

Navigating Sustainability in Loktak Lake: Socio-ecological Changes and its impact on Wetland Ecosystem and Native Fishers

Sanjay Kumar

Loktak Lake, the largest freshwater lake in Northeast India, has a unique ecosystem. Because of its ecological significance, the Ramsar Convention declared it as a wetland of international significance in 1990. The lake is surrounded by villages inhabited by fishermen whose everyday source of subsistence comes from the lake. However, over the years anthropogenic activities and developmental projects have caused irreversible damage to the wetland and affected the region's ecology. This paper highlights the various factors that brought about detrimental changes to the wetland ecosystem and the impact of these socio-ecological changes on the wetlands and fishermen. It also explores the way forward for sustainable development and to preserve the area's ecological balance without compromising with developmental goals in the region.

Keywords: Loktak Lake, Socio-ecological changes, Anthropogenic activities, Native fishers, Sustainable Development

Introduction

Loktak Lake is in Bishnupur district of Manipur and it is the largest freshwater lake in Northeast India. It is situated between longitude 93.46 degrees east and latitude 24.25 degrees to 24.442 degrees north. The lake has a unique ecosystem called '*phumdi*' that is a heterogeneous mass of soil, vegetation, and organic matter that looks like a small floating island on the lake. Only one-fifth of the *phumdi* is visible on the surface, the rest is underwater. The lake is also a popular tourist destination because of Keibul Lamjao National Park, situated in the south-western part of Loktak Lake, spread over 40 sq. km. It is the only floating National Park making it a unique phenomenon. The National Park is also the only home to the rare and endangered species Sangai deer (*Cervus eldi eldi*). In 1990 Ramsar Convention declared Loktak Lake as a wetland of international importance because of its ecological significance. The lake is surrounded by villages inhabited by the Meitei people, a dominant ethnic

Sanjay Kumar is with Special Centre for the Study of North East India, Jawaharlal Nehru University, New Delhi - 110067, India. [Email: gsanjaykumar74@gmail.com]

group of Manipur. Some native people build *phumsangs* or small huts on the *phumdis* to live as well.

Champu Khangpok is one such village that is entirely built on phumdis and is located inside the lake. For the native people, the lake is significant socially and culturally as the natives consider the lake as their mother (*ema*), and many mythological stories are also associated with the lake. Loktak is also called Loktak *lairembi* which means goddess in the local language. Apart from the lake, the sangai deer is also venerated as a sacred animal. In one of the popular folktales centered around the love story of Kamba and Thombi, Loktak is mentioned as the area where their love blossomed. Another popular legend around the region is that of a dragon python *Poubi Lai* which lives in the Loktak lake. According to the legend the huge python woke up because of disturbances by the fishers and started ruthlessly attacking them. The fishers took help from shaman Kabui Salag Maiba who slayed the python. To protect themselves from the wrath of the dragon python some fishers still have images of the python inscribed or painted in the boat.

Apart from its ecological and cultural value, the lake also has economic utility for the native people as most villages around Loktak Lake are inhabited by fishermen who have been living in commune with the lake for generations. These fishers have utilized the natural resources of the lake to build a fishery-based economy in the region. However, over the last few decades, anthropogenic activities and developmental projects have led to socio-ecological changes in the region and have negatively impacted the ecosystem of the wetland (Singh & Khundrakpam, 2011; Laishram & Dey, 2014; Kangabam et al., 2015; Thakur, 2020). Studies have also pointed out the impact of these changes on the indigenous fishers and their livelihood (Singh, A.L. & Moirangleima, K., 2012; Oinam & Dey, 2017). This article intends to highlight the impact of these socio-ecological changes on fishers and native people while also exploring the causes for various socio-ecological changes in the wetland. Further, the article also intends to open a discussion on the scope of sustainable development in the region.

Materials and Method

This study is based on both primary and secondary sources. Primary data was collected using surveys and in-depth interviews. The random sampling method was used, and the interviews were open ended, while questionnaires were also used, making the survey a blend of both qualitative and quantitative methods. The fieldwork was done in the Bishnupur district in Manipur. Data was primarily collected from 7 villages; Ithing Khola, Sendra, Chingkha. Oinam, Khunjem, Salam and Tongbram, mainly because of the fact that these fall within the vicinity of the lake and also are the major centres of tourism and allied activities. Data was also collected from Karang island located within Loktak Lake and from phumdi dwellers, particularly from Champu Khangpok village. A total of 150 fishers were interviewed of which 50 were women. Apart from native fishers' discussions were also held with officials from Loktak Development Authority, Loktak Folklore Museum, All Loktak Lake Area Fishers Union Manipur (ALLAFHUM) and NGO's working for the conservation of the lake.

Secondary sources issued by the Loktak Development Authority (LDA) were also referred to.

Loktak and its People: An Ethnographic Description

The day in Loktak Lake begins early, as fishers start the preparation for fishing by 4 am, and they generally return before noon. It is generally men who go fishing at dawn, while women prepare meals and manage the household chores before their return. However, this does not imply that women are not engaged in fishing. Both men and women are actively engaged in fishing in the Loktak area. There are some fishing practices exclusively practiced by women such as *Nupee il*.¹



Fig 1: *Nupee il*

The net is attached to a frame that is made in the shape of an arc called Hangel with a bamboo pole (poura) in the middle, which is used to lift the net. After resting for a few hours, they again go for fishing in the evening. This also depends on the morning catch. There are many other indigenous forms of fishing practiced in the area. For instance, *Kabo Loo*, *Sora Loo* are forms of trap fishing that are very popular in the region. *Kabo Loo* is a fishing technique that functions by trapping the fish in its tabular body made of bamboo whereas *Sora Loo* is also trap which is conical in shape and used to catch small fishes. Athaphum fishing, *Il jao* (Drip net), and *Lang* (Gill net) fishing are more commercially viable. *Il jao* is a fishing technique in which where a net in a rectangular shape is attached to four bamboo sticks.

