

MANAGEMENT ACTION PLAN OF LOKTAK LAKE.

AN OVERVIEW



BY

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INTRODUCTION.

The goal of sustainable Development and water Resources Management of Loktak lake is to improve water management of the lake and sustain its resources for the benefit of the local communities on a long term basis. The sustainable Development and water resources Management of loktak adopts an integrated approach based on sound scientific principles of wetland management to ensure conservation and sustainable utilization of resources at basin level. The strategy emphasis on shifting the focus from sectoral approaches to an integrated management with a focus on catchment Conservation, Water regime management, Sustainable resources management of course with Community Development.

Loktak lake ($93^{\circ} 46'$ - $93^{\circ} 55'$ E and Lat. $24^{\circ} 25'$ - $24^{\circ} 42'$ -N). The Loktak lake is a flood plain wetland of Manipur river, which used to be flooded by its lateral flows as well as backflow of water from Sugru hump, besides confluences of several rivers like Chapki are responsible for inundation of large areas. The Loktak lake comprises several smaller lakes locally called Pats, which become one sheet of water during monsoon .The lake used to experience large fluctuations in the water level during the year, so that these pats were separated during the low water phase and merged into one sheet of water during high floods. The commissioning of Ithai barrage in 1983, has brought about drastic changes in the character of wetland from fluctuating water level to more or less constant water level. The lake is oval in shape with maximum length and width of 32km and 13 km respectively. Depth of the lake varies between 0.5 to 4.6m with an average depth record of 2.7m. The lake covers an area of 287sq km which is mainly dictated by maintenance of water level. The lake possesses 14 hills varying in size and elevation in the southern part which look like as islands.

The characteristic feature of the Loktak lake is the presence of floating islands called PHUMDIS, comparable to floating gardens of Dal Lake Kashmir and to Chinampass of Mexico. These floating gardens are hetrogenous mass of soil, vegetation and organic matter at various stages of decomposition and are exploited for economic utility in terms of providing economic benefits to the people. Vegetables, food, fodder, fuel, thatching, fencing material, medicinal herb,etc are grown on these Phumdis.

Land use:

Out of the catchment directly draining the lake 342 sq km is under agriculture,133sqkm under habitation 262 sq km under forests, 22 sq km under water logged and 287 sq km being the lake itself. The watersheds are divisible into four physiographic units viz; Hills (900-1940 masl), medium hills (760 and 900 masl), Plains(areas with gentle slope) and marshy lands (shallow water with thick growth of both floating and submerged weeds).

The soil developed on the higher slopes of both high and medium hills are very deep, well drained, fine loam to fine texture with coarse fragments in place and are moderately to excessively eroded. Soils of high slopes of both high and medium hills are prone to excessive erosion.



Drainage:

Number of streams originating from hill ranges of the west flow directly into the lake. Of these Nambul, Nambol, Thong-Jaorok, Awang Khujairok, Awang Kharok, Ningthoukhong, Postsangbam, Oinam, Keinou and Irulok contribute maximum discharge and silt load into the lake. The indirect catchment area covers watersheds of 5 important river viz; Imphal, Iril, Thoubal, Sekmai and Khuga. All the five join together and flow towards the south by passing the Loktak lake and drain into the Chindwin River, a tributary of the Irrawdy river in Myanmar.

