International Journal of Business Management & Research
(A Peer-Reviewed Bi-Annual Journal) ISSN: 2249-2143

BEYOND COASTAL BOUNDARIES: FINANCING THE INLAND BLUE ECONOMY IN INDIA – EVIDENCE FROM PUNJAB

***Dr. Manpreet Kaur, *Manmeet Singh and *Gurjit Kaur**
*Assistant Professor, Department of Business Management and Commerce
Desh Bhagat University, Mandi Goindgarh

Abstract

Purpose: This study investigates sustainable financing models for water-based sectors contributing to the Blue Economy in Punjab, a non-coastal Indian state. It explores how inland aquaculture, fisheries, and water resource management can be integrated into India's Blue Economy through appropriate financial mechanisms.

Methods: A mixed-methods approach was employed, combining field surveys across four districts of Punjab with secondary data analysis. A total of 50 stakeholders were surveyed to assess awareness, access, and satisfaction related to financing. Statistical techniques, including regression and ANOVA, were used to explore relationships among variables.

Findings: The study found that access to funding varies across districts, with awareness levels significantly predicting satisfaction. Despite available schemes like PMMSY and NABARD's Aquaculture Fund, procedural hurdles limit access. Stakeholders showed a strong preference for sustainable, long-term instruments such as blue bonds over PPPs.

Implications: The research informs policymakers and financial institutions on the need to develop customized, inclusive, and environmentally responsible financial products for inland Blue Economy actors. It also advocates for stronger institutional outreach and awareness-building in non-coastal states.

Originality: This research is one of the first to examine the inland dimensions of the Blue Economy in India. By focusing on Punjab, it expands the geographic and conceptual scope of Blue Economy discourse beyond the traditional maritime framework.

Keywords: Blue Economy, Punjab, Inland Aquaculture, Sustainable Finance, Blue Bonds, Public–Private Partnerships (PPPs)

1. Introduction

1.1 Background and Rationale

The Blue Economy has gained global prominence as an integrated development paradigm that seeks to align economic growth with marine and freshwater ecosystem sustainability. Originally conceptualized in the context of oceans and coastal resources, the Blue Economy today encompasses a wider array of water-based activities, including inland aquaculture, freshwater fisheries, riverine transport, wetland conservation, and integrated water resource management (Pauli, 2017; Commonwealth Secretariat, 2016). According to the World Bank (2017), the Blue Economy represents the sustainable use of aquatic resources for economic growth, improved livelihoods, and ecosystem health. However, most scholarly and policy discourse remains heavily skewed towards maritime geographies, often marginalizing inland regions that possess significant water-based economic potential.

India, with a 7,517-kilometer coastline and a 2.2 million square kilometer Exclusive Economic Zone (EEZ), has understandably focused its Blue Economy initiatives on marine sectors such as coastal tourism, port development, deep-sea fishing, and offshore renewable energy (Ministry of Earth Sciences, 2021). These sectors collectively contribute approximately 4% to India's GDP, with fisheries alone supporting over 14 million livelihoods (ForumIAS, 2024). Government schemes like the Sagarmala Programme and the Deep Ocean Mission are emblematic of this marine-centric focus (Drishti IAS, 2023). Yet, states without direct access to oceans, such as Punjab, are often excluded from national-level Blue Economy frameworks, despite their dynamic engagement in aquaculture, fisheries, and water conservation.

Punjab, though a landlocked state, has made substantial strides in freshwater aquaculture and fisheries, supported by its dense canal network, favorable agro-climatic conditions, and growing

institutional interest in sustainable water management (NABARD, 2023). The state's inland aquaculture production and water-based livelihood systems align well with the goals of the Blue Economy, particularly those related to Sustainable Development Goals (SDGs) 1 (No Poverty), 2 (Zero Hunger), 6 (Clean Water and Sanitation), and 14 (Life Below Water) (UNDP, 2022). However, the financing landscape for such activities remains underdeveloped, with stakeholders often lacking awareness, access, and trust in formal and innovative financial mechanisms (Chakraborty & Banerjee, 2023).

Traditional sources of financing—such as government subsidies, bank loans, and donor programs—have proved insufficient or inaccessible, particularly for small-scale aquaculture and water-resource ventures. These challenges are exacerbated by regulatory complexity, procedural bottlenecks, and institutional fragmentation (Nayak, 2019; Ghosh & Rao, 2020). As a result, stakeholders frequently encounter barriers in leveraging available schemes like the Pradhan Mantri Matsya Sampada Yojana (PMMSY) and NABARD's Aquaculture Infrastructure Development Fund. Simultaneously, new financing models such as blue bonds, impact investing, and blended finance are gaining attention globally but remain nascent in India's inland sectors (Sullivan, 2020; OECD, 2020).

1.2 Significance of the Study

This study is situated at the intersection of environmental finance, regional development, and policy innovation. It expands the geographic and conceptual scope of India's Blue Economy by focusing on Punjab—an inland state largely absent from the national Blue Economy narrative. In doing so, it addresses critical gaps in the literature, where most studies emphasize coastal infrastructure or marine-based industries (Sharma & Dey, 2022; Borthakur & Singh, 2021).