The phumdi provides support to the bamboo sticks. The portion of the net in the water traps the fish which is then harvested by the fishers after a few hours. In lang' or gill net fishing, the net is set at the surface of the lake allowing sufficient time for the fish to get tangled in the net after which it is pulled back to land/ boat.

The days catch is either sold the same day or it is smoked or sun-dried. On an average, a fisher can make ten to twenty thousand a month. Like in most societies' women are multitaskers. They cook meals, look after the poultry, process the fish, prepare for the next fishing trip and take care of children and other family members.

Women are not just involved in catching fish they are also actively involved in processing them and selling them. While some women sell fish in the local markets like Sendra, Moirang, Ningthoukhong some take the fish to markets as far as in Ima Market (Imphal) to sell. Usually, women fish dealers or *unja* buy fish from the fishers and to sell them in the market. In Manipur, it is not unusual to find women-dominated market places. Ima market, situated in Imphal, for instance, is run entirely by women. Further women are so engaged in suppling edible aquatic vegetation to markets. *Heikak* or Water chestnuts (*Trapa bispinosa*), *Thanging* or Foxnut (*Euryale*), *Eashing ekaithabi* or Water Mimosa (*Neptunia oleracea*), *Yelang* or knotgrass (*Polygonum barbatum*), *Kangjao* or Water lettuce (*Pistia stratiotes*) are some aquatic vegetation consumed in Manipur obtained from around Loktak lake area. Some other products like *Thambal* or Lotus Stem (*Nelumbo nucifera*), *Komprek* or Water Celary (*Oenanthe javanica*), and Water Spinach (*Ipomea aquatic*) are also found in and around Loktak lake which is used in making of a popular Manipuri dish Singju, which can be eaten as a side dish or as a snack.²

Because of the lack of cold storage facilities, the natives have their unique ways of preserving fish. Three methods are popularly used to process the fish which include drying, smoking, and fermentation and it is women who are actively involved in this activity.³ Dried fish can be preserved for a long and is a delicacy in Manipur. Fishes like Ngapemma (*colisa faciatus*) Ngawa (*Notopterus spp.*) Ngakha (*Puntius manipirensis*) are some of the common fishes which are consumed after drying. The fish can be dried under direct sunlight or by hanging them over a fireplace. The second, method is the smoking of fish. Fishes are smoked over a place designed specifically for this made using bamboo poles. While the size of these often vary, it usually consists of a platform where the fish are kept and a hearth underneath where fire it set and the smoke from it prepares the fish.



Fig 2: smoked fish



Fig 3: Sun dried fish

Ngari and Hentak are two fermented dishes made of fish which is very popular in Manipur. Hentak is made by sun drying the fish for five to seven days and then crushing it and making it into a powder and then made into a paste by mixing it with aroid plants. It is put into an earthen pot to ferment. It is often a standard condiment in Manipuri households. It is often made with Indian flying barb (*Esomus danrica*). Ngari is a fermented fish product made of small fish locally known as Phabou Nga (*Puntis sophore*). Other dishes like Eromba, singjiu, and kangsoi use ngari.

Most households keep both ducks and hens whose eggs are used mostly for home consumption. These items play a very critical role in their livelihood maintenance. Most of them have a small pond popularly called pat, in the backyard of their residence. These hens and ducks are sustained only through natural feed; they eat fish and other raw materials used by fisherfolk.

Yumsang Devi is a 60-year-old fisherwoman from Chingkha village who has more than 25 small and big ducks at her home. Tongbram Prakash Singh is a 65-year-old fisherman from Tongbram Village and has desi murga, also known as hens. These are long and thin chicken legs, and no one weighs more than one and a half kilograms.

Many fishers in Loktak Lake area also have small handloom machines. Women during their free time engage in weaving clothes. *Fanek* (traditional wrap-arounds), shawls, scarfs are some of the most commonly woven products and Khudei a kind of small dhoti used by men every day at home. Some women are also engaged in weaving commercially.

They are often provided raw materials by agents to purchase raw materials from agents who then come to collect the finished product. But the everyday life of the fishers has been affected by social-ecological changes taking place in the region and the next section explores these changes and their causes.



Fig 4 and 5: weaving machines

Oinam Madhubala Laiba, a 49-year-old woman informed that she has been weaving for over five years now. She sourced raw thread supplies from the Moirang market and sells the finished garments only there. They sometimes also customise products and produce based on customer demands.

Oinam Tampha Devi is a 37-year-old weaving woman from Oinam village. She has been doing this task for the past twelve years. She sells the merchandise to Ningthoukhong Bazar. Agents come and collect from the market; they also make their products based on customer requests. She added almost 12-15 thousand rupees are needed to acquire a machine, which lasts for 5-7 years.

