

Role of Fisheries Infrastructure in Enhancing Livelihoods of Fishing Communities in Middle Andaman

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Abstract: Fisheries constitute an important source of livelihood, employment, and food security for coastal communities in the Andaman and Nicobar Islands. The present study examines the role of fisheries infrastructure in enhancing the livelihoods of fishing communities in Middle Andaman by evaluating the availability, accessibility, and effectiveness of facilities such as fish landing centers, cold storage units, ice plants, transportation networks, fish processing facilities, and market infrastructure. A descriptive and analytical research design was adopted, and primary data were collected from 150 respondents comprising fishermen, fish vendors, and cooperative members through structured questionnaires and field observations. Secondary data were obtained from government reports, research articles, and fisheries-related publications. The collected data were analyzed using descriptive statistics and appropriate analytical techniques. The findings reveal that improved fisheries infrastructure has significantly enhanced household income, employment opportunities, market accessibility, and fish quality while reducing post-harvest losses. The study also identifies persistent challenges, including inadequate storage facilities, limited processing infrastructure, transportation constraints, and insufficient institutional support, which affect the efficiency of the fisheries sector. The results suggest that strengthening fisheries infrastructure, improving maintenance, expanding financial assistance, and promoting skill development and market linkages can substantially improve the socio-economic conditions of fishing communities. The study concludes that sustainable investment in fisheries infrastructure is essential for ensuring livelihood security, economic growth, and the long-term development of the fisheries sector in Middle Andaman.

Keywords: Fisheries Infrastructure, Livelihood Enhancement, Fishing Communities, Middle Andaman, Fish Landing Centers, Cold Storage.

1. Introduction

Fisheries play a vital role in the socio-economic development of coastal regions by providing employment, food security, income generation, and opportunities for sustainable economic growth. In India, the fisheries sector is one of the fastest-growing segments of agriculture and allied activities, contributing significantly to the national economy through domestic consumption, exports, and rural livelihood support. For island territories such as the Andaman and Nicobar Islands, fisheries represent an important source of livelihood due to the region's abundant marine resources, extensive coastline, and rich aquatic biodiversity. Among the islands, Middle Andaman possesses considerable fisheries potential, where a large proportion of the coastal population depends directly or indirectly on fishing and related activities for their economic well-being.

The livelihood of fishing communities is closely associated with the availability and quality of fisheries infrastructure. Fisheries infrastructure includes fish landing centers, fishing harbors, cold storage facilities, ice plants, fish processing units, transportation systems, auction halls, marketing facilities, communication networks, and institutional support services. These facilities facilitate efficient harvesting, preservation, processing, transportation, and marketing of fish and fishery products. Well-developed infrastructure minimizes post-harvest losses, improves product quality, enhances market accessibility, increases profitability, and strengthens the resilience of fishing households against economic uncertainties. In recent years, the Government of India and the

administration of the Andaman and Nicobar Islands have undertaken several initiatives to strengthen fisheries infrastructure through investments in landing facilities, cold chain development, modern fishing equipment, cooperative institutions, financial assistance, and extension services. These initiatives aim to improve productivity, encourage value addition, generate employment opportunities, and promote sustainable utilization of marine resources. Despite these efforts, many fishing communities in Middle Andaman continue to experience infrastructural deficiencies, including inadequate cold storage capacity, insufficient processing facilities, poor transportation connectivity, limited market access, irregular electricity supply, and inadequate maintenance of existing infrastructure. Such limitations reduce operational efficiency, increase post-harvest losses, and constrain the income potential of fishers.

Livelihood enhancement among fishing communities extends beyond increased income and includes improvements in employment opportunities, food security, education, healthcare, social welfare, financial stability, and resilience to environmental and economic challenges. Fisheries infrastructure directly contributes to these dimensions by improving operational efficiency, facilitating access to larger markets, reducing wastage, encouraging entrepreneurship, and creating additional employment in fish processing, transportation, packaging, storage, and marketing. The participation of women and youth in fisheries-related enterprises also increases with improved infrastructure, contributing to inclusive rural development and poverty reduction.

