International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Blue Economy and Viksit Bharat 2047: Assessing the Economic Contribution of Inland Fisheries to Rural GDP Growth and Livelihood Sustainability in Himalayan Regions

Pankaj Bhatt[1], Neelam Gaur[2]

[1,2] Research Scholar, Department of Commerce, Soban Singh Jeena University, Almora
[2]Research Scholar, Department of Commerce, D. S. B. Campus Kumaun University, Nainital

Abstract

The Blue Economy has become an important framework to support sustainable economic development by means of responsible use of aquatic resources. In this respect, inland fisheries can be viewed as a valuable sector that can assist in the rural economic development, the livelihood sustainability, and food security. This paper discusses the role of inland fisheries towards rural GDP growth and livelihood sustainability in Himalayan areas in the context of Viksit Bharat 2047 development vision. The study will be quantitative, using primary survey data of 384 fish farmers in a multi-stage sampling method with secondary fisheries statistics. To analyze the trends of fish production, household income generation, employment creation, and livelihood sustainability, descriptive statistics and economic estimation models were used. The findings suggest that inland fisheries in the research region are mostly small scale and medium scale enterprises, with 41.8 percent of farmers earning 5001000 kg of fish per year. Fisheries serve as an important source of additional income, with 41.1% of households having an annual fisheries income of ₹50, 000-100, 000. The economic worth of fisheries production in the surveyed area was estimated to about ₹47.28 million, and this indicates the potential contribution of the sector to the rural economy. Further, fishing operations provided 599 workers with their employment, family, hired, and seasonal workers. The Livelihood Sustainability Index (LSI) analysis indicates that 54.9 percent of households are in the moderate category of sustainability of their livelihood and 24.8 percent of households have high livelihood sustainability. The results indicate that inland fisheries are important in boosting rural livelihoods and local economic growth in Himalayan areas. Enhancing the role of inland fisheries in rural GDP growth by strengthening fisheries infrastructure, encouraging sustainable practices in aquaculture, and improving market access can also serve to supplement the goals of the Blue Economy and Viksit Bharat 2047.

Keywords: Blue Economy; Inland Fisheries; Rural GDP Growth; Livelihood Sustainability; Himalayan Region; Aquaculture Development; Rural Employment; Viksit Bharat 2047.

1. Introduction

The Blue Economy has become a major paradigm in ensuring sustainable economic development by ensuring that the use of aquatic resources is done in a responsible manner. Over the past years,

policymakers and researchers have been insisting more on the value of aquatic ecosystems in enabling economic development, environmental sustainability, and livelihood security (Petersen et al., 2026). The vision of Viksit Bharat 2047, in the Indian context, gives emphasis on the need to empower the rural economies and provide inclusive development by various sectors, including fisheries. The inland fisheries, especially in ecologically sensitive areas like the Himalayan belt, have a significant potential of playing a role in rural income generation, creating jobs, and development of the local economy. In spite of this potential, the overall economic value of inland fisheries to the rural GDP and livelihood sustenance in Himalayan areas has not yet been adequately studied. The importance of inland fisheries in the context of the larger picture of the Blue Economy is, then, critical to develop the policies that would contribute to sustainable rural development and long-term economic stability (Ainsworth et al., 2023).

1.1 Research Background

The Blue Economy is a development model, which combines economic development, environmental sustainability, and social inclusion in the form of a sustainable utilization of aquatic resources. Fisheries have been identified as an important element of this framework globally and their contribution on food security, employment creation and economic stability in the rural communities is great. Fisheries has become one of the fastest growing sectors of the agricultural economy in India, which has been developing quickly in the last few decades (Chakrabarti, 2025). Although marine fisheries are typically the focus of more policy, inland fisheries have come to be a central focus of rural growth. Freshwater resources such as rivers, reservoirs, ponds and other water bodies offer fish production opportunities that directly benefit rural households.

Himalayan region with its rich freshwater reserves and a wide range of aquatic life has great opportunities in developing inland fisheries. Fisheries activities are also being encouraged in other states like Uttarakhand as an alternative source of livelihood to rural communities. Nevertheless, inland fisheries have not yet achieved their full economic potential in these mountainous areas because of insufficient infrastructure, technological barriers and lack of policy integration (Natarajan et al., 2022). The impact of inland fisheries on the rural economy is thus a crucial area to analyze the role of the Blue Economy in the Himalayan areas in promoting sustainable development.