Socio-ecological changes and their impact on the wetland

Several factors have contributed to altering the ecology and hydrology of the region and deteriorating the water quality of the lake but one anthropogenic activity that stands out has been the commissioning of Ithai barrage. The Loktak Hydroelectricity Project was conceived as a multipurpose project to supply electricity to various parts of Manipur and the neighbouring states and included a lift irrigation facility. Loktak Lake formed the headwater for the project (Singh, 2010). The Ithai barrage has a total length of 68.6 meters, with a full reservoir level (the highest level at which water can be stored safely without compromising structural safety) of 769.63 meters above sea level and a flood level (beyond which the peripheral area of the lake will flood) of 768.50 meters above sea level. The minimum drawdown level to abstract water from the lake for hydropower generation is 766.23 meters above sea level.

A barrage was created on the Manipur River, near the village of Ithai, to maintain the water level required for continuous hydropower generation. Although the Ithai Barrage served immediate purposes, it had significant impacts on the lake's hydrology and affected the region's ecology and socioeconomic structure (Singh, 2010). Till the Ithai barrage was built, the lake was composed of several small pats or lakes that merged during monsoon season. After the construction of the barrage, the water of the lake is kept constant throughout the year for electricity generation completely changing the hydrology of the region. The phumdis which is used to absorb nutrients from the soil during dry season is unable to sink because of the constant water level in the lake because of which it is getting weak. These weak phumdis disintegrate easily leaving the dead organic material in the lake to rot.

The Keibul Lamjao National Park which is home to the endangered Sangai or Brow- Antlered Deer also gets affected with the weakening and disintegration of phumdis. If adequate steps are not taken with time the only home of Sangai will be in danger leading to even extinction of this species.⁴

Talking about the effects of Ithai barrage on KLNP, Salam Raju, a caretaker said that:

Because of the Ithai barrage the water levels have increased in the area and has caused flooding. The phumdis are also getting weak and is breaking down easily because of which it is not able to support the weight of all the sangai deers. This is the only habitat of sangai deer. If the water levels are no reduced and the phumdis are not restored to its natural ecology it will be very dangerous for the deer. A few years ago, we had a flood-

like situation in the park which is very dangerous for the safety of these animals (personal communication with the caretaker on November 28, 2021)

The Ithai barrage has also blocked the natural outlet which pushes out the waste from the lake because of which pollution is increasing in the lake and water quality is deteriorating. Khordak channel which acted both as inlet and outlet point of Loktak lake now only allows inflow. Earlier the natural dredging process was used to clear the soil, vegetation, and other waste materials brought down by various rivers and streams. Domestic, agricultural and industrial waste which is carried by rivers into the lake is another important factor contributing to water pollution. Nambul River, which is one of the most polluted rivers of Manipur because of its flowing through Imphal city merges into Loktak Lake depositing its waste into the lake.⁵

These issues are invariably connected with deforestation in the catchment area which has also increased soil erosion into the lake. Phumsangs or floating huts built inside Loktak Lake on the phumdis also contribute in the deterioration of the water quality of the lake. While phumsangs have been a traditional way of living for the native fishers, the increase in population in the lake has also increased the quantity of domestic waste being disposed of in the lake.

Ithai barrage has also affected the route of migratory fishes as a result of which several species of fish have been reported extinct in the region. Some species of fish that have been reported as extinct by fishers are; *Labeo Dero* (Khabak), *Labeo bata* (ngaton), *Obstebrama Belangui* (Penga) and *Gagata cenia* (Ngarang). As a result of the decrease in the number of fish, fishers have shifted from traditional capture fishing to more profitable fish farming and not all of them have been sustainable. For instance, many fishermen have expanded to fish farming by converting the marshlands. Marshlands are also being converted for permanent agriculture. Meitei et al. (2011) point out that the conversion of marshes has several implications, which include shrinking of the natural wetland. According to the authors, since the 1970's the wetland has shrunk 33 percent. The lake and its marshes are important for the management of flood in the region and one of the implications of the conversion of marshlands is excessive flooding in the region.⁶ Mitul Baruah's book explores the concept of 'slow disaster' on Majuli Island, highlighting how gradual environmental changes from flooding and erosion affect local communities. It discusses state interventions and popular resistance.

State interventions and local resistance highlight the disconnect between public policy and community needs. Further, the authors point out that marshlands also act as a sink for nutrients from the nearby catchments therefore the conversion of marshlands affects the ecology of the region by reducing the nutrient retention capacity of wetlands. Various fertilizers and supplementary feed added in fish ponds and farms lead to nutrient enrichment in the lake leading to imbalances. Based on their study Singh and Moirangleima (2009) also point out that there has been a shrinking in the water area of wetlands. They identified factors like the conversion of land for agriculture, fish farming, human settlement, and dams as some of the reasons for these changes. This decline in water area affects the overall ecology of the region and leads to imbalances.

As the competition among fishers increased, the number of athaphums in the lake also increased. Athaphum, is a local fishing technique that has evolved over generations. Athaphum are circular enclosures built using phumdi strips and plants such as *Echinochoa stagnina*, *Hydropiper*, *Salvinia sp.*, *Eichhornia sp.*, *Capillipedium* etc. The building phase is called *phum thaba* and harvest phase is known as *phum namba*. The plants that are used to build Athaphum attract fishes and then they are trapped using nets. During harvesting the fishes are caught using dragnets. One of the problems with the increase in the number of Athaphum is that there has been a decrease in the clear water surface. From a hydrological perspective, Athaphum fragments the water and breaks its natural flow, and disturbs its self-cleansing mechanism. Further, fast-growing aquatic species are used to attract fish within closures and these plant species are thrown in the open water after harvesting leading to the proliferation of phumdis. Similarly, after harvesting the remains of Athaphum are left in water where it proliferates further. This has led to reduced open water areas and pollution in the lake. Phumdis creates anoxic conditions in the lake which negatively impacts the fish. Athaphum also obstructs other forms of fishing like capture fishing by obstructing the open water area.