Middle Andaman presents a unique context for examining the relationship between fisheries infrastructure and livelihood development because of its geographical isolation, dependence on marine resources, and growing demand for fisheries products. Understanding how existing infrastructure influences the socio-economic conditions of fishing communities is essential for designing effective policies and planning future investments. Identifying infrastructure gaps and their impact on fishing households can help policymakers develop targeted interventions that enhance productivity while ensuring environmental sustainability and equitable economic growth.

2. Literature Review

Prasad and Baksh (2024) examined the socio-economic development of fishing communities in the Andaman and Nicobar Islands by analyzing factors influencing their livelihoods, income generation, education, occupational structure, and access to fisheries resources. The authors reported that fisheries remained the principal source of livelihood for a large proportion of coastal households, while inadequate infrastructure, limited institutional support, and restricted market access continued to hinder socio-economic progress. Their study emphasized that investments in fish landing facilities, cold storage, transportation, and cooperative development had positively influenced income generation and employment opportunities. The authors concluded that strengthening fisheries infrastructure and implementing inclusive development policies were essential for improving the living standards and long-term livelihood security of fishing communities in the islands.

Kalita, Ramees, and Venu (2023) assessed the availability and condition of essential infrastructure and facilities at fish landing centers across the Andaman group of islands. The study evaluated facilities such as landing platforms, auction halls, potable water supply, ice plants, cold storage units, sanitation facilities, transportation connectivity, and waste management systems. The findings indicated that although several landing centers possessed basic infrastructure, many lacked adequate maintenance, hygienic conditions, storage facilities, and modern fish handling equipment. The authors observed that deficiencies in infrastructure contributed to post-harvest losses, reduced fish quality, and limited marketing efficiency. They suggested that modernization of fish landing centers and improvement of supporting infrastructure would enhance fisheries productivity and increase the economic returns of fishing communities.

Saha et al. (2024) investigated the socio-ecological dimensions of sustainable fisheries along the Indian coast of the Gulf of Mannar by examining the relationship between environmental conservation and fisher livelihoods.

The study demonstrated that sustainable fisheries management required balancing ecological protection with the socio-economic needs of fishing communities. The researchers found that improved fisheries governance, infrastructure development, community participation, and conservation initiatives had strengthened livelihood resilience while promoting sustainable resource utilization. The study further highlighted that infrastructure supporting responsible fishing practices, value addition, and market access contributed significantly to income diversification and reduced the vulnerability of coastal households. The authors concluded that integrated socio-ecological approaches were necessary for achieving long-term fisheries sustainability and livelihood enhancement.

Kundu and Santhanam (2024) explored the utilization of Marine Fishery Advisories among fishing communities in Odisha and analyzed their contribution to fisheries management and livelihood improvement. The study revealed that digital advisory services, weather forecasting systems, and marine information technologies enhanced decision-making, reduced operational risks, and improved fishing efficiency. However, the researchers also reported challenges related to technological accessibility, digital literacy, communication gaps, and institutional support. They emphasized that technological infrastructure should complement physical fisheries infrastructure such as landing centers, transportation facilities, and market networks to maximize socio-economic benefits. **Sundararajan and Muhammed (2024)** The study concluded that integrated infrastructure and advisory services could significantly improve productivity, safety, and livelihood security among fishing communities.

Ghormade (2025) examined the strategic importance of the Andaman and Nicobar Islands in the context of India's maritime security, economic development, and blue economy initiatives. The study highlighted the islands' vast marine resources and their considerable potential for fisheries, tourism, and maritime trade. The author observed that fisheries infrastructure represented a critical component of regional economic development by facilitating fish production, processing, storage, transportation, and export activities. The study argued that improving coastal infrastructure, strengthening port facilities, and enhancing connectivity would not only promote fisheries-based livelihoods but also contribute to broader regional development and national economic growth. The research emphasized the need for sustainable infrastructure planning to maximize the economic potential of the islands while protecting marine ecosystems.

