Conservation, Restoration and Management of Chilika Lagoon, East Coast of India

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ABSTRACT

Chilika is the largest brackish water lagoon of India. It is a pear shaped lagoon wider in the northern sector then the southern sector region. The lagoon was opened to the sea at Arrakhakuda which is known as outer channel or Magarmukh and the lagoon was connected to the Rushikulya estuary by the Palur channel. The Magarmukh mouth and channel has been silted and there was no free flow of water from the sea to the lagoon and vice-versa. The total area of lagoon was 1165 sq Km during monsoon and 906 sq.Km during summer. Due to siltation and erosion the area has been reduced to 1050 sq.Km during monsoon season and 740 sq. km during summer. The water depth was 4.5 meters and now it has been reduced up to 0.91 meter only. The salinity of the lagoon has drastically changed and infested with aquatic weeds. A new mouth has been opened by Chilika Development Authority (CDA) near Sipakuda during September 2000. Now the water quality ,fish production and reappearance of few species has been observed in Chilika lagoon. A constant inflow of silt of about 13 million tonnes annually entering in to the lagoon. Therefore, dredeging operation has been implemented to check the siltation by the river runoff and soil erosion. The step taken by the CDA, NGOs and fishermen community for conservation, restoration and management of Chilika lagoon has been discussed in detail in this paper.

INTRODUCTION

Chilika is the largest brackish water lagoon of India. Ecologically it is a wetland of international importance. It is pear shaped brackish water lagoon located on the east coast of peninsular India. It stretched over three districts namely Puri, Khurda and Ganjam. It is separated from the Bay of Bengal by a barrier spit attached at its Southern end (Venkataratnam, 1970). The Chilika lagoon can be divided into four sectors depending on the hydrological parameters. The four sectors are Central sector, Northern sector, Southern sector and the Outer channel.

The Chilika lagoon has originated since long due to the earth's crustal moment causing depression for holding water. Actually some of the most remarkable lakes in the world has been originated due to tectonic phenomenon and therefore rightly called tectonic lagoon based upon the observation of the Blanford(1872) and Venkataratnam (1970). Chilika lagoon may be well regarded as tectonic in origin. There are 52 rivers and rivulets

draining into the lagoon. The water depth varies from 0.38 to 4.9 meters during different season of the year. The physical parameters like temperature varied from 17.5 – 32 °C (Banerjee and Roy Choudhury, 1966). Now the temperature has increased up to 35.6°C to its maximum (Nayak and Mohanty, 2006).

The salinity varied from trace to 36.0 ppt during 1966 and reduced to 0.35 – 32.25 ppt during 2005.Similarly the transparency has varied from 0.3 – 1.4 meters during 1966 and reduced to 0.43–0.83 meter during 2005. Many organisms starting from microorganism to the spectacular dolphins are found in the Chilika lagoon. Due to anthropogenic pollution, human activities, siltation, reduction in salinity and excessive growth of fresh water weeds, some important fish species and crustacean are disappearing from the lagoon.

RESTORATION

The lagoon has been facing multidimensional ecological and anthropogenic pressures leading to an overall loss of biodiversity and productivity adversely affecting the livelihood of the local communities who have been depending on the lagoon. Construction of major hydraulic structures on the river systems and the change in the land use pattern in the catchment area are also responsible for the alternation in the flow into the lagoon. The root causes of the degradation of the lagoon were due to siltation, shifting and siltation of the inlet channel, decrease in salinity, decline in fish landing, proliferation of fresh water weed and invasive species, poor discharge of flood water leads to water logging in the peripheral cropland, unauthorized shrimp culture, setting of khanda jal etc.