Invasion of paragrass (*Brachiaria mutica*) has also been identified as a threat to the biodiversity of the lake. Singh (2011) points out that the paragrass was introduced in Manipur by Veterinary and Animal Husbandry Department during 1972-1973 to support dairy development. This grass is a good feed for milch cattle and for fish farming and is also used by athaphum fishers to strengthen their enclosures. Some natives also collect this paragrass and sell it to farmers. Despite the benefits of the grass for the community, the invasive nature of the grass and its overall role played in the proliferation of phumdis in lake makes it a nuisance. Its growth in marsh areas is a concern as it is gradually changing the vegetation pattern of the region thereby affecting the biodiversity of the region. Singh suggests strengthening of dairy and fish farming in lakeshore areas as one way to economically manage the invasion by the paragrass.

Today most of the Athaphum are owned individually unlike in the past when the majority of the Athaphum was owned and operated by several fishers. Speaking of increase in number of athaphum, a fisher from Tongbram village mentioned that:

For migrant fishers athaphum fishing is easier and more convenient than any other skill-based method of fishing which is why over time we have seen an increase in number of athaphums. Some people have many Athaphum in the lake. This is causing scarcity of fish in the lake. (Rajkumar Togbram, 58 yrs, Fisherman, personal communication, October, 25,2022)

In comparison to other forms of fishing Athaphum provide more stable form of income which is also another reason why there has been an increase in athaphum. Some fishers also own multiple Athaphum to maximise their income and some fishers use athaphum fishing with other forms of fishing like capture fishing to supplement their income.

Impact of Changing Ecology on the Native Fishers

The construction of the Ithai barrage not only affected the ecology of the region but also the livelihood of the natives. Loktak lake is surrounded by vast agricultural field which is locally known as *pat-lou*; *pat* means lake and *lou* meaning agricultural field. Many fishers who also used to cultivate paddy in lakeshore areas lost the land in they used to cultivate when the water levels of the lake increased. Talking about losing the land in which her family used to cultivate paddy, a resident of Ithing village said:

My family used to cultivate paddy and grow vegetables along the lakeshore areas but now the land where we used to farm has been submerged under water. Even though we never got enough paddy to sell it was enough for our family's use. (Bidya Devi, 30 yrs, Fisherwomen, personal communication, October, 26, 2022)

Like Bidya Devi many families used to cultivate along the lake shore areas of Loktak lake but the increase in water level of the lake swallowed the land on which they used to cultivate. With the migratory route of many fish coming from the Chindwin-Irrawaddy system of Myanmar being blocked because of the Ithai barrage, many species of fish have disappeared. As the number of fish is decreasing in the lake the livelihood of the fishers is affected. Talking about the extinction of fish species from the lake a native fisher from Chingkha said that:

There was a lot of variety of fish in the lake before the Ithai barrage. Many species of fish have now disappeared because of the dam. Pengba which is very common in our lake is now almost extinct. Not only have fishes disappeared but the number of fishes in the lake has also decreased because of many new fishers in the lake. There has been a lot of migration from the hill region leading to overfishing in the lake. (Laishram Binu Singh, 55 yrs, Fisherman, personal communication, October 26, 2022).

To maximize the catch, fishers began to adopt practices that were not sustainable in the long run. They began to abandon their traditional sustainable methods of fishing in favour of harmful fishing practices like LED fishing at night or using pesticides or poisons in the lake. Further, to catch small fish, nets with closer meshes are also being used, which prevents young fishes from maturing and breeding. In order to cope with the situation caused by the *Ithai* barrage, people started using innovative means such as the fish cage, as well as new instruments such as the nylon net, along with an increase in the variety of nets.

Attaphum fishing, while it helps fishers have stable income, has same major drawbacks. Apart from the role it plays in proliferation of phumdis, attaphum fishing leads to fragmentation of water creating stagnant conditions. Further, attaphum creates obstruction in other forms of capture fishing and also leads to privatization of lake resources. Transportation within lake is also a problem due to proliferation of phumdis and construction of attaphums.

Deterioration of the quality of lake water

With the self-cleansing mechanism of the lake disrupted because of the barrage, the



Fig 6 and 7: Fish cage

Source: <http://www.cifri.res.in/art339.html>

quality of the lake water has deteriorated. Fishers who live in and around the region directly consume the lake water for domestic purposes and for drinking. Because of the consumption of this water, they are prone to waterborne diseases like diarrhoea, jaundice, and other stomach infections. Some people also reported skin infections caused by using the water. Talking about the deteriorating water quality of the lake a resident of Karang Island mentioned that:

Many fishers who have money have started purchasing water for drinking and other domestic needs but those who cannot afford it have to use the water from the lake which is not as clean as before this leads to many diseases. My children are drinking this water we have no other option. We do not have money to buy water. (Salam Bhagat, 45 yrs, Fisherman, personal communication, October 27, 2022)

Like Salam Bhagat, many families are dependent on the lake water for their everyday consumption and the deteriorating water quality is of immense concern for them.

