Management of Biological resources of Chilika Lake, Odisha, India

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***Abstract*—The Chilika Lake is one of The Asia's largest brackish waters with rich biodiversity. It is the winter ground for the migratory Avifauna in the country. This lake is a highly productive ecosystem for several fishery resources more than 1.5 lakh fisher folks of 132 villages and 8 towns on the bank of Chilika directly depend upon the lagoon for their sustenance based on a unique biodiversity and socio-economic importance. The lagoon also supports a unique assemblage of marine, brackish water and fresh water biodiversity. The lagoon also enriches with avi flora and avi fauna, fishery fauna and special attraction for eco-tourism. The status of fisheries in Chilika Lake on the east coast of India is in a critical state. Local fishing communities feel that catches have reduced significantly and they face more hardships now to sustain their livelihoods. State interventions through mechanization and new regulations have undermined the traditional management strategies leading to conflicts between different stakeholders and decline in traditional fisheries. There is a growing realization that without traditional fishing community's participation it is not possible to ensure sustainable use of the lake resources. The other major components of the restoration are based on the management of lagoon by local community participation for the sustainable of the ecosystem. A wise step is taken by CDA for conservation and management of lagoon is that the salt sustainable mechanism and integrated the terrestrials aquatic resource management.**

***Index Terms*—Biodiversity, Chilika Lake, CDA, Conservation & management, Lagoon, Eco-system, Avi-fauna, Fisheries, Fishing Community.**

I. INTRODUCTION

The Chilika Lake is a brakish water lagoon, located betweenthe Puri, Khurda & Ganjam districts of Odisha state, on the east coast of India at the mouth of Daya river, flowing into theBay of Bengal. It is the largest coastal lagoon, in India and second largest lagoon in the world.

The lake is situated in between latitude $19^0$43'N and longitude $85^0$19'E, of the globe. 35 number of streams like Bhagravi, Daya, Malguni Nuna etc. inflows to Chilika and two number of outflows from Chilika to Bay of Bengal like old mouth at Arakhakuda and new mouth at Satapada. This lake having a catchment area of 3560 km^2 and is maximum length is km^2, depth. The surface area of water varies winter season. Several islands are located in the lagoon covering an area of 223km^2. the major islands are Kalijai, Barakuda, Ghantasila, Nalabana etc. Plant resources which include more than 546 angiospermic species 379 genera and 107 families, 100 phytoplankton genera, 20 seaweed species and 7 pteridophyte species were studied by Biswas (1932), Mooney (1950). Plankton diatoms and their periodicity in Chilika during 1950-51 was studied by Roy (1954). Patnaik (1973, 1980), Panda and Patnaik (1988) and Panigrahi (1988).

A pollen analysis study indicates that the oldest sediments in the lake are 13,500 years old. At that time, Chilika was a river mouth or a river delta with fresh water vegetation. With increase in the sea level, after 9,500 years, the area became an estuary with mangrove vegetation. The lagoon is divided into four sectors like Northern, Central, Southern and Outer channel

It is the largest winter ground for migration birds on the Indian sub-continent. The lake is home for several threatened species of plants and animals. The lake is also ecosystem with large fishery resources. It sustains more than 1.5 lakh fisher – folks living in 132 villages on the shore and islands. The lagoon hosts over 230 species of birds on the pick migratory season. Birds from as far as the Casparian sea, lake Baikal, remote

part of Russia, Central and South Asia, Ladhak and Himalaya come here.

Access to resource bases will always be characterised by the above determinants to lesser or greater degrees. In developing countries, where state regulation may be weak or absent, these access determinants will dominate the interactions that users have with their resource bases. In these contexts, it is important to understand what factors govern the access to a resource base, so that socially acceptable and efficient systems of management can be allowed to continue given that the state alone cannot be relied upon to deliver an appropriate managerial input.

The Chilika lagoon is identified as one of the hotspots of biodiversity in India. Based on unique biodiversity and socio- economic importance, India designated Chilika lagoon as a wetland of international importance under the Ramsarconvention in 1981. A study published by the Salim Ali Centre for Ornithology and Natural History, Coimbatore says that between 1991-2001, India lost 40% of its wetland. The National Wetland Conservation Programme was started in 1987. India's wetlands are extraordinarily diverse-ranging from lakes and ponds to marshes, mangroves, backwaters and lagoons, and play a vital role in maintaining water balance, flood prevention, biodiversity and support food security and livelihoods.



Fig. Satellite view of Chilika

II. MATERIALS AND METHODS

After several visit was undertaken to the site during the year 2022 and biodiversity of Chilika lake was noted various information and data were collected during interaction with local inhabitants as well as the Chilika Development Authority.

III. THE STUDY AREA

Chilika lake falls within the state of Orissa and is the largest brackish water lagoon with estuarine character that sprawls along the east coast. The water spread area of Chilika varies between 1165 and 906 km^2 during the monsoon and summer seasons, respectively. It is the largest wintering ground for migratory waterfowl on the Indian sub-continent.

IV. RESULT AND DISCUSSION

The following data were detected during the study period:

Eco-Tourism

At present Chilika has little by way of ecotourism several brochures published by the Odisha State Tourism Department (OSTD), highest the recreational, religious, historic and science beauty of Chilika Lake, state of interest at Chilika includes

(i) Rambha Bay: It is situated at the southern end of the lake. There are number of inviting islands with an excellent site for water sports, camping sites.

(ii) Becon Islands: It is an architectural marvel with a conical pillar and a small room constructed on a sub-merged mass of rocks.

(iii) Breakfast Islands: It is a pear-shaped island. The

Bungalow constructed by the king of Khallikote. The flora of the island is quite interesting.

(iv) Honeymoon Island: Britishers used this island for picnicking. The water around the island is very clear and dark blue in colour.