1.2 Overview of Inland Fisheries in India

India is one of the major fish-producing countries in the world and fisheries is an important part of the agricultural and rural economy. Inland fisheries industry has enjoyed a remarkable growth over the past years because of the advancements in aquaculture industry, governmental assistance, and the growing need of fish products in the market. Inland fisheries now have a significant portion of the overall fish production in the country and they are a source of employment to millions of people, especially in the rural areas (Liu et al., 2025).

The industry covers a large area of freshwater resources, which include rivers, lakes, reservoirs, wetlands and village ponds. The resources are used to sustain capture fisheries and aquaculture which earns income and enhances food security to rural people. Moreover, inland fisheries also provide a source of diversification of rural livelihoods, as they provide opportunities to small-scale entrepreneurs, cooperatives, and self-help groups (Ma et al., 2026). With the ever-increasing demand in fish, the establishment of inland fisheries has taken a significant role in enhancing the economy of the rural areas and enhancing overall inclusive growth.

1.3 Inland Fisheries in the Himalayan Region

The Himalayan area has got distinctive ecological features that impact the framework and possibilities of

fisheries endeavors. Cold water rivers, streams, reservoirs and natural lakes present good habitats to various fish species such as trout and native hill fishes. These freshwater sources have potentials of capture fisheries as well as cold-water aquaculture which can play a significant role in promoting local economic growth (Novák et al., 2025).

Fisheries have started to become a significant source of rural livelihood among households in most of Himalayan districts especially where geographical and climatic factors restrict the scope of traditional agricultural activities. The initiation of trout farming, reservoir fisheries and community based aquaculture projects has shown the potential trout fisheries to provide income and jobs in the mountainous areas (Aguión et al., 2025). Irrespective of these opportunities, fisheries development in the Himalayan region is limited by poor access to technology, poorly developed infrastructure and lack of policy focus. Consequently, inland fisheries have failed to deliver their economic benefits in rural economies in these areas.

1.4 Objectives of the Study

The current paper seeks to investigate how inland fisheries can contribute to the rural economic growth and livelihood sustainability in the framework of the Blue Economy and the national vision Viksit Bharat 2047. The objectives of the study are:

1. To examine the role of inland fisheries in rural incomes and local economic growth in the Himalayan areas.
2. To determine the contribution of inland fisheries to the creation of employment and livelihood sustainability in the rural communities.
3. To test how inland fisheries can be a part of the Blue Economy in increasing rural GDP.
4. To find out main challenges and opportunities of fisheries development in Himalayan areas.

1.5 Research Questions and Hypotheses Development

Research Questions

1. What role do inland fisheries play in rural incomes and employment in the Himalayas?
2. How much do the fisheries activities affect the rural GDP growth in these regions?
3. How can inland fisheries contribute to sustainable rural development in the context of the Blue Economy?

Hypothesis

H1: Inland fisheries play an important role in the rural household income and economic growth in the Himalayas regions.

H2: Inland fisheries development has a positive effect on rising GDP and creation of jobs in rural areas.

H3: Sustainable fisheries can improve livelihood security and complement the goals of the Blue Economy.

2. Review of Literature

Fisheries sector has become a subject of growing interest in the academic circles as well as in the policy arena because of its ability to aid the economic growth, food security, and sustainability of livelihoods. Fisheries are viewed as an important sector within the broader context of the Blue Economy that is capable of fostering inclusive growth and ensuring sustainable utilisation of the aquatic resources. In the last 20 years, the economical and social significance of fisheries in the coastal and inland settings has been the subject of many studies (Wang & Sun, 2025). Most studies have however been on marine fisheries and the inland fisheries have been underserved especially those in mountainous areas. The

current state of literature review is thus in need of systematic review to comprehend the changing attitude towards fisheries development, rural livelihoods, and economic contribution in the framework of sustainable development.

2.1 Blue Economy and Sustainable Fisheries Development

The Blue Economy has become a key concept in ensuring a balance between economic development and environmental sustainability in aquatic environments (Amillano-Cisneros et al., 2025). It focuses on the sustainable use of marine and freshwater resources to achieve economic growth, better livelihoods and ecosystem well-being. The Blue Economy model incorporates different industries, including fisheries, aquaculture, marine biotechnology, tourism, and renewable energy, emphasizing their overall potential to contribute to the national and regional development.