From a theoretical standpoint, this research draws on the Triple Bottom Line (TBL) framework (Elkington, 1998), which evaluates performance through economic, environmental, and social lenses. It also employs Institutional Theory (Scott, 2005) to understand how policy, governance, and regulatory ecosystems influence stakeholder engagement and financial accessibility. Additionally, the study incorporates the Blended Finance model (OECD, 2020), which leverages public and philanthropic capital to mobilize private investment in development sectors. These frameworks collectively support a multidi mensional analysis of how innovative financing can drive inclusive and sustainable growth in Punjab's Blue Economy sectors.

Practically, the study provides valuable insights for policymakers, financial institutions, and development agencies on designing customized, regionally relevant financial instruments. It foregrounds the role of awareness, outreach, and procedural clarity as enablers of financial satisfaction and inclusion, echoing findings from previous empirical work on development finance in the Global South (Teh et al., 2018; Guest et al., 2006). By integrating primary field data and secondary policy analysis, the research offers a robust evidence base for future programmatic and policy interventions in non-coastal regions.

1.3 Research Objectives

The primary objective of this study is to investigate sustainable financing models for Blue Economy sectors in Punjab, with a particular focus on inland aquaculture, fisheries, and water-based livelihoods. Specific objectives include:

1. To assess the current landscape of financing for water-based economic activities in Punjab.
2. To identify key gaps, barriers, and regional disparities in access to funding.
3. To evaluate stakeholder perceptions of emerging financial instruments such as blue bonds, impact investing, and public–private partnerships (PPPs).
4. To provide actionable policy recommendations to enhance the inclusivity, effectiveness, and environmental accountability of financial systems in the Blue Economy.

1.4 Central Research Questions

To guide the empirical inquiry and theoretical framing, the study seeks to answer the following research questions:

- RQ1: What is the current state of access to finance in Punjab's inland Blue Economy sectors, and how does it vary across districts?
- RQ2: What is the main barriers stakeholders face in obtaining finance, and how do institutional factors influence these challenges?
- RQ3: How do stakeholders perceive innovative financing models like blue bonds and blended finance, and what factors influence their preferences?
- RQ4: What policy and institutional interventions are needed to promote inclusive and sustainable financing for Blue Economy sectors in non-coastal states?

1.5 Bridging Gaps in Literature and Practice

While numerous studies have analyzed the financial dimensions of India's Blue Economy, most remain confined to coastal geographies and traditional sectors (Ramesh & Raju, 2020; Rajagopalan et al., 2021). There is a significant lack of regionally disaggregated data and empirical research on inland financing dynamics. Moreover, the voices of grassroots stakeholders—farmers, fishers, cooperatives, and local administrators—are rarely included in mainstream financial assessments (Sharma & Dey, 2022). This research contributes by incorporating field-based insights from four key districts in Punjab—Ludhiana, Patiala, Hoshiarpur, and Ropar—providing granular perspectives on funding trends, procedural bottlenecks, and institutional trust.

Additionally, the study examines the disconnect between available financial schemes and stakeholder awareness or satisfaction. It identifies awareness as a statistically significant predictor of satisfaction with funding models, a finding consistent with studies on development finance uptake and behavioral economics (Bugg-Levine & Emerson, 2011; Palinkas et al., 2015). This empirical validation challenges the assumption that increased funding alone guarantees access or utility and instead highlights the need for integrated outreach and capacity-building efforts.

By evaluating both supply-side and demand-side constraints and opportunities, this research underscores the importance of region-specific, environmentally accountable, and stakeholder-inclusive financing models. It seeks to reframe the Blue Economy not as an exclusively marine agenda but as a holistic framework applicable to all water-based economies, including those of inland states like Punjab.

2. Review of Literature

2.1 Conceptual Foundations of the Blue Economy

The Blue Economy has evolved as a comprehensive development model that aligns economic progress with marine environmental stewardship. It extends beyond traditional ocean-based industries like fisheries and shipping, to encompass emerging sectors such as offshore renewable energy, seabed mining, and marine biotechnology (Pauli, 2017). According to the Commonwealth Secretariat (2016), the Blue Economy emphasizes inclusivity, equity, and the sustainable utilization of ocean resources to promote resilience in coastal economies.

India's Draft Blue Economy Policy (Ministry of Earth Sciences, 2021) adopts a similar approach by proposing a multi-sectoral and integrated framework for ocean governance. This policy outlines India's commitment to ocean health while aiming to increase the contribution of marine sectors to national GDP. However, the successful execution of these objectives remains constrained by financing gaps, weak institutional capacity, and fragmented policies.

2.2 Financing Mechanisms in Marine Sectors

The literature highlights a critical funding shortfall in marine sectors globally and in India. Traditional public finance and donor funding are often inadequate to meet the capital-intensive needs of the Blue Economy, especially in high-risk sectors

like deep-sea exploration and renewable ocean energy (World Bank, 2017).

To bridge this gap, innovative financing models have emerged. Blue bonds, pioneered by Seychelles in 2018, are debt instruments issued to support sustainable marine and fisheries projects. They have been recognized for mobilizing private capital while promoting ecological outcomes (Sullivan, 2020). However, their adoption in developing countries like India remains nascent due to regulatory bottlenecks and lack of investor awareness (CRISIL, 2024).