(v) Somoto & Dumkudi – Situated in the central and southern sectors of the lake, these islands are inundated remnantsof the Eastern ghats through rocky, they are rich in Flora and Fauna.

(vi) Birds Islands: It is situated in the southern sector of Chilika Lake. This is a hillock with huge exposed hanging rocks. The island is covered with herbs, shrubs, trees and creepers. The granite rocks are the remnants of Eastern Ghats.

(vii) Kalijai Temple: Kalijai Temple is situated on an island considered to be the above of the Goddesss Kalijai. She is venerated due to the folklore and the legend. An excellent destination.

(viii) Satapada: Located on the eastern shore of the lake. It is bounded by the lagoon on three sides and thus offers anexcellent view of the lagoon. One main attraction Satapada is Irrawady Dolphins.

(ix) Sand bar and mouth of Chilika lagoon: A beautiful and endless unexplored stretch of empty beach exists across the sand bar which separates the lagoon from the sea.

A great expanse of water like Chilika Lake holds considerable tourism potential. Almost all parts of Chilika are easily accessible and rare proximate to the so-called Golden Triangle of Odisha Tourism which enjoys brisk tourist traffic for at least 3 to 5 months a year.

Avi-Fauna:

Over a million of birds congregate in this waterbed for feeding and roosting, migration commences in late September and the birds remain upto April. Birds belonging to over 230 species including 14 birds of prey (32% aquatic, 22% waders and46% terrestrial birds). 95 species are intercontinental and local migrants. Flocks of migratory, waterfowl arrive from as far as the casparion sea, lake Baikal, Remote parts of Russia, Central and South East Asia, Ladakh and Himalaya for feeding and roosting, 15 species of ducks and two species of geese, cover over 70% migratory birds which visit this lagoon annually, 15% waders, 12% pelicans, 1.5%grebes, 1% kites and eagles and 0.5% kingfishers.



Fig. 2 Birds in Chilika

Fishery Fauna of Chilika:

Different types of fishes are found in Chilika, they come from different inflow channels (rivers) and outflow channel (sea). The total number of fish species is reported to be 158. The great fishery diversity is due to different salinity condition in different season. So this fauna, is not a uniform habitat. Since from last few years, sudden reduction in quantum of catch of native varieties. For their conservation, CDA and fishery Department implemented various measures.



Fig. 3 Fishes in ChilikaEndangered species of Chilika Most natable endangered species are available in the lagoon.

Barakudia insularis (Limbless lizard) Irrawaddy dolphin (orcaella brevirostris) Felisviverrina (fishing cat)

Haliaeetus leucogaster (white bellied sea eagle) Platalea leucorodia (white spoon bill) Pandion haliaetus osprery

Eurynorhynchus pygmeus (spoon billed sandpiper)

Arribada of olive ridley sea turtles:

The mass nesting beach along the Chilika coast is at Rushikulya which is located at the Southern Odisha

coast. It spread over six km straight from coast like in front of village Purunabandha, Kantiagada of Ganjam district. The nesting beachis much wide more or less flat with sea and sand dunes of 1-2m high. The average beach width is about 100m from near the high tide line about 200000 turtles estimated to have nested.



Fig 4 Olive ridley at Chilika coast, Rushikulya





Fig. 5 Dolphin in Chilika

Crabs of Chilika:
Chilika lake has a rich source of Brachyuran crabs with 45 number of species found in different eight families, like Grapsidae, heucosida, ocypodidae, potrunidae, Gecarcidae, Calappidae, parthenopidae and majidae

Threat
Chilika lake is threatened by siltation, eutrophication, change in salinity, proliferation of fresh water weed, increased aquaculture activities, change in species composition, depletionof bioresources, decrease in fish population etc.

Conservation and management strategy:
The wetland is important for sustainable development of bioresources. Its degradation is so severe that the Chilika Development Authority was formed to restore and conserve the lake.
The state Environment Department and the CDA have taken several measures for conservation and management of this unique wetland and its rich biodiversity with the support of theMinistry of E&F, Govt. of India.

* Protection of migratory waterfowl and other speciesprone to poaching for meat.
* Catchment area treatment
* Weed control
* Restoration of feeding and roasting habitat of waterfowl
* Pollution control
* Creation of awareness about the values and function ofwet land
* Research and development activity
* Community participation
* Capacity building
* Building of database of lagoon
* Promotion of eco-tourism

Dolphin in Chilika Lagoon:
Endangered dolphins have been recorded in Chilika Lake between east coast and sundarban delta. These are protected under Wild Life Act, 1972. Presence of this species indicates rich piscine population. At present 1561 Dolphins are scattered over different parts of the lake. For maintaining ecosystem and economy dolphin play a vital role. So the authority trying hard to conserve the species from unusual mortality.

The salient features of the policies adopted for conservation of Chilika fisheries under Marine Fisheries Act introduced in 1988 are i. Fishing by any method is prohibited in Palur canal throughout the year, ii. Capture of Khainga, Kabla, Bhekti below 150mm size and prawn like Bagda and Chapra varieties below 100mm size by any means is prohibited throughout the year. iii. Fishing is completely prohibited in the outer channel of Chilika Lake during the months between December and January, iv. No fishing by means of net shall be allowed in the outer channel throughout the year. v. At Balugaon, Khordha fishery training centre has been established. Training programmes for fishery extension officers, officers of marine science department and fishcultivation are also imparted here.

V. CONCLUSION

Asia's unique largest wetland is one of the hotspots of Biodiversity with ecology and bioresources. This lake has characteristic of fresh water, salt water and brakish water creating on extraordinary environment due to efficient nutrient cycle. The lagoon in view of its biodiversity creates a number of sites for eco-tourism and excellent centre for research.

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