Many studies have pointed attention toward climate change impacting genders unequally (Denton, 2002; Moosa & Tuana, 2014; Ylipaa et al., 2019). In particular, there are discussions about gender vulnerabilities where the impact of climate change is understood to be more severe for women as compared to men. This understanding can also be applied in the case of Loktak lake where anthropogenic activities and developmental projects have contributed in major socio-ecological changes. Women residing in and around Loktak lake engage in fishing, fish selling or both along with managing domestic responsibilities. As income decreases pressure on women to manage household expenses with limited income also increases. The already overburdened women try to make ends meet by taking other part time activities like poultry, weaving, net making etc. Further, women have been traditionally the custodians of traditional indigenous knowledge which is losing its relevance with advent of modernity. These forms of traditional knowledge are integral to sustainable development and hence needs to be persevered and also integrated into mainstream policies regarding sustainability. To sustainably manage the lifeline of the fishers, Loktak Development Authority (LDA) was formed and the next section discusses

the impact LDA had on the native fishers.

Loktak Development Authority: Policy and activities

In the Loktak Lake (Protection) Act, 2006, Loktak Development Authority was entrusted with the task of management of lake. Previously, the LDA was a registered society under sec 20 of the Society act XXI of 1860. In July 1987 the authority was reconstituted by govt of Manipur and functioned under the aegis of Department of Irrigation and Flood Control. Currently, the chief minister is the chairman of the authority and project director its member secretary. One of the duties mentioned in the act was to “administer the affairs of the Loktak Lake and to protect and improve the natural environment of the lake”.

LDA performs various tasks in the region including analyzing the ecosystem and devising strategies for the management of the lake, water quality monitoring, clean-up drives, management of phumdis, catchment conservation, identification of flood-prone area etc. The LDA also encourages diversification in employment and community participation in the conservation of the lake. With relation to fishes and fishery, the LDA engages in recording and surveying the various fish species along with other activities like introducing fingerlings, development of fish hatchery, etc. LDA has launched several additional/alternative income generation programmes which include integrating pisciculture with paddy, promoting duckery, piggery, and other handicrafts and handlooms.

However, all the activities of by LDA have not been supported by the natives. In November 2011 the LDA burned down hundreds of floating houses as a part of the lake clean up. The destruction of the floating huts along with fishing equipment left many families homeless and unemployed. They took refuge in a community centre and were supported by non-Government organizations and All Loktak Area Fishermen Union, Manipur. This was followed by huge protests by fishers. One of the demands of the fishers which continues till today is to revoke the act of 2006. They are also fighting for compensation for the displaced fishers. The compensation which was offered by LDA was rejected by many families. While the LDA official said that compensations were given to the people, many fishers have claimed that they have not been given any adequate compensation. A scientific officer from LDA, who is also a resident of Thanga, said that “the battle is not between the fishers and the authorities it is about protecting the lake. He defended the steps taken by LDA and said that lake is like a mother to him and some steps had to be taken protect it which did not suit the fishers”. However, the secretary of ALLAFUM, said that the fishers and the native people have been the custodians of the lake since times immemorial. They have always looked after the lake and will continue to do so. It is the activities of the outsiders, who do not know anything about the environment here, which is destroying the lake. He also mentioned that in certain areas where phumdis have proliferated and it is difficult to navigate the boat they have asked assistance from LDA but the response to such needs is very slow.

Similarly, the LDA notice to fishers regarding banning of homestays and Athaphumin the lake has also been met with resistance as the fishers see such moves by LDA as an attack on their livelihood. Around 30-40 homestays operate in Loktak

Lake and fishers own some of them as an alternate source of income. The lack of solid and liquid waste disposal plan has created conflict between Loktak lake development authorities and homestay owners. The homestay owners however see this as a challenge to their livelihood and have mentioned that LDA is doing this to promote commercial homestays in Loktak Lake.

Tourism in Loktak Lake: Boon or Bane for the fishers?

In 2019 Loktak Inland Waterways Improvement Project was approved by Union Ministry of Shipping with an estimated budget of 25.6 crores for developing inland waterways transport system. The aim was to connect islands and villages in and around the lake area by motorboats. The project also aims to promote eco-tourism in the region and generate livelihood for people. The project also involves building resorts etc. However, this project has received criticism from the native people and environmentalists worldwide.

In February 2020, Loktak Fishing Association, Ningthoukhong wrote a letter to Grievance committee of Manipur State wetland Authority addressing their concerns regarding Loktak Inland waterways project. They highlighted how the families residing in the areas of Ningthoukhong were not consulted before taking this decision. They are concerned that motorboats in the lake will destroy the water rhythm in the lake impacting the fishes and thereby their livelihood. Similar letter was also drafted by Fishing village of Thinungei, Thanga, Champu Kangpok where they addressed the concerns of motorboats in the lake as it affects their fishing activities. Dugout canoes or non-motorized boats are preferred by the natives as they do not impact the aquatic life or cause disturbance in the lake.