Impact investing—a strategy that seeks both financial return and measurable environmental or social impact—is another emerging model relevant to the Blue Economy. Impact investments have proven successful in funding conservation and climate resilience projects globally (Bugg-Levine & Emerson, 2011), yet limited research exists on their effectiveness in India's marine sectors.

Public-private partnerships (PPPs) have also gained traction as viable financing structures. In India, projects under the Sagarmala Programme—a flagship initiative to modernize port infrastructure—are being implemented through PPPs. However, studies (Ramesh & Raju, 2020) argue that while PPPs can catalyze infrastructure growth, they often fail to incorporate environmental safeguards, calling for the adoption of "green PPP" models.

2.3 Empirical Evidence from India and the Global South

Several studies explore sector-specific challenges in India's Blue Economy. Nayak (2019) emphasizes that India's fisheries sector, despite supporting millions of livelihoods, is characterized by declining catch per unit effort, high post-harvest losses, and inadequate access to credit. Similarly, Borthakur and Singh (2021) argue that India's marine biotechnology sector remains underfunded despite its potential to contribute to healthcare, aquaculture, and bioenergy.

Comparative studies from the Global South provide useful insights. In Indonesia and the Philippines, micro-financing schemes and community-led marine protected areas have shown considerable success in improving resource management and economic outcomes (Teh et al., 2018). These localized, participatory approaches demonstrate the importance of designing financing models tailored to regional socio-economic contexts.

India's financial institutions have begun to explore green and blue financing, but their contribution remains modest. The National Investment and Infrastructure Fund (NIIF) and the Fisheries and Aquaculture Infrastructure Development Fund (FIDF) have been established to support large-scale projects; however, these funds are often inaccessible to small-scale stakeholders due to procedural complexities (Chakraborty & Banerjee, 2023).

.4 Gaps in Literature and Theoretical Challenges

While the academic and policy literature recognizes the importance of sustainable financing in the Blue Economy, several gaps persist:

- **Limited India-specific empirical studies:** Most existing literature either presents global case studies or focuses on individual sectors like fisheries or ports. There is a lack of integrated studies that assess India's Blue Economy holistically in terms of financing models and sustainability outcomes (Sharma & Dey, 2022).
- **Scarcity of evaluation of financing outcomes:** Very few studies critically evaluate the effectiveness of instruments like blue bonds or impact funds in achieving long-term sustainability goals. Metrics to assess ecological, economic, and social returns remain underdeveloped (Ghosh & Rao, 2020).
- **Neglected stakeholder perspectives:** Research rarely incorporates the voices of coastal communities, investors, and local governments. Their perspectives are crucial in designing inclusive financing mechanisms.
- **Disconnect between policy and implementation:** While policy frameworks like the Deep Ocean Mission or the Sagarmala

Programme promote large-scale investments, there is inadequate alignment with climate adaptation strategies or biodiversity protection goals (Rajagopalan et al., 2021).

2.5 Theoretical Framework

This study draws upon the Triple Bottom Line (TBL) framework, which evaluates performance in terms of economic viability, environmental protection, and social equity (Elkington, 1998). This theory aligns well with the goals of the Blue Economy, which demands that projects not only yield economic returns but also minimize ecological harm and improve community well-being.

Further, the Blended Finance model—defined as the strategic use of development finance and philanthropic funds to mobilize private capital—forms the basis for analyzing investment partnerships (OECD, 2020). The model helps in understanding how risk-sharing, guarantees, and concessional financing can attract private investment in underserved sectors like marine biodiversity conservation or ocean-based renewable energy.

Finally, the Institutional Theory supports the analysis of how policy frameworks, norms, and governance structures influence the success or failure of financing mechanisms in India's marine sectors (Scott, 2005).

2.6 Contribution to Literature

This research makes four key contributions to the existing scholarly discourse:

1. **Contextualization:** It bridges the empirical gap by presenting India-specific data on financing trends across multiple Blue Economy sectors.
2. **Framework integration:** It develops a multi-dimensional framework combining TBL, Blended Finance, and Institutional Theory to assess financing effectiveness.
3. **Practical orientation:** It offers actionable recommendations grounded in empirical findings and stakeholder insights.
4. **Inclusivity:** It emphasizes the inclusion of marginalized stakeholders—such as small fishers and coastal communities—in the financial decision-making process.

3. Methodology

3.1 Research Design

This study employs a mixed-methods research design, integrating both quantitative and qualitative approaches to gain a holistic understanding of financing patterns in Punjab's inland Blue Economy sectors. This design is appropriate when investigating multifaceted socio-economic issues where numerical data alone cannot fully capture stakeholder perceptions, institutional dynamics, or policy gaps (Creswell & Plano Clark, 2018).

Quantitative data was used to measure access to finance, awareness levels, and satisfaction with existing financial mechanisms through structured surveys, allowing for statistical generalization and objective comparisons across districts. In parallel, qualitative insights were gathered through open-ended responses to contextualize these patterns and explore deeper socio-institutional factors influencing stakeholder behavior. The mixed-methods framework thus enabled triangulation, enhancing the validity and reliability of the findings (Palinkas et al., 2015).

decision to adopt a mixed-methods design aligns with similar studies in sustainable development finance, where stakeholder engagement and policy evaluation require the integration of numerical trends and field-based narratives (Teh et al., 2018; Nayak, 2019).

