

Loktak Lake: Natural Capital and Livelihood Security in Manipur

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ABSTRACT

Loktak Lake, the largest freshwater wetland in Northeast India and a Ramsar site, represents a valuable natural capital that supports ecological sustainability and livelihood security in Manipur. The lake provides multiple ecosystem services, including fisheries, aquatic resources, biodiversity conservation, hydropower generation, tourism, and water regulation, benefiting thousands of households. Fisheries remain the primary livelihood source, while wetland resources such as edible plants, medicinal species, and handicraft materials contribute to income diversification and food security. The lake also supports eco-tourism and the emerging blue economy through sustainable utilization of aquatic resources. However, environmental degradation caused by pollution, siltation, hydrological alterations, invasive vegetation, and unsustainable resource exploitation threatens its ecological integrity and economic potential. Sustainable management through community participation, wetland restoration, ecosystem service valuation, and conservation-oriented policies is essential to safeguard Loktak Lake. Protecting this unique wetland will strengthen livelihood resilience, biodiversity conservation, and long-term sustainable development in the region.

Keywords: Loktak Lake; Natural Capital, Livelihood Security, Ecosystem Services, Sustainable Wetland Management

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1. INTRODUCTION

Natural resources are often viewed merely as environmental assets, but in reality they function as productive economic capital that supports livelihoods, generates income, and contributes to long-term development. Among India's wetlands, Loktak Lake in Manipur stands as a remarkable example of how nature and economy are deeply interconnected. Known as the "Lifeline of Manipur," Loktak is the largest freshwater lake in Northeast India and a Ramsar Wetland of International Importance. Beyond its ecological significance, the lake serves as a vital source of

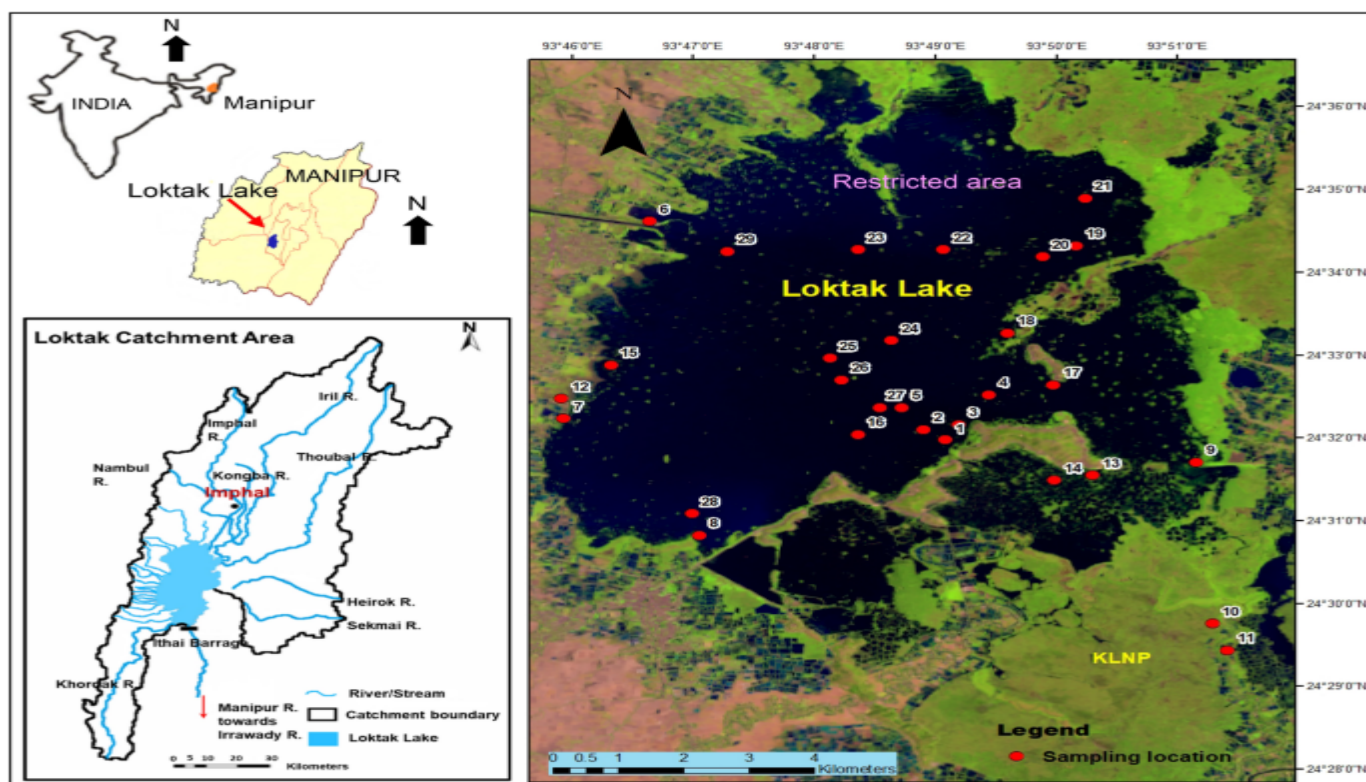
livelihood, food security, biodiversity conservation, hydropower generation, tourism, and cultural identity. The concept of **natural capital** refers to the stock of natural resources and ecosystems that provide valuable goods and services to society. Forests, rivers, wetlands, and lakes generate economic benefits that are often overlooked because many of these services are not traded in conventional markets. Loktak Lake exemplifies natural capital by continuously providing fisheries, edible plants, water resources, tourism opportunities, ecological services, and employment to thousands of people. However, increasing