Fishers across villages and unions have formed *Ngamee Lup* (The fishing federation, www.smallscalefishworkers.org) to oppose the project. The fishers and native people are concerned about the pollution that will be caused due increased tourist activities. They have also questioned the development of Loktak Lake as a tourist hub at the cost of the fragile ecosystem which is their home and livelihood and how its benefits will reach the native people. Salam Bijoy, a native fisher from Karang island, for instance points out that while all kinds of restrictions are being imposed on the fishers in the name of lake clean up and preservation of the lake but will not promoting tourism in an already fragile ecosystem be more damaging? To quote:

Few years ago, they (the LDA) destroyed many huts in the lake. These huts belonged to poor fishers who had nothing else. Many people did not even get time to save their belongings. Now every other day they come up with new rules like no Athaphum on the lake. You tell me how are we supposed to live? Fishing is our occupation and if we do not fish how are we supposed to survive? On the other hand, the government is coming up with big plans to make Loktak Lake into a touristy place, but won't tourism also lead to the destruction of the lake. Where will all the waste be disposed? We have respect for the lake and we take care of our lake. Will outsiders take care of the lake like we do? (Salam Bijoy, 47 yrs, Fisherman, personal communication October 29, 2022)

Fishers in particular are concerned about tourist projects blocking their fishery activities and feel that the tourism project in the area is undemocratic and against the human rights of indigenous people. There is a consensus that the native people of the area are not being included in decision-making regarding Loktak Lake and the surrounding area. This alienation was further increased in 2022 when a notice was circulated regarding a ban on homestays run by native people. The ban primarily affected those homestays that were inside Loktak Lake. Many of the owners of these homestays were fishers for whom running the homestay was an additional source of income. One of the concerns with homestays was that they were running without any proper regulations and that they did not have adequate waste disposal mechanisms. The president of Loktak Floating Homestay Association said that the people who run homestays are ready to comply with rules which will limit the pollution however, in spite of contacting the LDA they are not provided with any proper guidelines. He also added that local homestays provide additional income to not just homestay owners but also to other people who are indirectly involved in providing materials such as those who sell vegetables and fish; so dismantling the homestay was a direct attack on the local people and their livelihood options.

Women have to ensure the survival of the family and often find themselves threatened with the various projects and policies. Hence women also play an active role in resistance movements and protests. One such resistance movement was against the proposed bird sanctuary at Thinuengei. In January 2018 the Forest Department expressed their intention to convert Thinuengei village into a bird sanctuary. The natives were worried about this proposal and felt betrayed that this decision was taken without consulting them. What followed was huge protests because of the worry that marking certain areas as bird sanctuary would limit their activities thereby affecting their livelihood.

The fishers are divided in the way forward with regard to promoting tourism in the region. While some argue that tourism in the region will help in generating more employment but also point out that any decision must be taken after discussion with all the stakeholders in the region, some argue that Loktak lake is a significant source of livelihood for the fishers, and hence, external interference must be kept at minimum and that the management of the lake must be left to the natives.

All Loktak Lake Area Fishermen's Union, Manipur (ALLAFUM)

All Loktak Lake Area Fishermen's Union, Manipur (ALLAFUM) was started in 2011 as an association for the fishers to address their livelihood issues and the various ecological concerns of the Lake. After the various steps taken by Loktak Development Authority such as the eviction of fishers on phumdis and cleansing of attaphums, this association became all the more important for the fishers. The union acts as a voice for the fishers and helps in highlighting the issues faced by them. Not only they express their grievance through letters they also conduct protest and organize events to highlight their issues. One such event was the 9th Loktak Lake Arson Commemoration Day which was observed in Champu Kangpok on 23rd November 2020. The event aimed to remember the burning of phumdis by LDA which was the home of many fishers and it condemned such inhumane steps taken by LDA. Similarly

in 2018, on the occasion of International Rivers Day ALLAFUM organised a meeting to discuss the water quality of the rivers that flow into Loktak lake. Rivers like Nambul and Naga flow with a lot of waste, which gets deposited in the lake causing pollution.

The ALLAFUM also takes initiatives for the conservation of the lake. such as: clean up drives, creating awareness among fishers, and declaring a portion of the lake as fish sanctuary during breeding season. The awareness creation had huge impacts as fishers stopped harmful fishing practices such as using pesticides or fishing by electrocuting. Similarly, there has been a restriction on fishing at night using the LED lights, particularly during the season when migratory birds visit the lake. During certain time of the year, restrictions are also imposed in certain parts of the lake to allow the repopulation of fish in the lake. The ALLFUM has also expressed their concerns about the proposed eco-tourism project because of their neglect of all stakeholders in the region primarily the fishers.

Towards ‘Wise Use’ and Sustainable Development in Loktak Lake

Under Article 3.1 of the Ramsar Convention on wetlands held in 1971, all parties agreed to promote the ‘wise use’ of wetlands in their territory. In India, there are currently 75 sites designated as Wetlands of International Importance (Ramsar Site).⁷ This term-wise use gained popularity within the Ramsar community and in 1987 at its 3rd meeting held in Regina Canada it was given a proper definition and revised in 2005 as follows: “Wise use of wetlands is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development.”

In the 10th meeting of the conference of contracting parties to the Ramsar Convention on wetlands, held in 2008 in Changwon, Republic of Korea a declaration known as Changwon Declaration which shows how to deliver some of the world’s most critical environment sustainability goals. One of the positive actions for ensuring human well-being in the declaration was explained under the thematic heading ‘People’s livelihood and wetlands’. It was emphasized that many major developments and infrastructural schemes aimed at poverty reduction can lead to wetland degradation, ultimately leading to deepening poverty. In particular, it is mentioned that: “Wise use, management and restoration of wetlands should help to build opportunities for improving people’s livelihoods, particularly for wetland-dependent, marginalised and vulnerable people. Wetland degradation affects livelihoods and exacerbates poverty, particularly in marginalised and vulnerable sections of society” (Changwon Declaration).