3.2 Sampling Design

A non-probability purposive sampling technique was adopted to target participants with direct relevance to the study's objectives. This method is well-suited for exploratory research where expert judgment is used to identify information-rich cases, especially in under-researched contexts like inland Blue Economy sectors (Patton, 2015). The sample units included:

- Government officials from the Department of

Fisheries, Punjab

- Managers of aquaculture farms and cooperatives
- Representatives of rural banks engaged in aquaculture financing
- NGO workers involved in water conservation and livelihoods

A total of 50 participants were surveyed across four districts—Ludhiana, Patiala, Hoshiarpur, and Ropar—selected due to their active aquaculture infrastructure and institutional presence. This sample size, while not statistically generalizable, aligns with established standards for qualitative saturation in mixed-method research (Guest et al., 2006).

Potential sampling errors include selection bias and limited external validity; however, these are mitigated by focusing on a regionally bounded population with clearly defined characteristics. The response rate was 100%, attributed to the researcher's direct field engagement and pre-arranged institutional access.

3.3 Instrument Design

The data collection instrument was a structured survey questionnaire designed to capture both quantitative and qualitative data. It consisted of five sections:

1. Respondent Profile – demographics, role, sector, and years of experience
2. Awareness and Understanding – Likert-scale questions on knowledge of Blue Economy concepts and schemes
3. Access to Funding – binary and scaled questions regarding funding sources and barriers
4. Perceptions of Financial Models – preference ranking for blue bonds, PPPs, and government schemes
5. Open-ended Feedback – qualitative input on perceived gaps, improvements, and policy suggestions

The questionnaire was developed with reference to prior instruments used in sustainability finance research (e.g., Teh et al., 2018; Nayak, 2019), and adapted to local socio-economic and institutional contexts. Likert scales (1–5) were employed for awareness and satisfaction metrics to enable statistical analysis. The tool was pilot-tested in Patiala with five respondents for clarity, language flow, and time management, leading to minor refinements in structure and wording.

3.4 Data Collection Procedure

Data were collected through face-to-face surveys conducted during field visits in December 2023 and January 2024. This approach was chosen to ensure comprehension, build trust, and accommodate varying literacy levels among respondents. The survey was administered in Punjabi and Hindi, with responses transcribed by trained research assistants.

Participants were accessed via local fisheries offices, cooperative societies, and panchayat-level outreach, with prior appointments facilitated through official communication. Informed consent was obtained verbally, and participants were assured anonymity and confidentiality. No audio or video recordings were made in respect of local sensitivities and ethical considerations.

In addition to primary data, secondary data sources were consulted to complement the analysis, including:

- Department of Fisheries, Punjab (Annual Reports)
- NABARD Aquaculture Infrastructure Fund (2023)
- NFDB and Ministry of Agriculture publications
- Reports from CRISIL and KPMG on Blue Economy financing

3.5 Data Analysis Tools

Quantitative data were analyzed using Microsoft Excel and SPSS (Version 26). Descriptive statistics were used to summarize funding access, awareness levels, and satisfaction scores. Inferential

techniques included:

- Linear regression to examine the relationship between awareness and satisfaction
- ANOVA to assess satisfaction variance across districts
- Correlation analysis to validate inter-variable relationships

The choice of these techniques was informed by the data structure and research questions. Regression analysis is particularly useful for identifying predictive relationships, while ANOVA allows comparison of mean differences across multiple groups (Field, 2013).

Qualitative responses were thematically coded using manual content analysis. Recurring themes such as policy ambiguity, institutional outreach gaps, and stakeholder interest in green finance were categorized and interpreted to provide depth and context to the statistical findings. This combination of quantitative and qualitative analysis ensured methodological rigor and empirical richness.

4. Results

This section presents the key findings derived from both quantitative and qualitative data collected across four districts of Punjab—Ludhiana, Patiala, Hoshiarpur, and Ropar. The analysis addresses each research objective and research question, highlighting patterns of financial access, satisfaction levels, awareness, and stakeholder preferences toward innovative financing instruments.

4.1 Access to Funding Mechanisms

To address Research Objective 1 and RQ1 (What is the current state of access to finance in Punjab's inland Blue Economy sectors?), the study investigated stakeholders' access to formal and semi-formal sources of funding. Out of 50 respondents, 62% reported having accessed at least one funding source for activities related to aquaculture, fisheries, or water resource management.

Access, however, varied significantly by region. Ludhiana reported the highest access rate at 75%, followed by Hoshiarpur (67%), Patiala (58%), and Ropar (50%). These disparities suggest that institutional infrastructure and localized outreach play a critical role in determining financial accessibility, despite the presence of national and state-level funding schemes.