environmental degradation and anthropogenic pressures threaten the sustainability of these benefits. Understanding Loktak through the lens of natural

capital and livelihood security can help policymakers and communities recognize the true economic value of conserving this unique wetland ecosystem.



Figure1. Overview of Loktak lake and its catchment areas



2. LOKTAK LAKE: A NATURAL ASSET OF MANIPUR

Located in the southern part of the Imphal Valley, Loktak Lake covers a vast wetland complex and forms the largest freshwater ecosystem in Northeast India. The lake is globally recognized for its floating biomass called phumdis, heterogeneous masses of vegetation, soil, and organic matter floating on the water surface. These phumdis create a unique ecological environment that supports rich biodiversity and sustains numerous economic activities. The importance of Loktak extends far beyond its scenic beauty. The Loktak Wetland Complex supports approximately 45 villages and 29 towns, while nearly 14 percent of the valley population lives in and around the lake ecosystem. The lake also provides water to the 105 MW Loktak Hydroelectric Project, one of the most important sources of electricity in the region. From an economic perspective, Loktak functions as a productive asset that generates multiple streams of benefits. Unlike manufactured capital, which depreciates over time, natural capital can continue producing benefits indefinitely if managed sustainably. Therefore, conserving Loktak is not merely an environmental concern but an investment in economic sustainability.

3. FISHERIES: THE BACKBONE OF LIVELIHOODS

Among the various economic activities associated with Loktak Lake, fisheries occupy a central position. The lake is considered the largest fishery resource in Manipur and accounts for more than 50 percent of the state's fish-producing area. Studies indicate that approximately 50,400 fishers depend directly on Loktak Lake, while nearly 12 percent of the state's population relies on its resources either directly or indirectly. Fishing has been an integral part of the socio-economic fabric of the region for generations. Traditional fishing methods, including the use of phumdi-based structures, have evolved in harmony with the lake ecosystem. Fishing not only provides income but also contributes significantly to household nutrition and food security. However, socio-economic studies reveal that many fishing households remain economically vulnerable. The average annual income of fishers was found to be relatively low, and more than half of the surveyed households possessed Below Poverty Line (BPL) ration cards. A substantial proportion of household expenditure is devoted to food consumption, indicating the fragile economic condition of fishing communities. These findings highlight an important economic reality: while Loktak generates substantial livelihood opportunities, the full economic

potential of its fisheries sector remains underutilized. Investments in sustainable fisheries management, value addition, cold-chain infrastructure, and market access can significantly enhance income opportunities for local communities.

4. WETLAND RESOURCES AND RURAL LIVELIHOODS

The economic importance of Loktak extends beyond fisheries. Communities residing around the lake depend on a diverse range of biological resources for subsistence and income generation. Research conducted in villages surrounding the lake documented the utilization of 38 fish species, one prawn species, two mollusc species, one mussel species, 16 edible vegetable species, eight fodder species, six fuelwood species, three thatching grass species, twelve medicinal plant species, and two handicraft resources. These resources contribute significantly to household livelihoods, especially among economically weaker sections. Aquatic vegetables harvested from the lake are widely consumed and marketed. Medicinal plants provide healthcare benefits and possess potential for commercial utilization. Wetland grasses and biomass support livestock production and traditional handicraft activities. For many households, the lake serves as a natural insurance mechanism during periods of economic distress. When agricultural incomes decline or employment opportunities become scarce, wetland resources provide an alternative source of sustenance and income. This livelihood diversification enhances household resilience and reduces vulnerability to economic shocks. The contribution of women to this informal wetland economy is particularly significant. Women are actively involved in fish marketing, collection of aquatic vegetables, processing activities, and household resource management. Consequently, conservation of Loktak also contributes to gender-inclusive rural development.

5. ECOSYSTEM SERVICES: THE HIDDEN ECONOMY OF LOKTAK

While fisheries and biological resources generate visible economic benefits, Loktak also provides a range of ecosystem services whose value often remains invisible in conventional economic accounting. Wetlands are among the most productive ecosystems on Earth. Loktak performs several critical ecological functions, including water purification, flood regulation, groundwater recharge, nutrient cycling, carbon sequestration, and biodiversity conservation.