The recent years have witnessed an increased realization of the role of the Blue Economy in the realization of sustainable development objectives by governments and international organizations (Mahmud et al., 2025). The strategy promotes sustainable management of resources, technological advancement and integration of policies to make sure that economic gains made out of aquatic resources do not affect environmental integrity. The role of fisheries, especially in this context, is critical since it has a direct contribution to food systems, rural employment, and income generation. The long-term economic opportunities offered by the Blue Economy include sustainable fisheries and effective use of resources through the preservation of aquatic ecosystems (Elsira et al., 2025).

2.2 Economic Significance of Fisheries Sector

It is common knowledge that fisheries are a great source of contribution to national and regional economies. It is a sector that can earn revenue by manufacturing, processing, distributing, and trading fish hence sustaining a broad spectrum of economic activities. Fisheries are a significant part of agricultural sector in most developing countries and provide a significant contribution to gross domestic product (Hahlbeck et al., 2022).

Fisheries have more than direct production value as far as their economic significance is concerned. The industry promotes other industries like feed production, equipment manufacturing, transportation and marketing. These connections generate multiplier effects which boost the economic activity in rural regions. Furthermore, fisheries are instrumental to enhance food security since they supply inexpensive food sources of animal proteins (Quintanilla-Pineda et al., 2024). With the world ever-growing and insatiable demand of fish, the fisheries industry has emerged as a significant source of economic development and livelihood in most areas.

2.3 Role of Inland Fisheries in Rural Livelihoods

Inland fisheries has become a significant means of livelihood to millions of rural households worldwide. Freshwater resources like rivers, lakes, reservoirs and ponds offer the capture fisheries as well as aquaculture opportunities. Such activities create jobs and earnings to fish farmers, fishers, traders and other stakeholders in the fisheries value chain (Hansen et al., 2025).

Inland fisheries play a vital role in the rural livelihoods, especially in areas where there are limited opportunities of alternative jobs. The small-scale fisheries and aquaculture businesses may have comparatively low capital requirements, and thus, are available to the economically marginalized groups. Moreover, fisheries activities help in diversifying livelihoods since households are able to engage in fishing alongside agriculture and other rural jobs (Diriba et al., 2026). This diversification assists in reducing the economic vulnerability and increases the resilience of households to environmental and market shocks.

2.4 Fisheries Development in Himalayan Ecosystems

The Himalayan region is endowed with various freshwater ecosystems which have a lot of fisheries potential. Some of the major activities that have been encouraged in mountainous regions to boost rural livelihoods include cold-water fisheries, reservoir fisheries and trout farming. These fisheries systems are specifically adjusted to the ecological situation of high-altitude areas and can contribute to the economic development of the area (Zeleke & Gubale, 2026).

Government programs have supported the creation of fisheries infrastructure, hatcheries, and training programs on aquaculture in several Himalayan states. The objectives of these initiatives are to enhance production of fish, boost the income of the farmers and provide jobs to the rural communities. The problem with fisheries development in mountainous areas, however, is that it may be difficult due to the steep topography, poor infrastructure, and the inability to access the markets (Basurto et al., 2025). Consequently, the potential of fisheries as an economic activity in the Himalayan areas has not been fully exploited.

2.5 Research Gap

Although there is an increasing literature on fisheries and economic development, there are a number of major gaps. Current literature tends to concentrate on the marine fisheries or mass-producing aquaculture, whereas the inland fisheries in mountainous areas are relatively under-researched. In addition, the majority of studies focus on the production figures and environmentally sustainable fisheries development instead of analyzing the overall economical context of fisheries development in rural societies (Tabassum et al., 2025).

The other disconnectivity is between fisheries research and other development models like the Blue Economy and national development strategies. Despite the growing appreciation of fisheries as a possible source of rural economic development, there is limited empirical research on the basis of which the role of fisheries in rural GDP and livelihood sustainability in the Himalayan areas can be measured. The gap of understanding these gaps would be crucial in ensuring that the development of inland fisheries is seen as a way of promoting sustainable rural development and economic objectives in the long term (Das et al., 2026).