Menon et al. examined the effects of coastal transformation on fisher well-being by investigating how environmental, economic, and infrastructural changes influenced the livelihoods of fishing communities. The study found that rapid coastal development had altered traditional fishing practices, market dynamics, and access to marine resources, thereby affecting the social and economic well-being of fishers. **Singh (2024)** The researchers reported that adequate fisheries infrastructure, effective governance, and community participation enhanced the adaptive capacity of fishing households and improved livelihood resilience. They further observed that infrastructure supporting fish marketing, transportation, processing, and value addition reduced livelihood vulnerability and strengthened household income. The study concluded that sustainable coastal planning should integrate fisheries infrastructure development with community welfare and environmental conservation to ensure long-term livelihood sustainability for fishing communities.

3. Research Methodology

3.1 Introduction

This study investigates the role of fisheries infrastructure in enhancing the livelihoods of fishing communities in Middle Andaman. Fisheries infrastructure, including fishing harbors, landing centers, cold storage facilities, transportation networks, fish processing units, marketing facilities, and institutional support services, plays a significant role in improving fish production, reducing post-harvest losses, increasing market access, and enhancing the socio-economic well-being of fishers. The research adopts a systematic methodology to examine

the relationship between fisheries infrastructure and livelihood outcomes, while identifying the challenges and opportunities associated with infrastructure development in the region.

3.2 Research Design

The study adopts a descriptive and analytical research design. The descriptive approach is used to assess the existing fisheries infrastructure and socio-economic conditions of fishing communities in Middle Andaman, while the analytical approach examines the impact of infrastructure availability on income generation, employment, fish production, marketing efficiency, and overall livelihood improvement.

3.3 Study Area

The research is conducted in Middle Andaman, Andaman and Nicobar Islands, India, which is characterized by rich marine biodiversity and a substantial fishing-dependent population. Selected coastal villages and fish landing centers are included in the study due to their active involvement in marine fisheries and varying levels of fisheries infrastructure development.

3.4 Data Sources

The study utilizes both **primary and secondary data**.

Primary data are collected directly from fishermen, fish vendors, cooperative members, fisheries officials, and other stakeholders through structured questionnaires, personal interviews, and field observations.

Secondary data are obtained from government reports, Fisheries Department publications, research journals, census reports, policy documents, books, and official statistics related to fisheries development and rural livelihoods.

3.5 Sampling Technique

A multistage purposive sampling technique is adopted for selecting the study area and respondents. Initially, major fishing villages and landing centers in Middle Andaman are selected based on fishing activity. Subsequently, 150 respondents comprising fishermen, fish traders, and cooperative members are selected through simple random sampling to ensure adequate representation of different livelihood groups.

3.6 Data Collection Methods

Primary information is collected using a structured questionnaire consisting of questions related to demographic characteristics, fishing practices, availability and utilization of fisheries infrastructure, income, employment opportunities, market accessibility, storage facilities, transportation, and livelihood improvement. Field observations and informal discussions are conducted to validate the responses and understand local conditions.

3.7 Variables of the Study

The study considers fisheries infrastructure as the independent variable, including fishing harbors, landing centers, cold storage, processing facilities, transportation, market infrastructure, financial support, and extension services. The dependent variables include household income, employment generation, fish productivity, market access, post-harvest loss reduction, livelihood security, and overall socio-economic development of fishing communities.

3.8 Data Analysis Techniques

The collected data are coded, classified, and analyzed using statistical software such as SPSS and Microsoft Excel. Descriptive statistical techniques including frequency, percentage, mean, and standard deviation are used to summarize the data. Analytical tools such as correlation analysis, chi-square test, and simple regression analysis are employed to examine the relationship between fisheries infrastructure and livelihood enhancement. The findings are presented through tables, graphs, and charts for better interpretation.