These ecosystem services support agriculture, human health, and environmental sustainability across the region. The lake acts as a natural reservoir that regulates water flow and reduces the risk of flooding in downstream areas. Aquatic vegetation absorbs pollutants and improves water quality, reducing the need for expensive water treatment infrastructure. Wetlands also serve as breeding grounds for fish and habitats for migratory birds and numerous aquatic organisms. Recent studies emphasize that ecosystem services provided by Loktak and its phumdis are essential for maintaining ecological balance and supporting human livelihoods. The lake supports irrigation, domestic water use, fisheries, tourism, and biodiversity conservation simultaneously. Economists increasingly recognize that these services possess substantial monetary value. If such functions had to be replaced through artificial infrastructure, the costs would be enormous. Therefore, conservation of Loktak should be viewed as protecting a valuable stock of natural capital that continuously generates economic returns.

6. TOURISM AND THE BLUE ECONOMY

In recent years, tourism has emerged as an important component of the lake's economic significance. The breathtaking landscape of floating islands, traditional fishing practices, and the world's only floating national park make Loktak one of the most attractive tourist destinations in Northeast India. The lake provides opportunities for eco-tourism, boating, bird watching, cultural tourism, and nature-based recreation. Keibul Lamjao National Park, located within the lake ecosystem, serves as the last natural habitat of the endangered Sangai deer, often called the "dancing deer" of Manipur. Tourism generates employment opportunities for local communities through hospitality services, transportation, handicrafts, and food enterprises. When managed sustainably, eco-tourism can create economic incentives for conservation while improving local livelihoods. The emerging concept of the Blue Economy emphasizes sustainable utilization of aquatic resources for economic growth and improved livelihoods. Loktak Lake has immense potential to become a model of wetland-based blue economy development through sustainable fisheries, eco-tourism, biodiversity conservation, and value-added wetland products.

7. EMERGING CHALLENGES TO SUSTAINABILITY

Despite its immense economic and ecological value, Loktak Lake faces serious threats that jeopardize its long-term sustainability. One of the most significant interventions affecting the lake ecosystem has been the construction of the Ithai Barrage. While the barrage supports hydropower generation and contributes to economic development, it has also altered the natural hydrological regime of the lake. Research indicates that changes in water levels have affected fish migration, wetland ecology, agricultural practices, and habitat conditions. Environmental degradation has been compounded by pollution, siltation, encroachment, invasive vegetation, and unplanned developmental activities. Recent land-use studies reveal substantial declines in vegetation and agricultural land alongside increases in built-up areas, reflecting growing anthropogenic pressure on the lake ecosystem. Another challenge arises from the increasing spread and management complexities of athaphums, circular floating fish culture structures used by local communities. Although they support livelihoods, their uncontrolled expansion has implications for water circulation and ecological balance. Recent studies have highlighted the need to strike a balance between livelihood security and environmental sustainability. If these challenges remain unaddressed, the degradation of natural capital could reduce fish productivity, diminish ecosystem services, and threaten the livelihood security of thousands of households.

8. INVESTING IN NATURAL CAPITAL FOR SUSTAINABLE DEVELOPMENT

Conservation and development should not be viewed as competing objectives. Rather, sustainable development requires investments that enhance the productivity and resilience of natural capital. A comprehensive strategy for Loktak should focus on sustainable fisheries management, wetland restoration, catchment area treatment, pollution control, biodiversity conservation, and community participation. Strengthening local institutions and promoting participatory governance can improve resource management outcomes. Economic instruments such as ecosystem service valuation, payment for ecosystem services, and community-based conservation incentives can help integrate environmental sustainability into development planning. Investments in eco-tourism infrastructure, fish value chains, and livelihood diversification can further enhance economic opportunities for local

communities. Importantly, conservation policies must recognize that local communities are not merely beneficiaries but active custodians of the ecosystem. Their traditional knowledge and participation are essential for the long-term sustainability of the lake.

9. CONCLUSION

Loktak Lake is far more than a freshwater wetland. It is a dynamic stock of natural capital that sustains livelihoods, supports food security, conserves biodiversity, generates energy, and contributes to the socio-economic development of Manipur. Fisheries, wetland resources, ecosystem services, tourism, and hydropower collectively make Loktak one of the most valuable natural assets in Northeast India. However, the benefits derived from this natural capital are increasingly threatened by environmental degradation and unsustainable resource use. The future of Loktak will depend on the ability of policymakers, researchers, communities, and civil society to balance economic development with ecological conservation. Protecting Loktak is not merely an environmental obligation. It is an investment in livelihood security, economic resilience, and sustainable development. As the world increasingly recognizes the value of natural capital, Loktak Lake offers an important lesson: economic prosperity and environmental sustainability are not opposing goals but mutually reinforcing pathways toward a better future.

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