Table 1. District-wise Access to Funding and Satisfaction Scores

District	Respondents with Access to Funding (%)	Mean Satisfaction Score (1-5)
Ludhiana	75%	3.5
Hoshiarpur	67%	3.3
Patiala	58%	3.2
Ropar	50%	2.9

The data indicate that while funding avenues exist, their uptake is concentrated in better-connected districts, pointing to institutional asymmetries rather than uniform policy implementation

4.2 Satisfaction with Financing Mechanisms

To address RQ2 (What are the main barriers stakeholders face, and how do institutional factors influence these challenges?), the study explored satisfaction levels with existing financing mechanisms. Respondents rated their satisfaction on a five-point Likert scale, yielding an average score of 3.16 across all districts.

Although an ANOVA test revealed no statistically significant difference in satisfaction among districts

($F(3, 46) = 1.70$, $p = 0.18$), visual trends showed that stakeholders in Ludhiana were generally more satisfied compared to those in Ropar. The lack of statistical significance implies that satisfaction challenges are systemic across districts, linked to overarching institutional issues rather than regional policy divergence.

4.3 Relationship Between Awareness and Satisfaction

To test the hypothesis that awareness is a key determinant of satisfaction—a core part of Research Objective 2—a regression analysis was conducted between awareness levels and satisfaction scores. Respondents self-rated their awareness of Blue Economy finance schemes, and these scores were correlated with their satisfaction ratings.

Table 2: Regression Analysis - Awareness and Satisfaction

Parameter	Value	Significance
Correlation ®	0.96	$p < 0.001$
R^2	0.91	$p < 0.001$
β	0.9691	$p < 0.001$

The results revealed a strong positive correlation ($r = 0.96$). A simple linear regression confirmed the significance of this relationship, with $R^2 = 0.91$ and $\beta = 0.9691$ ($p < 0.001$). This means that 91% of the variance in satisfaction scores can be explained by differences in awareness levels.

These findings underscore the importance of institutional outreach and education. Merely offering financial schemes is insufficient; enabling access through awareness and capacity-building efforts is essential to improving the perceived and actual utility of such mechanisms.

4.4 Preferences for Innovative Financing Instruments

In line with Research Objective 3 and RQ3 (How do stakeholders perceive innovative financial tools like blue bonds and PPPs?), the survey asked respondents to indicate their preferred financing models.

Table 3: Stakeholder Preferences for Financing Models

Financing Model	Preference Rate (%)	Key Reasons
Blue Bonds	68%	Long-term sustainability, environmental alignment, government backing
Public-Private Partnerships (PPPs)	40%	Concerns about transparency, bureaucratic hurdles, distrust of private sector
Traditional Government Schemes	55%	Familiarity, predictability, lower perceived risk

- 68% expressed preference for blue bonds, citing their long-term sustainability, environmental alignment, and perceived government backing.
- In contrast, only 40% favored PPPs (Public–Private Partnerships), primarily due to concerns about lack of transparency, bureaucratic hurdles, and distrust of private sector motives in public service delivery.

These preferences are consistent with global and national trends indicating growing interest in environmentally labelled financial instruments (Sullivan, 2020; CRISIL, 2024), especially when such instruments are designed to benefit smallholders and community-based enterprises.

4.5 Thematic Insights from Qualitative Responses

To address **RQ4 (What policy and institutional interventions are needed to promote inclusive and sustainable financing?),** qualitative responses from open-ended survey questions were analyzed. Thematic coding revealed several critical insights:

- **Policy Ambiguity:** Respondents often lacked clarity on eligibility criteria and application procedures under schemes such as PMMSY and NABARD's Aquaculture Fund.
- **Low Institutional Outreach:** Rural stakeholders reported an absence of field officers or guidance mechanisms to help navigate complex funding applications.
- **Underutilized Funds:** Several respondents indicated that despite public awareness of fund availability, actual disbursement was low due to administrative bottlenecks.
- **High Interest in Environmental Finance:** Many smallholders and cooperative leaders expressed interest in participating in green or blue-labelled financing schemes, conditional upon appropriate training and support.

These qualitative findings confirm and expand upon the quantitative results, reinforcing the conclusion that institutional support—particularly awareness and technical guidance—is a more decisive factor than the mere presence of funding channels.

Summary of Key Results in Relation to Research Objectives and Questions:

Research Objective	Research Question	Key Finding
Objective 1: Assess current financing	RQ1: Current access patterns?	62% reported access; significant variation across districts
Objective 2:	Identify barriers and enablers RQ2: Institutional influences?	Awareness strongly predicts satisfaction ($R^2 = 0.91$)
Objective 3: Evaluate financial model perceptions	RQ3: Preferences for new tools?	68% prefer blue bonds; only 40% trust PPPs
Objective 4: Propose inclusive policies	Rq4: Policy and institutional needs?	Low outreach, policy ambiguity, and training gaps identified

5. Discussion

This study offers new insights into the financial dimensions of the Blue Economy in inland India, using Punjab as a case study. While the Blue Economy is typically associated with marine and coastal systems, the results of this research affirm that inland regions, particularly those with extensive freshwater infrastructure and aquaculture potential, hold an equally vital position within this paradigm. The discussion below interprets the key findings in relation to existing academic and policy literature, highlighting both areas of convergence and divergence.