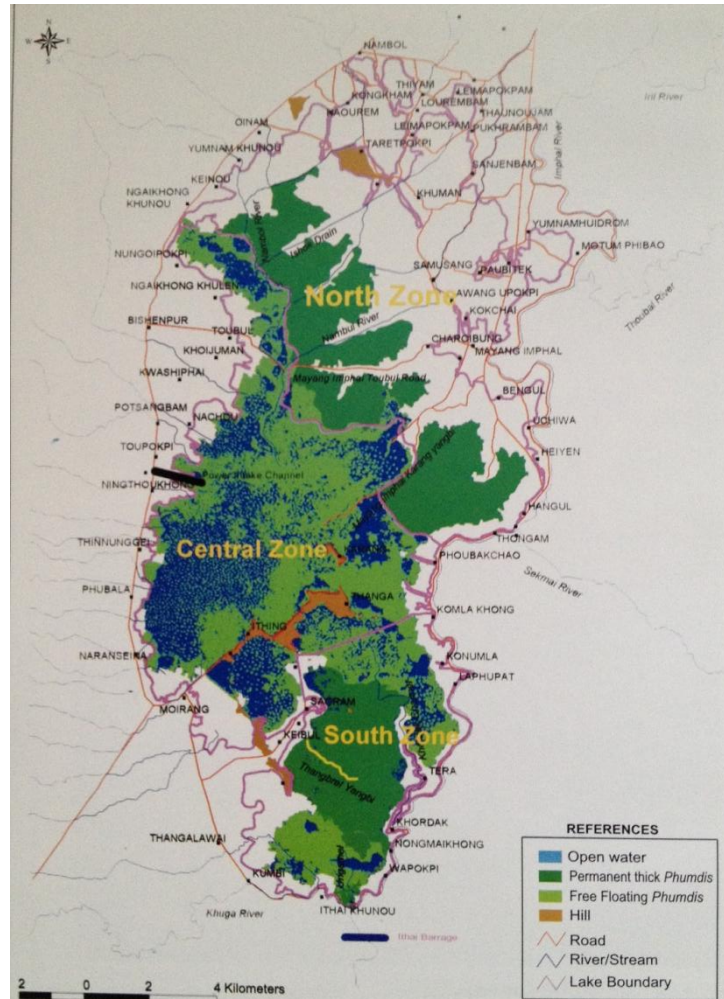
Developmental Activities:

The developmental activities within the lake water shed include Water resource and agricultural development. The multipurpose project and single dam projects which have been taken up to meet the increasing human demands have however drastically altered the hydrological regime thereby adversely impacting the Loktak lake ecosystem and people living in and around. Since the agriculture forms the single largest source of livelihood of communities living in the watershed of Loktak lake, however rapid increase in population and near insignificant increase in the cultivated area has led to land degradation, increase in soil erosion, pressure on the forests, increase in fertilizer usage.

Urbanization:

The rapid growth of urbanization especially in the valley region resulted in increase in urban population with an alarming increase in annual growth rate creating severe stresses on the

civic amenities like potable water and sanitation, lack of adequate sewerage and solid waste management system in the urban areas which lead to high amount of wastes dumped into the water bodies. Rivers Nambol and Nambol flowing through highly urban stretches consequently have very high levels of pollutants, nutrient loads, solid wastes, directly discharged into the Lake.

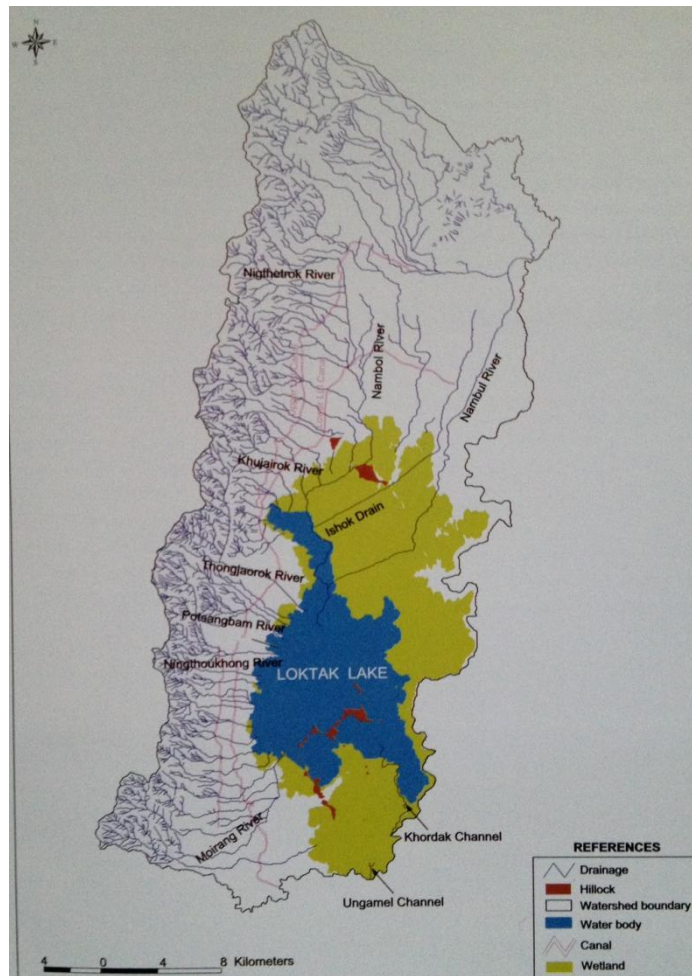


Hydrological regimes:

The existing operational regimes for water management is characterised by:

- Vague qualitative estimation of water availability and demand, consequent apprehensions about perceived damage due to construction of Ithai barrage.
- Lack of quantitative sectoral demands on Loktak lake water has left its regulation to be dictated only by hydel power generation requirement.
- Adhoc arrangement of reliable monitoring network flood forecasting in terms of likely discharge, timing and consequences.
- Lack of base line data for sectoral and integrated development of the Manipur basin.

- Lack of coordination among the institutions dealing with different sectors of development.



Water quality and usage:

The lake water due to increasing pollution loads is rendered unfit for drinking purposes unless otherwise treated effectively. However, the lake water are used for irrigation and ecological purposes. Analysis of water quality of various zones reportedly, indicate a significant pollution in the northern and southern zones. High intensity of fertilizer usage in the agricultural fields and practices of fish farming in the northern zone are also causative factors for water quality deterioration. The southern zone however is polluted due to flow of all pollutants towards this zone and their accumulation because of poor flushing.

Fisheries:

Fishery is an important economic resource of Manipur contributing to approximately 3% of the State's gross domestic product. Loktak lake provides more than 50% of fish production. High rates of population growth in the valley accompanied by insignificant growth in the secondary and tertiary sectors have led to stresses on the natural resource base of the state including fisheries. The decline in fish yield is

attributed to changes in fishing practices, use of exploitative fishing techniques and inadequate marketing infrastructure.



Phumdis:

Phumdis play an important role in governing the ecological processes and functions of the lake. They influence hydrological regimes, harbour fish biodiversity and provide several economically important species.

However, the proliferation of phumdis poses a serious threat to the lake and cause various changes in the various zones of the lake. These phumdis can choke the entire lake are, retard flow of water and natural aeration, accelerate process of eutrophication besides effecting water usage and reducing water holding capacity.

Keibul Lamjoo National Park (KLNP):

Within the lake body in the southern zone is the National Park, a unique natural habitat for *Cervus eldi eldi* locally known as SANGAI. The habitat comprises of floating phumdis, hillocks and elevated strips of land. In its natural habitat Sangai lives with other animals like hog deer, wild boar, large Indian civet etc. The park is rich in fauna and accounts for 81 species of animals. Degradation of Loktak lake, particularly after construction of Ithai barrage has seriously affected the Park habitat.

Management Planning frame work:

The Management planning frame work requires a balance between Ecosystem Conservation for ensuring ecological integrity of Loktak lake and ensuring livelihood security to the communities involved. An effective institutional mechanism that harmonizes planning at various levels with participation of all concerned stakeholders to achieve the objectives of integrated conservation and livelihood. Thus in order to achieve the above, the components like land and water resource management, biodiversity conservation, ecotourism development, livelihood improvement and institutional development need to be considered.

GOAL:

The goal of the Loktak lake Conservation is the restoration and sustainable development of the lake within Manipur basin and the Barak river basin.

Objective 1. Control on encroachment within and on the periphery of the lake.

- **Strategies:**
 - Delineation of lake boundaries by Way of walk way or pedestrian mal
 - Creation of Green Buffar zone on theLake boundaries and arresting of discharge of liquids and solid wastes.

Objective 2: Water Management.

Strategies:

- Selective Dredging of silted lake areas.

The silted up areas and land masses need to be dredged out to an average of 1.5 metres depth besides the waterways and water courses to facilitate better water circulation. The dredging would also solve the problem of water logging. The dredged material could be utilized for Fillings in pedestrian mall construction.

- **Hydraulic connectivity of marshes:**

In order to improve the hydrological connectivity of the existing marshes through improvement of major surface courses of the existing marshes and catchment drainages based on detailed assessment of hydrological exchange pattern.