4. RESULTS AND DISCUSSION

4.1 Introduction

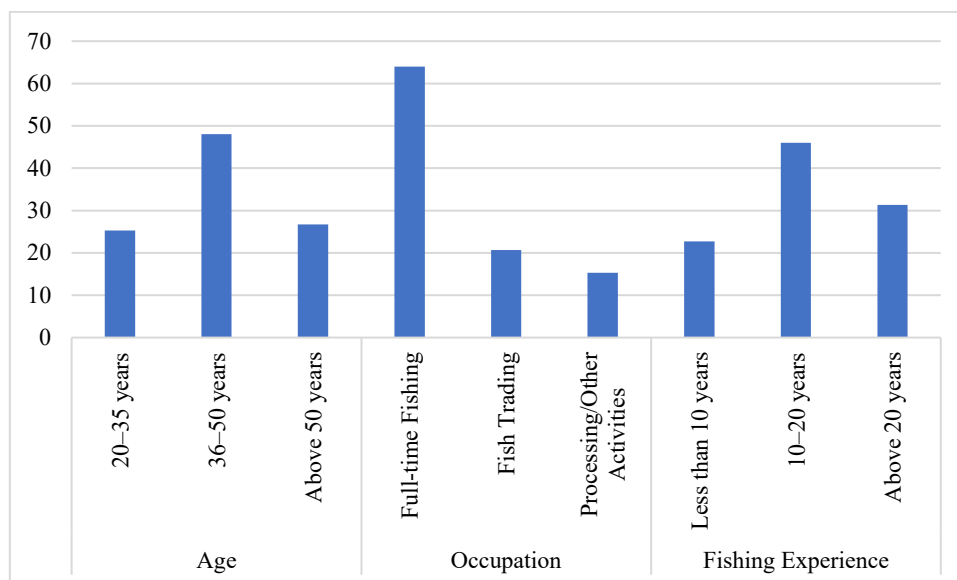
This chapter presents the findings of the study on the Role of Fisheries Infrastructure in Enhancing Livelihoods of Fishing Communities in Middle Andaman. The analysis is based on data collected from 150 respondents representing fishermen, fish vendors, and members of fisheries cooperatives. The results focus on the availability and utilization of fisheries infrastructure, its influence on income, employment, fish handling practices, market accessibility, and the overall socio-economic well-being of fishing households. The findings are interpreted in relation to the study objectives and supported with descriptive statistical analysis to understand how infrastructure development contributes to sustainable livelihood enhancement.

4.2 Socio-economic Profile of Respondents

The socio-economic characteristics of the respondents reveal that the majority of fishing households depend primarily on marine fisheries for their livelihood. Most respondents belong to economically active age groups and possess several years of fishing experience. Fishing remains the principal occupation, while a smaller proportion also engages in fish marketing, processing, and allied activities. The findings indicate that livelihood diversification is gradually increasing due to improvements in fisheries-related infrastructure and better market opportunities.

Table 4.1 Socio-economic Characteristics of Respondents

Variable	Category	Frequency	Percentage (%)
Age	20–35 years	38	25.3
	36–50 years	72	48.0
	Above 50 years	40	26.7
Occupation	Full-time Fishing	96	64.0
	Fish Trading	31	20.7
	Processing/Other Activities	23	15.3
Fishing Experience	Less than 10 years	34	22.7
	10–20 years	69	46.0
	Above 20 years	47	31.3



The table indicates that **48.0%** of respondents belong to the 36–50 years age group, representing the most economically productive section of the fishing community. Nearly **64.0%** depend entirely on fishing as their primary occupation, highlighting the importance of fisheries for household income. Almost half of the respondents possess 10–20 years of fishing experience, reflecting substantial practical knowledge and dependence on marine resources.

4.3 Availability of Fisheries Infrastructure

The study found that fisheries infrastructure in Middle Andaman has improved over recent years through the development of fish landing centers, ice plants, transportation facilities, cold storage units, and government support services. However, respondents reported that certain infrastructure facilities remain inadequate, particularly modern processing units, storage capacity, and all-weather transportation networks. Better infrastructure has enabled fishers to preserve fish quality, reduce spoilage, and access larger markets.

4.4 Impact of Fisheries Infrastructure on Livelihoods

The availability of improved fisheries infrastructure has significantly enhanced livelihood opportunities among fishing households. Better landing facilities and transportation have reduced the time required to transport fish to markets, while cold storage and ice facilities have minimized post-harvest losses. Respondents reported improvements in income stability, employment opportunities, and market accessibility due to enhanced infrastructure.