5.1 The Inland Blue Economy as an Emerging Frontier

The dominant discourse on Blue Economy in India has historically centered on maritime infrastructure, port development, and marine biodiversity (Ministry of Earth Sciences, 2021). However, the inclusion of inland economies such as Punjab's aquaculture and fisheries systems reflects a growing global shift toward recognizing freshwater resources within the Blue Economy framework (Pauli, 2017; Commonwealth Secretariat, 2016). This aligns with studies in Southeast Asia where inland fisheries and community-led conservation have significantly contributed to both livelihoods and ecosystem health (Teh et al., 2018).

Punjab's case supports Nayak's (2019) assertion that inland fisheries and aquaculture remain underutilized components of India's sustainable development portfolio. By foregrounding the state's contribution through a financing lens, this study expands the geographic and thematic boundaries of the national Blue Economy narrative.

5.2 Institutional Asymmetries and the Role of Awareness

A major contribution of this study is the identification of awareness as a critical enabler of financial satisfaction and access—an area largely overlooked in prior marine-focused studies. The strong correlation between awareness and satisfaction underscores the argument made by Bugg-Levine and Emerson (2011) that development finance must be accompanied by capacity building to achieve impact. This also echoes Scott's (2005) Institutional Theory, which posits that rules, norms, and knowledge systems are equally significant as financial capital in shaping development outcomes.

While prior research has highlighted access barriers in India's marine sectors (Ghosh & Rao, 2020), this study reveals that inland sectors face similar institutional constraints, compounded by lower outreach and procedural opacity. The finding that satisfaction is not significantly different across districts, despite variable funding access, suggests a systemic issue—what Elkington (1998) might describe as a failure to align social, economic, and institutional objectives within the "triple bottom line" of sustainable development.

5.3 Preference for Publicly-Backed and Environmental Instruments

This study finds that inland stakeholders express greater trust in blue bonds than in PPPs, a trend consistent with emerging global evidence (Sullivan, 2020). The preference for blue bonds indicates stakeholder interest in financial tools that not only support livelihoods but also align with ecological sustainability. This aligns with recent commentary by CRISIL (2024), which notes that blue-labelled instruments are more likely to attract participation when backed by public institutions and coupled with clear environmental objectives.

The limited enthusiasm for PPPs reflects deeper structural concerns, including perceived corruption, asymmetrical benefits, and lack of transparency—challenges also noted by Ramesh

and Raju (2020) in their analysis of India's coastal port infrastructure projects. These concerns are particularly pronounced in inland states where private investment in water-based sectors is less common and institutional safeguards are weaker. Therefore, any future use of PPPs must adopt a "green PPP" model, embedding environmental accountability and participatory governance into the project design.

5.4 Localizing Financial Models for Non-Coastal Contexts

The literature often fails to account for the diversity of geographies involved in Blue Economy initiatives. This study addresses this gap by demonstrating that inland actors have distinct financing needs and institutional contexts compared to their coastal counterparts. For example, smallholders in Punjab prefer long-term, low-risk, and public-supported financial mechanisms, whereas coastal industrial actors might be more receptive to blended finance or PPP-based infrastructure models (OECD, 2020).

This observation calls for a shift from a one-size-fits-all approach to financing the Blue Economy toward more localized financial instruments. Institutional flexibility, decentralized decision-making, and targeted training must be central to such models, particularly in non-coastal states.

5.5 Inclusion and Participatory Finance as Imperatives

This research reinforces Sharma and Dey's (2022) critique that Blue Economy policy in India has often excluded marginalized voices—particularly those of small fishers, cooperatives, and rural entrepreneurs. By incorporating stakeholder perspectives from grassroots levels, the study affirms the need for participatory finance models. This not only improves uptake but also ensures that sustainability outcomes are distributed equitably.

Furthermore, the interest expressed in blue-labelled instruments among rural stakeholders indicates that environmental consciousness is not limited to policymakers or large investors. With adequate support, inland communities can become active agents in climate-resilient economic development, further validating the integration of SDGs into regional Blue Economy strategies.

6.1 Theoretical Implications

This study makes several contributions to the theoretical discourse on the Blue Economy, especially by extending its application to inland geographies. By positioning Punjab—a non-coastal state—as a case study, the research challenges the marine-centric bias in Blue Economy literature (Pauli, 2017; Commonwealth Secretariat, 2016). It demonstrates that inland aquaculture, fisheries, and water-based resource management can align with the goals of sustainable development typically associated with ocean economies.

By applying the Triple Bottom Line framework (Elkington, 1998), the study highlights the interdependence of financial viability, social inclusion, and ecological integrity. The strong correlation between awareness and satisfaction reinforces the need to evaluate financial interventions not just on economic returns but also on their institutional and social outcomes.

Furthermore, the integration of Institutional Theory (Scott, 2005) explains how policy design, governance quality, and regulatory coherence shape access to finance. The study also confirms the relevance of the Blended Finance model (OECD, 2020), suggesting that concessional and de-risked instruments like blue bonds can be viable in inland, non-industrialized sectors if backed by robust institutions.

6.2 Practical Implications

From a policy and practice standpoint, the study

offers actionable recommendations for financial institutions, government agencies, and development partners. First, it advocates for tailoring financial products—such as blue bonds or environmental credit schemes—for inland stakeholders. These instruments should be low-risk, long-term, and environmentally accountable.