The Chilika lagoon has been degraded due to several factor .The drainage of 52 large river and nalas bring about 13 million tones of silt per year .The outer channel i.e. Magarmukh has been closed due to physical process of the sand bar between the lagoon and the sea. The soil erosion has reduced the area of the lagoon from 1165 sq km during monsoon season and 906 sq km during summer to 1050 sq km during monsoon season and 740 sq km during summer. The degradation due to siltaton and soil erosion has taken several years which is cost effective and time consuming. The salinity has been reduced from 36ppt to 32.25ppt within a prolonged time period (Banerjee and Roy Choudhury, 1966,Nayak & Behera,2004 and Nayak & Mohanty,2006).Culture of shrimp through gheri culture,using of Daudi jal, Khanda Jal, setting of shrimp traps etc.So severally affect the wet land ecosystem. Therefore immediate steps should be taken for the restoration of the lagoon. The siltation and decrease of depth can be restored by way of dredging the lagoon regularly and dispersing mud with silt at a greater distance from the lagoon .To improve the range of salinity the Magarmukh area as well as the new mouth opened at Sipakuda should be deepened. This will facilitate for free flow of water between the lagoon and the sea. So that the salinity will increase in the lagoon. In the southern sector which was connected to the Rushikulya estuary through palur channel

should be reopened. So that the salinity of the southern sector will also increase.Gheri culture, use of Daudi jal, shrimp traps etc should be strictly banned inside the lagoon. The growth of aquatic weeds can be utilized by way of using as the fodder or to extract agar agar from the weeds, so that the decrease of depth around the periphery of the lagoon can be checked.

The local communities are to be considered as an integral component of wetland ecosystem, their socio-economic requirement should be met but without compromising the integrity of the ecosystem .If it is achieved then our ecosystem can be restored and be more sustainable.

CONSERVATION

Planned management of natural resource or the total environment of a particular ecosystem is to prevent exploitation, pollution, destruction or neglect and to ensure the future use of resources.

Natural resources are classified as either renewable or non renewable .Living resources –animals and plants can produce or renew them selves, minerals and fuels can not .Although protecting uncultivated land from poachers and loggers can some times be difficult .Natural parks and nature preserves are maintained on a wide scale in some countries. These preserves protect endangered species and afford natural laboratories for research. Fisheries as well as wild life parks help in increase natural resources by humanity is necessary to conserve the environment for the future.

The root causes of the degradation of the lagoon were due to siltation ,shifting and siltation of the inlet channel, reduction in salinity, decline in fish landing proliferation of fresh water weeds and invasive species ,poor discharge of flood water leading to water logging in the peripheral land areas, unauthorized Gheri culture, encroachment of peripheral land of the lagoon ,soil erosion etc.The ecosystem approach is strategy for the integrated management of the land, water and living resources that promotes conservation and sustainable use in an equitable way.

Government of India has sanctioned Rs 27 crores to remove the silt from the lagoon and to carryout the developmental work at Chilika lagoon. Due to this activity the lagoonal ecosystem diversity ,physicochemical parameters can be mentained.Chilika Development Authority has opened a new mouth at Sipokuda on 23rd September 2000.So that the salinity has been increased in outr channel as well as in the central and southern sectors .The average fish landing from 1600 metric tones in the year 2000-01 (prior to intervention) has improved to 14,000 metric tones in 2003-04 due to opening of the new mouth .48 species of fish,4 species of shrimp and 6 species of crab were the new record of chilika after the opening of the new mouth. The weed spread area was 20sq km in 1972 which proliferated to 681.70 sq. km by may 2000.After opening of new mouth ,the weed free area has come down to 508.51 sq km computed through the image processing technique.

The Gheri culuture and encroachment area should be evicted fully by the Government. The peripheral areas should be planted with trees to check the soil erosion .Gully control should also be made to reduce the siltation as well as soil erosion so that the conservation strategy can be achieved.

The use of the term conservation is expanded to consider the environment as a whole. Today, from the ecological point of view, it is the science of the interrelationship between living things and their environment. Modern conservation then can be defined as the management of the human use of environment so that it may yield the greatest sustainable benefit to the present generations. It is concerned with the quality as well as the basic support of human life .Conservation also ensures that proper consideration is also given to ashethtics and recreation.

The demand of intensification of agriculture is to be supported by irrigation, chemical fertilizer and pesticides. The upstream erosion and sedimentation process in the lagoon directly contributed to the loss of depth of lagoon and also to the chocking of mouth, this in turn, led to decline the salinity which resulted in rapid growth of fresh water weed species and macrophytes disturbing the delicate ecosystem of the lagoon.