In the case of Loktak Lake, the development projected aimed at bringing prosperity and progress in the region affects the vulnerable fishing community negatively and leads to their marginalization. Some principals of United Nations Declaration of the Rights of Indigenous Peoples can act as guideline while introducing development projects in sensitive regions like Loktak lake. The UNDRIP recognises that “respect for indigenous knowledge, cultures and traditional practices contributes to sustainable and equitable development and proper management of environment”. Further, Article 10 talks about the right of Indigenous people to their land or territory and that they

shall not be forcibly removed from their land without free, prior and informed consent. Article 18 further talks about the right of indigenous community to participate in decision making in matters that impact their rights through representatives chosen by them.

The first step then towards development, particularly sustainable development in Loktak region requires inclusion of natives in all decision making. Traditional indigenous knowledge have been sustaining ecosystems across the world and preservation of this knowledge system and inclusion of this knowledge in all further plans and policies is essential for sustainable growth. Active participation by the community is essential to manage the resources sustainably. As discussed earlier many non-sustainable practices were put to an end with the intervention of ALLAPHUM. As awareness spread that LED bulbs which were used to catch fish at night disturbs the fish and migratory birds, restrictions on its use was imposed by the community itself. Similarly, the practice of using poison to catch fishes was stopped and decision was taken to limit fishing in breeding grounds and during certain seasons so as to allow re- population of fishes in the lake. Such community driven changes has much more impact than any decision taken by outside body.

For the preservation of Loktak ecology, all the stakeholders in the region including the native fishers, the LDA authorities, and the state officials must be aware of the ecological significance of the lake. Creating awareness of the issues in the area then must be of utmost importance when talking about sustainable development. In the end it is the actions of individuals which can positively or negatively impact the environment. Governing bodies cannot make positive changes unless the people cooperate with them. Similarly public demands cannot be met unless leaders and decision makers understand the issue or crises at hand. Along with awareness creation designing a management plan for the wetland by recognizing all stakeholders and balancing the various needs that wetlands meet is important. In the case of Loktak, the wetland is important for hydropower generation, for meeting domestic and commercial needs of the natives and also as a habitat area for fishes and other flora and fauna. So, a wetland management plan must be considerate of the diverse needs that Loktak meets.

Restoration of wetland ecology is another important step one needs to consider while talking about bringing sustainability in the region. Restoration in the broadest sense would mean promoting a return of the wetland to its previous condition. While reversing the damages done to the ecology due to developmental projects or anthropogenic activities is difficult, efforts can be made for some restoration projects. While the cost of a restoration project may seem heavy in the long run the benefits will outweigh the costs. For instance, steps can be taken to limit the pollution of rivers that drain into Loktak Lake. Afforestation in the catchment area can also prevent soil erosion into the lake. The restocking of the lake with fingerlings by the Fishery Department is another such step towards restoring and enhancing the fishery resources. In the principles and guidelines for wetland restoration adopted by resolution VIII.16 (2002) of the Ramsar Convention, principal 15 points attention to local community stakeholders and indigenous people who will be affected by the project. It is mentioned that these local community stakeholders must be fully involved in the wetland

restoration project. Further, this involvement needs to be maintained during early consideration of the restoration project to its implementation to its long-term stewardship.

Innovation is another key step toward sustainable development. In terms of fishing techniques used, there is a need for innovation of more sustainable methods. One such method that the LDA has been promoting is pen and cage culture. In pen and cage culture method fishes are raised in enclosures in the lake, typically made of nets or bamboo. This method is considered environmentally friendly and can prevent overfishing in the lake. Promoting diversification of occupation can also ease the burden on the lake. When it comes to promoting alternative livelihood options it may require additional efforts like giving training, financial assistance and creating market linkages etc Poultry, piggery, weaving/ handlooms, and basket making are some of the activities in which training can be given. These activities can give additional income to the fishers and can give them income security. While LDA has started promoting and training in alternate income generation schemes, it was observed from the field that not many people were aware of it. So, more awareness has to be generated and financial assistance provided to start with these activities.

Concluding Remarks

The need for discussion on sustainable development in Loktak Lake acquires much more relevance when the lake is not just seen as an economic or ecological unit but also as an important part of the heritage and identity of the native people. While the damages in terms of ecology and economy can be assessed to some extent, the loss of tradition, culture, and values in the life of the community is immeasurable. Anthropogenic activities and developmental projects negatively impacted the wetland ecology and the impact of these changes is directly experienced by the native people particularly the fishers in their everyday life. Development in such sensitive areas must be then driven by a shared vision of the future where all the stakeholders particularly the natives are considered and a participatory model of sustainable development must be prioritised.

References

- Fatma Denton. (2002). Climate Change Vulnerability, Impacts, and Adaptation: Why Does Gender Matter? *Gender and Development*, 10(2), 10–20.
- Kangabam, R. & Boominathan, S. D. & Munisamy, G. (2015). Ecology, disturbance and restoration of Loktak Lake in Indo-Burma Biodiversity Hotspot-An overview. *NeBio*, 6 (2), 9-15.
- Laishram, J. & Dey, M. (2014). Water Quality Status of Loktak Lake, Manipur, Northeast India and Need for Conservation Measures: A Study on Five Selected Villages. *International Journal of Scientific and Research Publication*, 4(6), 1-5.
- Majumdar, R. K., Roy, D., Bejjanki, S., & Bhaskar, N. (2016). An overview of some ethnic fermented fish products of the Eastern Himalayan region of India. *Journal of Ethnic Foods*, 3(4), 276–283.
- Matthews, G. V. T. (1993). *The Ramsar Convention on Wetlands: Its history and development*. <https://www.ramsar.org/sites/default/files/documents/pdf/lib/>

