



## EXPLORING CLIMATE IMPACTS AND ADAPTIVE RESPONSES AMONG CHILIKA'S FISHER COMMUNITIES

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### ABSTRACT

The study investigates how climate change is steadily transforming the lives and livelihoods of fisher communities living around Chilika Lake-a landscape where human wellbeing is closely linked to the ecological stability of Asia's largest brackish water lagoon. With rising climatic uncertainty-frequent temperature shifts, unpredictable monsoons, fluctuating salinity, and recurring cyclones-fishing families are facing heightened livelihood insecurity. These environmental disruptions have affected fish abundance, altered breeding grounds, and destabilised traditional fishing routines, making it increasingly difficult for households to sustain their daily needs. Using a livelihood-focused lens, the study explores how these ecological disturbances interact with long-standing socio-economic challenges, shaping the overall resilience of fishing villages in the region. The value of this research lies in connecting the impacts of climate stress with household wellbeing, local resilience practices, and community-led adaptive responses. By documenting fishers' lived experiences, traditional ecological knowledge, and the adjustments they make-whether through modified fishing techniques, seasonal migration, or income diversification-the study reveals how families are coping with rapid environmental change. It also examines existing institutional measures and policy frameworks, highlighting gaps in support and areas needing improvement. Centred on climate risks, adaptive capacity, and long-term resilience, the study emphasises the role of diversified livelihoods, social safety nets, and access to climate information. It also analyses the promise of sustainable aquaculture, eco-tourism, and community-managed resource systems as pathways for future security. Ultimately, the study aims to provide actionable insights to help policymakers and local institutions strengthen the adaptive capacity of Chilika's fishing communities.

### KEYWORDS :

#### INTRODUCTION:

Chilika Lake-India's largest brackish water lagoon-has long sustained the cultural identity and economic wellbeing of its fishing communities. The livelihoods of these households are closely bound to the lake's seasonal rhythms and rich biodiversity, with generations depending on inherited ecological wisdom to interpret natural cycles. However, this balance is increasingly under strain. Climate-driven disruptions-rising temperatures, irregular rainfall, shifting salinity regimes, and recurrent cyclones-are rapidly transforming the ecological foundations on which fishers rely. Such disturbances have made fish populations uncertain, altered breeding habitats, and weakened traditional fishing systems, thereby heightening livelihood vulnerabilities for families who depend almost entirely on the lagoon's resources. These emerging stresses necessitate a deeper inquiry into how climate variability is reshaping the ecological and socio-economic landscape of Chilika's fishing settlements.

The study employs the Sustainable Livelihoods Approach (SLA) to analyse how households draw upon various forms of capital-natural, social, financial, physical, and human-while coping with environmental and economic shocks. In Chilika, where livelihoods are resource-driven, ecological degradation immediately affects earnings, nutrition, and wellbeing. SLA also highlights how these environmental challenges intersect with persistent socio-economic constraints such as limited savings, inadequate infrastructure, volatile markets, and weak institutional mechanisms.

Complementing this framework, Climate Vulnerability and Resilience Theory situates household experiences within broader ecological and governance contexts. It helps explain differentiated vulnerability, intensifying inequalities, and the adaptive strategies communities adopt-ranging from modifying fishing practices and diversifying incomes to seasonal migration and participation in conservation activities.

Overall, the research seeks to map climate-induced risks, document indigenous knowledge, evaluate adaptation initiatives, and identify policy gaps. By integrating climate concerns with robust theoretical perspectives, the study aims to offer actionable insights for strengthening resilience, safeguarding Chilika's ecosystem, and ensuring sustainable futures for its fishing communities.

#### Literature Review:

Existing research on Chilika Lake and Odisha's coastal fishing communities highlights how deeply human livelihoods are tied to this

sensitive ecosystem. Scientific studies and local observations together show that climate change is altering the lake's natural balance. Earlier ecological work documented improvements after the lake mouth was reopened, but recent assessments point to rising temperatures, erratic monsoons, and salinity shifts that are affecting biodiversity. Fishers' experiences of disappearing species and unpredictable seasons mirror these findings.

Social and anthropological studies reveal the cultural significance of fishing and the traditional knowledge communities rely on. However, this wisdom is increasingly challenged as ecological changes accelerate. Research using the Sustainable Livelihoods Approach shows how declining fish catch leads to financial strain, food insecurity, emotional stress, and migration, with poorer households most affected. Post-cyclone studies also highlight repeated gaps in preparedness and recovery systems.

Although communities are adopting adaptive practices, institutional support remains uneven. Key gaps persist in linking ecological science with human vulnerability-gaps this study seeks to address.