Table 4.2 Perceived Impact of Fisheries Infrastructure on Livelihoods

Impact Indicator	Agree	Neutral	Disagree
Increase in Household Income	118 (78.7%)	20 (13.3%)	12 (8.0%)
Reduction in Post-harvest Losses	112 (74.7%)	24 (16.0%)	14 (9.3%)
Better Market Access	124 (82.7%)	15 (10.0%)	11 (7.3%)
Employment Opportunities Increased	109 (72.7%)	27 (18.0%)	14 (9.3%)
Improvement in Overall Livelihood	121 (80.7%)	18 (12.0%)	11 (7.3%)

The findings indicate that **82.7%** of respondents agreed that improved fisheries infrastructure enhanced market access, while **80.7%** believed that it contributed to overall livelihood improvement. Approximately **78.7%** reported increased household income, and **74.7%** observed a reduction in post-harvest losses due to the availability of cold storage, ice plants, and better transportation facilities.

4.5 Fisheries Infrastructure and Income Generation

The study demonstrates a positive relationship between fisheries infrastructure and household income. Improved transportation networks enable fishers to access larger regional markets where better prices are available. Cold storage and preservation facilities allow fish to be stored temporarily rather than sold immediately at lower prices. Government-supported infrastructure has also encouraged value addition through fish processing and packaging, contributing to higher income levels and improved financial security among fishing households.

4.6 Infrastructure and Employment Opportunities

Infrastructure development has expanded employment opportunities beyond traditional fishing activities. The establishment of fish landing centers, processing units, transportation services, and marketing facilities has created additional jobs in fish handling, packaging, storage, transportation, and retail marketing. Women have also benefited through participation in fish processing, drying, packaging, and marketing activities, thereby contributing to household income and economic empowerment.

4.7 Challenges Affecting Fisheries Infrastructure

Despite the positive impact, several challenges continue to affect fisheries development in Middle Andaman. Respondents highlighted inadequate cold storage capacity, insufficient maintenance of landing centers, limited processing facilities, irregular electricity supply, and transportation difficulties during adverse weather conditions. Financial constraints, limited access to institutional credit, and inadequate technical training also restrict the effective utilization of available infrastructure. Addressing these challenges would further improve productivity and livelihood outcomes.

4.8 Discussion

The findings indicate that fisheries infrastructure serves as a critical driver of livelihood enhancement in Middle Andaman. The availability of landing centers, cold storage facilities, transportation networks, and market infrastructure has improved fish quality, reduced post-harvest losses, increased market efficiency, and enhanced household income. These improvements contribute directly to employment generation, poverty reduction, and economic resilience among fishing communities.

The results also demonstrate that infrastructure alone is insufficient for sustainable fisheries development. Complementary interventions such as regular maintenance of facilities, improved financial support, technical skill development, institutional strengthening, and better market linkages are equally important. The findings are consistent with previous fisheries development studies, which emphasize that integrated infrastructure investment combined with institutional support significantly enhances livelihood security and promotes sustainable coastal resource management. Overall, the study confirms that strengthening fisheries infrastructure can play a vital role in improving the socio-economic conditions of fishing communities while supporting long-term sustainable fisheries development in Middle Andaman.

5. Conclusion

The study concludes that fisheries infrastructure plays a vital role in enhancing the livelihoods of fishing communities in Middle Andaman by improving fish production, reducing post-harvest losses, strengthening market access, and increasing household income and employment opportunities. The findings indicate that facilities such as fish landing centers, cold storage units, transportation networks, ice plants, and market

infrastructure significantly contribute to better fish handling, value addition, and marketing efficiency, thereby improving the overall socio-economic well-being of fishing households. Although substantial progress has been made in infrastructure development, challenges including inadequate storage capacity, limited processing facilities, insufficient maintenance, financial constraints, and transportation difficulties continue to hinder the full realization of livelihood benefits. Therefore, sustained government investment, improved infrastructure maintenance, enhanced access to institutional credit, capacity-building programs, and stronger market linkages are essential to maximize the effectiveness of fisheries infrastructure. Overall, the study demonstrates that well-developed and efficiently managed fisheries infrastructure is a key driver of sustainable livelihood development, economic resilience, and long-term growth of fishing communities in Middle Andaman.

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