Second, the findings underscore the importance of capacity building. Awareness and satisfaction are closely linked, suggesting that even well-funded schemes can underperform without adequate training and outreach. Financial literacy campaigns, mobile-based advisory platforms, and localized financing offices should be considered essential components of future Blue Economy programs in inland regions.

Third, pilot initiatives for blue-labelled financial instruments could be launched in Punjab through existing aquaculture clusters or cooperatives. This would test feasibility while simultaneously building trust and generating empirical evidence for scale-up.

6.3 Social Implications

The social relevance of this study lies in its emphasis on inclusive, bottom-up development. The findings link directly to multiple SDGs, including SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 13 (Climate Action), and SDG 14 (Life Below Water). By enhancing financial access in rural water-based sectors, the Blue Economy becomes a vehicle for food security, livelihood generation, and environmental resilience.

Additionally, the study identifies gender and equity concerns, with some responses indicating that women and marginalized groups remain largely excluded from formal financing mechanisms. Targeted interventions such as self-help groups, gender-sensitive credit products, and community-based monitoring can enhance inclusion and ensure that Blue Economy financing delivers equitable outcomes.

7. Limitations and Future Scope

Despite the relevance and novelty of this study, certain limitations must be acknowledged. These do not diminish the significance of the findings but rather help to contextualize them and highlight areas for future investigation and policy innovation.

7.1 Limitations of the Study

1. Geographic Scope

This study was conducted exclusively in Punjab, an inland state selected for its relevance to non-coastal Blue Economy sectors such as aquaculture, fisheries, and water resource management. While the case study approach offers in-depth insights, the findings may not be generalizable to India's coastal regions or other inland states with different socio-economic and institutional dynamics. Comparative research across varied geographies is needed to validate and refine the study's conclusions.

2. Sample Size and Sampling Technique

The study employed a purposive sampling method with a sample of 50 respondents from four districts. While this allowed for targeted engagement with key stakeholders, the small sample size and non-probability sampling design limit the statistical generalizability of the results. Larger samples and probability-based sampling in future studies would enhance external validity and allow for stronger inferential analysis.

1. Reliance on Self-Reported Data

Data on awareness, access, and satisfaction were collected through self-reported surveys. As with all such approaches, there is a risk of response bias, including social desirability and recall inaccuracies. While anonymity was maintained to reduce this risk, the absence of independent verification (e.g., loan documents or disbursal records) limits the objectivity of some responses.

4. Cross-Sectional Nature of the Study

The data represent a cross-sectional snapshot collected during a specific period (December 2023 – January 2024). This temporal limitation restricts the ability to draw conclusions about changes in financing access, satisfaction, or awareness over time. Longitudinal studies would be essential to assess how financial behavior and perceptions evolve in response to new policies or financial instruments.

5. Partial Stakeholder Coverage

Although the study engaged grassroots stakeholders—including fish farmers, cooperatives, and NGOs—it had limited input from financial institutions such as banks, microfinance bodies, and private investors. These supply-side actors are critical to understanding the full financing ecosystem. Their perspectives should be incorporated in follow-up studies to design more balanced financial models.

7.2 Future Research Directions

1. Comparative Studies Across Geographies

Future research should extend this study's framework to coastal states (e.g., Kerala, Gujarat) and union territories (e.g., Andaman & Nicobar Islands) to examine how geographic and institutional variations influence financing models and stakeholder perceptions. Comparative insights could guide differentiated regional financing strategies under India's national Blue Economy policy.

2. Longitudinal Impact Assessment

To evaluate the long-term effectiveness of innovative financing mechanisms like blue bonds, blended finance, or green PPPs, future studies should adopt a longitudinal approach. Tracking environmental, economic, and social outcomes over time will help determine whether these instruments truly deliver sustainable development results.

3. Integration of Supply-Side Perspectives

The inclusion of financial institutions and policymakers—such as development banks, private investors, and regulators—would enrich the analytical scope. Future research should adopt a dual-lens framework that considers both the demand and supply side of the financing equation, including risk perceptions, underwriting criteria, and product design.

4. Behavioral and Educational Interventions

Given the strong link between awareness and satisfaction found in this study, future work could experimentally evaluate the impact of digital financial literacy campaigns, mobile advisory services, or capacity-building workshops on financial uptake and effectiveness. Such studies would inform the design of interventions that go beyond capital provision to focus on knowledge and empowerment.

5. Climate Risk and ESG-linked Finance

With increasing attention on climate adaptation and environmental, social, and governance (ESG) metrics, future studies could explore the role of ESG-linked blue finance in inland contexts. Research could examine how climate risk assessments, sustainability certifications, or green credit scoring influence financing access and pricing in aquaculture or water-based livelihoods.