- Matthews-history.pdf
- Meitei, S., Kumar, R., Singh., B. (2011). Shrinking natural regimes of Loktak wetland complex-challenges and management implications. *Loktak*, 6, 6-11.
- Moosa, C. S., & Tuana, N. (2014). Mapping a Research Agenda Concerning Gender and Climate Change: A Review of the Literature. *Hypatia*, 29(3), 677–694.
- Ningthoujam Kamala Chanu & Kh. Rajmani Singh, “A Study on Profile of the Fishers of Karang Island, Manipur”, *International Journal of Applied and Advanced Scientific Research*, Volume 2, Issue 2, Page Number 133-140, 2017
- Oinam, S.& Khoiyangbam, R.S. (2017). Changing landscape of Loktak Lake and its impacts on local people’s livelihood. *Researchers World Journal of Arts Science & Commerce*, 8(4), 124-132.
- Press Information Bureau (Research Unit), published the news on August 26, 2022, that India is now a land of 75 Ramsar Sites.
- Ramsar Convention on Wetlands. (2002). *Principals and guidelines for Weland restoration*.
- Ramsar Convention on Wetlands. (2008). *The Changwon Declaration on human well-being and wetlands*.
- Ramsar Convention on Wetlands. (2021). *Wetland restoration: unlocking the untapped potential of the earth’s most valuable ecosystem*. <https://www.ramsar.org/document/wetlands-restoration-unlocking-untapped-potential-earths-most-valuable-ecosystem>
- Ramsar Convention on Wetlands (2007). *The Ramsar concept of “wise use”*. Information Paper no.7. <https://www.ramsar.org/sites/default/files/documents/library/info2007-07-e.pdf>
- Sellamuttu, S. S., De Silva, S., Nagabhatla, N., Finlayson, C. M., Pattanaik, C., & Prasad, N. (2012). The Ramsar Convention’s Wise Use Concept in Theory and Practice: An Inter-Disciplinary Investigation of Practice in Kolleru Lake, India. *Journal of International Wildlife Law & Policy*, 15(3–4), 228–250. <https://doi.org/10.1080/13880292.2012.749138>
- Sharma, D., Kashyap, A. and Devi, K.P. (2017). A Survey on Women Working in Weaving Industries of Manipur, *Int. J. Pure App. Biosci.* 5(3): 905-911.
- Singh, A.L., & Khundrakpam, M.L. (2009). Phumdi proliferation: A case study of Loktak lake, Manipur. *Water and Environment Journal*. 25, 99-105.
- Singh, A.L. & Moirangleima, K. (2009). Shrinking Water Area in the Wetlands of the Central Valley of Manipur. *The Open Renewable Energy Journal*, 2, 1-5.
- Singh, A. L., & Moirangleima, K. (2012). Dying wetlands: a threat to livelihoods of Loktak Lake dwellers. *Greener Journal of Physical Sciences*, 2 (4), 107–116. <http://www.gjournals.org/GJPS/GJPS%20PDF/2012/October/Abha%20and%20Khundrakpam.pdf>
- Singh, S. (2011). Paragrass invation in Loktak. *Loktak*, 6,12-13.
- Singh, A.L., & Moirangleima, K. (2012). Dying Wetlands: A Threat to Livelihoods of Loktak Lake Dwellers. *Greener Journal of Physical Sciences*, 2(4), 17-116.
- Singh, N. M. R., & Singh, N. D. K. T. (2023). Environmental and Socio-Economic Impacts of Hydro Power Project: A Case Study of the Loktak Hydroelectric Project In Manipur. *EPRA International Journal of Socio-Economic and Environmental*

- Outlook*, 1–6. <https://doi.org/10.36713/epra13794>
- The Manipur Loktak Lake (Protection) Act 2006 (India)*
- Thakur, J. (2020). *The Ithai Barrage of Manipur: To Decommission or Not*. ORF Issue Brief No. 364, Observer Research Foundation.
- Xaxa, V., Saha, D., & Singha, R. (Eds.). (2018). *Employment and Labour Market in North-East India: Interrogating Structural Changes* (1st ed.). Routledge India. <https://doi.org/10.4324/9780429447020>
- Yenkokpam, S., & Devi, Y. R. (2018). Eshing Ekai Thabi - An Underutilised Aquatic Vegetable of Manipur. *International Journal of Current Microbiology and Applied Sciences*, 7(10), 1292–1296. <https://doi.org/10.20546/ijcmas.2018.710.145>
- Ylipaa J., Gabriëlsson S., Jerneck A. (2019). Climate Change Adaptation and Gender Inequality: Insights from Rural Vietnam. *Sustainability*, 11(10), 1-16.
- United Nations (General Assembly). (2007). *Declaration of the Rights of Indigenous People*. <https://www.wetlands.org/wetlands/ramsar-convention/>
- Davis, T. (1993). *Towards the wise use of wetlands: report of the Ramsar Convention Wise Use Project*. <https://ci.nii.ac.jp/ncid/BA41447288>
- Keibul Lamjao Conservation Area. (2016). In *UNESCO World Heritage Convention*. Retrieved May 5, 2022, from <https://whc.unesco.org/en/tentativelists/6086/>