- **Sewage Management in peripheral towns:**

Conventional sewerage treatment plants could be considered for the treatment of wastes generated by major towns falling within periphery. However, villages scattered around the lake could be intercepted using low cost sanitation units or by wetland mediated technologies. In higher reaches of the catchment WHO design comprising of twin pits with flush latrines could also be tried.

Objective 4: Control of soil erosion from watersheds.

- **Strategies:**

Enhance dense forest cover of the direct catchment, development of contours hedging to check soil erosion using local species of plants, construction of check dams, gully plugging, gabion structures wherever necessary. Promotion of sustainable agro practices for dryland agriculture/ horticulture. Reducing pressure on forest through provision of alternate source of energy.

Objective 5: Improve water regimes to restore ecological services and economic benefits.

- **Strategies:**

Since the allocation of water in qualitative and quantitative terms for human uses (hydropower generation, irrigation and domestic use) and ecological purposes (Fisheries, KLNP, Phumdis and other flora and fauna) is critical to water management planning of the lake. The draft report prepared for allocation of water for various uses need to be implemented.

The thinning of phumdis particularly around KLNP is one of the major issues confronted which has been attributed to reduce nutrient supply to Phumdis as these remain afloat throughout the growth period. This interferes with uptake of nutrients particularly under acidic conditions. Since fluctuation of water level is an important factor to allow Phumdis to settle at the bottom and derive nutrient from the enriched bottom during the growth period. The Construction of regulatory Ungamel channel will help in management of fluctuating water levels for the nourishment of phumdis and movement of Sangai during breeding season.

Water quality improvement could be achieved by manipulating water flow and frequent flushing during Monsoon session. The installation of aerators will also help in oxygenation of water particularly at stagnant zones, where the availability of electricity is possible.

An additional park for Sangai at Maibam Phumlok could be an alternate and additional habitat for Sangai deer.

Objective 6: Eco-development of peripheral areas:

- **Strategies :**

The core zone of the lake need to be insulated against all commercial and destructive activities and should be accorded a high protection. Since Government has already taken several measures under Eco- Development to provide alternate income generation activities which need to be strengthened and carried out further.

Objective 7: Biodiversity Conservation:

Enhancement of fish diversity;

- **Strategies:**

- Stocking of lake with fish fingerlings of important fish species like *Channa punctatus*, *Labeo rohita*, *Cyprinus carpio*, *Anabas testudinues*, *Clarias gueritinnus* etc.
- Enhancing auto recruitment through protection breeding and spawning grounds and clearing pathways.
- Total moratorium on Atha phum fishing and creating of Athaphum within the lake.

Enhancement of Waterbird population.

- **Strategies:**

- Strengthening of existing network protected areas.
- Establishment of new bird sanctuaries.
- Involvement of Local communities.
- Habitat improvement of bird areas through water level modifications and vegetation Management.
- Enhancement of food and cover plants.
- Maintenance of open water areas and proportionately vegetational belts.
- Control on invasive species.

Objective 7: Ecotourism Development.

- **Strategies:**

- Developing of key sites for bird and Sangai Watching for nature lovers.
- Developing board walks to have closer look of marshes, Phumdis etc.
- Construction of bird hides at key points and providing facilities for developing facilities for Cruising.
- Watch towers built strategically to have close view of the lake and important recreational sites.

Objective 8: Economic utilization of Aquatic weeds.

- **Strategies:**

- Formation of user groups for varied aquatic products.
- Organise and manage lake harvest.
- Develop financial mechanisms for investment into corpus for management of lake vegetation and suggest credit needs.
- Promote value addition.

Objective 9: Ecological monitoring mechanism and Research.

- **Strategies:**

- A strong and well equipped Monitoring lab. With infrastructure and expertise need to be established and strengthened.
- The online monitoring of limnological parameters to built up base line limnological data for the use of lake managers and planners.

- Documentation and publication of technical reports indicating monthly and seasonal changes in the physic- chemical characters of the lake besides biodiversity changes.
- Assessment of impacts (EIA) due to ongoing management practices like dredging, dewatering etc.