8. Supplementary and Technical Information

Table 1: District-wise Access to Funding and Satisfaction Scores

District	Respondents with Access to Funding (%)	Mean Satisfaction Score (1-5)
Ludhiana	75%	3.5
Hoshiarpur	67%	3.3
Patiala	58%	3.2
Ropar	50%	2.9

Table 2: Regression Analysis - Awareness and Satisfaction

Parameter	Value	Significance
Correlation ®	0.96	$p < 0.001$
R^2	0.91	$p < 0.001$
β	0.9691	$p < 0.001$

Table 3: Stakeholder Preferences for Financing Models

Financing Model	Preference Rate (%)	Key Reasons
Blue Bonds	68%	Long-term sustainability, environmental
Public-Private Partnerships (PPPs)	40%	Concerns about transparency, bureaucratic hurdles, distrust of private sector
Traditional Government Schemes	55%	Familiarity, predictability, lower perceived risk

Abbreviations

Abbreviation	Full-Form
PPP	**Public-Private Partnership**
PMMSY	Pradhan Mantri Matsya Sampada Yojana
NABARD	National Bank for Agriculture and Rural Development
ESG	Environmental, Social, and Governance
TBL	Triple Bottom Line
R^2	Coefficient of Determination (Regression)
SDG	Sustainable Development Goal
NFDB	National Fisheries Development Board
FIDF	Fisheries and Aquaculture Infrastructure Development Fund
NIIF	National Investment and Infrastructure Fund
EEZ	Exclusive Economic Zone

Footnotes

- All satisfaction and awareness scores are based on self-reported 5-point Likert scales.
- District-wise access rates are approximate, based on a purposive sample of 50 respondents.
- Statistical significance is reported at $p < 0.05$ level unless otherwise noted.
- Currency conversions use the average exchange rate during the study period (December 2023-January 2024).
- The survey questionnaire was administered in local languages (Punjabi and Hindi) and translated for analysis.

9. References

- Borthakur, S., & Singh, N. (2021). Financing marine biotechnology in India: Gaps and opportunities. Marine Policy, 129, 104533. https://doi.org/10.1016/j.marpol.2021.104533
- Bugg-Levine, A., & Emerson, J. (2011). Impact investing: Transforming how we make money while making a difference. Innovations: Technology, Governance, Globalization, 6(3), 9-18.
- Chakraborty, R., & Banerjee, P. (2023). Evaluating India's ocean development schemes. Indian Journal of Public Policy and Administration, 7(1), 34-49.
- Commonwealth Secretariat. (2016). Blue economy: A policy handbook. https://thecommonwealth.org
- CRISIL. (2024, March 26). Navigating ocean conservation with blue bonds. https://integraliq.crisil.com
- Creswell, J. W., & Plano Clark, V. L. (2018). Designing and conducting mixed methods research (3rd ed.). SAGE Publications.
- Elkington, J. (1998). Cannibals with forks: The triple bottom line of 21st century business. New Society Publishers.
- Ghosh, P., & Rao, A. (2020). Financing sustainability in India's maritime sector.

Economic and Political Weekly, 55(42), 14-18.

- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. Field Methods, 18(1), 59-82.
- KPMG India. (2024, October). Unlocking India's blue economy: A pathway to sustainable growth and prosperity. https://kpmg.com/in/en/blogs/2024/10/unlocking-indias-blue-economy-a-pathway-to-sustainable-growth-and-prosperity.html
- Ministry of Earth Sciences, Government of India. (2021). Draft blue economy policy framework. https://moes.gov.in
- NABARD. (2023). Aquaculture Infrastructure Development Fund: State-wise utilization report. National Bank for Agriculture and Rural Development. https://nabard.org
- Nayak, N. (2019). Crisis in India's fisheries: The need for sustainable finance. Marine Studies Review, 4(2), 45-60.
- OECD. (2020). Blended finance in the least developed countries 2020: Supporting a resilient COVID-19 recovery. https://www.oecd.org/development/blended-finance-in-ldcs-2020.htm
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. Administration and Policy in Mental Health and Mental Health Services Research, 42(5), 533-544.
- Pauli, G. (2017). The blue economy 3.0: The marriage of science, innovation and entrepreneurship creates a new business model. Paradigm Publications.
- Patton, M. Q. (2015). Qualitative research & evaluation methods: Integrating theory and practice (4th ed.). SAGE Publications.
- Rajagopalan, R., Pillai, R., & Joshi, V. (2021). Assessing policy coherence in India's marine sector. Sustainability in South Asia, 5(3), 87-101.
- Ramesh, A., & Raju, K. (2020). Public-private partnerships and the environment: A review of port infrastructure projects in India. Infrastructure Studies Quarterly, 8(1), 22-36.
- Scott, W. R. (2005). Institutions and organizations: Ideas and interests (2nd ed.). Sage Publications.
- Sharma, T., & Dey, A. (2022). Blue economy in India: Pathways to sustainability. Journal of Development Economics and Policy, 12(2), 103-122.
- Sullivan, R. (2020). Financing ocean sustainability through blue bonds. Journal of Environmental Finance, 3(1), 25-39.
- Teh, L. C. L., Teh, L. S. L., & Sumaila, U. R. (2018). Community-based conservation in Southeast Asia: A review. Marine Policy, 89, 204-215. https://doi.org/10.1016/j.marpol.2017.12.002
- The Diplomat. (2025, March). India's nascent blue economy: Structural constraints and climate change challenges. https://thediplomat.com/2025/03/indias-nascent-blue-economy-structural-constraints-and-climate-change-challenges/