitrogen cycle which had been relatively unchanged for millions of years. Population, affluence, and technology (P-A-T) continue to be critical determinants of nutrient loading. From various presentations it was also evident that global use of nutrients (nitrogen and phosphorus) continues to accelerate, particularly in Asia, and present modus of agricultural production system and animal husbandry are major drivers. Further, climate change has already had a noticeable effect on sensitivity of coastal systems to nutrient pollution. The participants therefore deliberated in understanding the scale and magnitudes of global nitrogen cycle change, and deciding on “Tools” not only for prediction but to integrate observational data to allow more meaningful cross-system and baseline comparisons for stakeholders and decision makers. Therefore it was considered important for ongoing monitoring of the Chilika Lake to understand dynamics of anthropogenic loads of nutrients. The meeting reiterated that ‘we will not be able to correct problems if we choose not to observe them’.

Following from above, it was decided that the data on physical, chemical, biological and microbiological parameters; that are collected on a regularly basis from different ecological sectors by CDA for assessing water quality parameters would form the basis for generation of the report card. Accordingly, the data was shared by Chilika Development Authority with the NCSCM, Chennai, based on this NCSCM has proposed a report card and also prepared a report outlining the ecosystem health index and this is summarised in the technical report that follows.

In the stakeholder meeting, which was attended by the non-governmental organisations and the representatives of the Primary Fisherman Cooperative Societies, it was observed that there was an overwhelming acceptance on the idea of report card model for Chilika Lake. In the stakeholder discussions, the following critical issues were also flagged by the members, they include: need for inclusion of data on fishery resources as a criterion in the health card, besides the other criteria like growing menace of *Phragmitis karka*, overfishing and prawn *gherries* (lake water partly enclosed for cultivation of prawn) would also be included as a tool in the assessment. The participants agreed to incorporate fishery data in the proposed ecosystem health report card that should be used as a monitoring tool in the Chilka.

The valedictory session of the three day workshop was chaired by Shri. R. K. Sharma, IAS, Principal Secretary, Forests and Environment Department, Government of Odisha, who impressed upon the need of the health report card of Chilika Lake to be user friendly especially to the local communities and stakeholders. The summary of the three day deliberations was presented by Dr. Anjan Datta, Programme Officer, UNEP and by Dr. Ajit Kumar Pattnaik, IFS, Chief Executive, Chilika Development Authority. The workshop also included a field visit to give the participants some exposures to the lake ecosystem and the management interventions presently on-going in the Chilika Lake.

western catchment (Pattnaik, 2002). The lake and the rivers experience heavy flooding during monsoon months. In association with strong wind, the sea level is elevated and affects the drainage of flood water to the sea. Therefore, the lake that receives large amount of silt load and fresh water obviously has no out flow to the sea and act as a sink of terrestrial material slowly increasing its shallowness, creating a chaotic environmental condition. The reason behind this sedimentation process also includes automatic closing of the inlet mouth due to littoral drift.

Salinity gradation in the lake ranges from seawater strength to freshwater, due to the influence of both semi-diurnal tides and perennial freshwater inflow from one of the largest rivers in India, the Mahanadi. Salinity is one of the most dominant factors which determine the ecosystem of the lake. However the sediment buildup at the mouth of Chilika and the Palur canal connecting the lake with the ocean had reduced the saline water influx over a time period. Ghosh and Pattanaik, 2005; observed a sharp decline in average salinity in the Lake from ~22.0 to ~2.00 in between 1957-58 to 1995 and according to them, this reduced salinity is due to the reduced inflow of saline water caused by narrowing of the lagoon mouth.

The Chilika Development Authority (CDA) has opened a new mouth in 2000, by which the salinity gradient in the lake changed with significant improvement of the lake ecosystem. Siltation, declining salinity and nutrient inflows led to extensive macrophyte growth. The lake is characterized by dense macrophyte vegetation in the northern and western bank of the lake. Macrophytes belonging to Algae, Pteridophytes and Angiosperms are identified and are further divided into submerged, emergent and floating but also rooted vegetation type.