Legislation to improve the present status of fishery resources in the lagoon is to be given top priority and the salient features of such measures may be indicated here under:

1. The first and foremost requirement is that the Ghery culture in the lagoon should be strictly banned to minimize the pollution of the lagoon.
2. A constant inflow of slit, 13 million tones per year, due to soil erosion in the catchment area and the river run off is chocking the lagoon mouth. Therefore, dredging work should be done continuously to reduce the rapid siltation.To increase salinity ,the mouth (Maggarmukh) should also be opened by dredging .The explosive growth of weeds can be checked due to increase in salinity ,of the lagoon and the recruitment of fish stock can also be made due to opening of the new mouth of the lagoon (Nayak,2003).
3. The area of the lagoon has been diminishing by about 1.5 sqkm .per year since 1925 due to natural siltation process and reclamation of marginal areas of agriculture, prawn farms, salt pans and construction of star hotels. Therefore, plantation of mangroves and casuarinas should be taken up by the Government to check the siltation process from erosion.
4. Over fishing and over exploitation of prawn and edible crabs and fishes should be checked by creating general awareness among the local fishermen.
5. The rapid growth of human population on the periphery of the lagoon should be checked so that the pollution from domestic sewage, pesticide, agricultural, chemicals and industrial effluents can be minimized to some extent which has a long term benefit to the lagoon.

6. Smaller fishes should not be caught from the lagoon, collection of the fish and shrimp seeds from the lagoon should be stopped.
7. The socio-economic condition of lagoon fishermen is very low .So; the socio-economic status should be improved by engaging them in developmental work, as an alternative source of their income.
8. The children of the coastal fisherfolk should be educated properly for the better management of the lagoon.
9. The bird sanctuary of the Nalabana of Chilika lagoon should be developed and the bird poachers should be punished strongly in accordance with the Wild life protection Act. Low salinity tolerance mangrove plants should be planted near the Nalabana area for perching of birds.
10. Increased number of motorized boats has become a matter of concern as they are causing oil pollution. Operations of a limited number of motorized boats should be imposed through regulation.
11. Processing plants and ice plants set up along the shore of the lagoon should not release untreated waste water into the lagoon.
12. Prohibition of cattle and buffalo grazing during summer in and around the lagoon will help the local birds to lay their eggs in the ground.
13. Efforts should be made to create a sense of belonging of the local people for the environment and the ecosystem.
14. Long term research is required by organization for proper management and monitoring of the lagoon.

MANAGEMENT PLAN FOR CHILIKA LAGOON

Chilika is a complex and sensitive ecosystem which requires an integrated management plan on the best available scientific knowledge and targeted research. The CDA has made a plan to implement a more ecologically beneficial hydrologic regime to improve the water quality .Recovering the lost habitat of the important species, enhancement of the fishery resources and controlling the invasive species .The ecotourism sector in chilika lagoon should be developed for the poverty elevation of the local community .The restoration process was set through adaptive planning and was done through successive cycles .In each cycle a set of goals is being achieved .After completion of one cycle a new one started with better and deeper understanding from the lesson learnt from the previous one. The fund received by CDA has been utilized for the restoration, conservation of biodiversity and management of this critical habitat..

CONCLUSION

The issues associated with restoration of wet land are invariably vast in scale and also ecologically, hydrologically and socio-economically complex ,that warrants a meticulous integrated management planning to address them .We will plan, formulate and also execute them for conservation ,restoration and management of the Chilika

lagoon .Naturally the lagoon has been created and one day it will vanish. It is a time period where man can prolong the process for vanishing. Recently on 1st of August 2008 again a new mouth has opened just 800meters towards north of the (New mouth) Sipakuda mouth having 70 meter wide. This mouth has been wider and reached up to 450meter,on 10th August 2008 (Samaj, 2008). Therefore, let us come together for the maintainance, restoration and conservation of naturally formed lagoon, so that it will help us to lead a better life.

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