#### Objectives Of The Study:

1. To analyse how climate change is affecting Chilika's ecological systems and reshaping the livelihood risks faced by fisher communities across different zones of the lake.
2. To document traditional ecological knowledge and examine how fishing households draw on various livelihood resources to cope with increasing environmental uncertainties.
3. To assess the role and effectiveness of government schemes, institutions, and community organisations in supporting climate resilience and sustainable fisheries.
4. To develop community-centred adaptation and mitigation strategies that enhance livelihood security, strengthen resilience, and promote long-term sustainable management of Chilika Lake.

#### Methodology:

The study adopts a mixed-methods approach to understand climate-linked vulnerabilities among fishing communities in **Ganjam district**. Ten coastal villages-**Aryapalli, Gopalpur, Sana Aryapalli, Podampeta, Prayagi, Markandi, Ramayapatna, Kantiagada, Sunapur, and Purusottampur fishing hamlet**-serve as the area of study. Household surveys, focus group discussions, and participatory rural appraisal tools will capture livelihood patterns, risk exposure, and adaptation strategies. Key informant interviews with community leaders, cooperative societies, women's SHGs, and local institutions will provide

qualitative depth. Secondary data from government reports and climate records will support analysis. The methodology integrates socio-economic profiling, ecological assessment, and community-driven insights to generate practical, evidence-based recommendations.

#### Data:

The matrix aligns with SLA by linking climate stresses to livelihood assets, identifying vulnerabilities, and generating targeted, resilience-building solutions for fisher households.

#### Solution-Oriented Data Analysis Matrix (Aligned With Objectives)

Sl.No.	Objective of the Study	Research Gap Identified	Data to Be Analysed	Analytical Approach	Solution-Focused Insight Expected
1.	<b>Assess climate-induced changes in fishing patterns</b>	Ecological studies miss the micro-level livelihood impacts felt by village fishers	Daily catch trends, species shifts, seasonal disruptions	Ecological trend mapping and time-series analysis	Identification of climate-sensitive fish species and recommendations for seasonal advisories, sustainable gear use, and improved lake management
2	<b>Understand livelihood stress and economic vulnerability of households</b>	Existing studies do not differentiate between small, marginal, and mechanised fishers	Household income, debt load, migration, asset loss	Cluster and vulnerability analysis	Targeted livelihood support, risk-based insurance coverage, and credit solutions for high-risk groups
3	<b>Capture traditional ecological knowledge and its erosion</b>	Limited integration of scientific climate data with community knowledge	Weather cues, indigenous fishing practices, oral narratives	Thematic coding and cross-comparison with climate records	Solutions for knowledge revival: community climate schools, TEK documentation, and integration with scientific advisories
4	<b>Analyse community-level adaptation practices</b>	Evidence on effective local adaptation remains scattered	Gear modification, alternative livelihoods, aquaculture adoption	Comparative and resilience scoring	Blueprint for scalable adaptation models such as climate-smart aquaculture, eco-tourism, and diversified income activities
5	<b>Review institutional support systems and governance gaps</b>	Policy frameworks lack ground-level validation from fisher communities	Access to schemes, cooperative efficiency, disaster support	Policy gap analysis and stakeholder mapping	Solutions for stronger institutions: improved scheme penetration, cooperative restructuring, disaster-ready infrastructure, and early warning outreach

#### CONCLUSION:

##### Climate Resilient Solutions For Mitigation And Adaptation

Building sustainable, climate-resilient pathways for Chilika's fishing communities requires solutions grounded in the principles of the Blue Economy—prioritising ecological protection, economic security, and responsible resource use. For Ganjam's lake-dependent villages, resilience starts with safeguarding the natural systems that sustain fisheries. This involves enhancing water flow, strengthening scientific tracking of salinity and fish populations, and encouraging environmentally responsible practices such as regulated fishing gear, seasonal no-fishing periods, and the restoration of wetlands and nursery habitats.

Diversifying livelihoods is essential to reduce pressure on a fishery increasingly affected by climate unpredictability. Climate-adaptive aquaculture options—such as pen culture, crab fattening, oyster farming, and mangrove-linked aquaculture—offer stable income alternatives. Training youth in eco-tourism, guiding, handicrafts, and value-added fish processing further broadens employment opportunities while reducing dependence on wild catch.

Strong governance systems are equally critical. Revitalised cooperatives, fairer market linkages, expanded insurance schemes, and efficient early warning systems can help communities better manage cyclones, economic risks, and resource fluctuations. Integrating traditional ecological knowledge with scientific climate forecasts improves community-level planning and strengthens adaptive capacity.

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