3. Theoretical and Conceptual Framework

The economic contribution of inland fisheries requires a systematic analytical framework, which describes the linkages between fisheries development, rural economic growth and livelihood sustainability. Conceptual frameworks assist in the identification of important variables, how they relate, and how to direct empirical analysis. Considering the Blue Economy, inland fisheries may be considered a productive sector making use of freshwater resources to yield income, employment, and economic value in rural locations (Liu et al., 2025). Fisheries development can be a significant tool in enhancing rural living standards and in addition to boosting local economies, especially in the Himalayan regions where economic opportunities may be few. Thus, the conceptual framework of this study is to connect the fisheries production, rural income generation, job creation, and livelihood sustainability to the greater objectives of the Blue Economy and the Viksit Bharat 2047 vision (Das et al., 2026).

3.1 Blue Economy as a Theoretical Perspective

The Blue Economy model focuses on sustainable utilization of water resources with the aim of fostering economic growth, social integration, and environmental protection. It has emphasized the contribution of fisheries and aquaculture as vital elements of sustainable economic systems which depend on freshwater

and marine ecosystems. In this context, fisheries are not just considered as a source of food production, but also as a sector that can help in providing economic opportunities and rural development (Mahmud et al., 2025).

When applied to inland fisheries, the Blue Economy promotes sustainable management of freshwater ecosystems to guarantee long-term productivity and environmental sustainability. The key to ensuring that the productivity of inland fisheries is increased and ecological degradation is reduced is sustainable aquaculture practices, better management of the resources, and technological innovation (Petersen et al., 2026). Combining economic goals with environmental management, the Blue Economy framework offers a full-fledged method of analyzing the contribution of fisheries to sustainable development.

3.2 Relationship between Fisheries Development and Rural GDP

The fisheries and economic growth relationship can be explained in terms of the role of fisheries activities in generating income, creating jobs, and value in the rural economies. The production of fish indirectly results in direct income to fish farmers and fishers who sell fish and other related products. This income is used in household consumption, investment and savings, hence economic activity in the rural communities (Hahlbeck et al., 2022).

Besides generating direct income, fisheries also generate indirect economic benefits by being connected with other sectors. These are processing, transportation, marketing, supplying of equipment and feed production, of fish. Economic transactions in rural areas are boosted by the existence of these related industries and they add to the overall economic output of the rural areas (Aguión et al., 2025). Consequently, fisheries may have significant impacts on improving rural GDP by augmenting both direct and indirect economic activities in local economies.

3.3 Livelihood Sustainability Perspective

Livelihood sustainability is the capacity of households to have stable and reliable sources of livelihood and to adjust to economic, social and environmental constraints. Fisheries are also able to sustain livelihood in the rural areas by offering people a source of employment, diversification of income sources and food security (Chakrabarti, 2025).

To most rural families, fisheries has been an addition to the traditional farming activities and it has been used to provide a backup to a single source of livelihood. This diversification enhances resilience of households and minimizes household susceptibility to risks like crop failure, market shocks, or climate related problems (Quintanilla-Pineda et al., 2024). Also, fisheries can lead to food security since it is a steady source of nutritious food to rural people. Inland fisheries are significant in enhancing sustainable livelihoods by ensuring income stability and increased access to food resources.

3.4 Conceptual Model of the Study

Relying on Blue Economy framework and current literature on fisheries and rural development, this research develops a conceptual framework that elucidates the role of inland fisheries in rural economic development and livelihood sustainability in Himalayan areas. According to the model, fisheries production is the main economic activity that creates income and jobs to rural households (Zeleke & Gubale, 2026).

The resultant effect of increased fish production is a rise in household income which subsequently results in better living standards and economic stability. Fisheries activities at the community level trigger other economic activities like fish marketing, fish processing and transportation which increases the local economies network (Natarajan et al., 2022). The total of these interactions is added to rural GDP. Simultaneously, with fisheries-based income opportunities, livelihood sustainability improves

through the promotion of income diversification, employment opportunities and food security.
The conceptual model thus emphasizes on a dynamic interrelationship where inland fisheries serve as a driver to the economic growth and sustainable rural livelihoods as part of the overall goals of the Blue Economy and national development programs like Viksit Bharat 2047 (Basurto et al., 2025).

4. Research Methodology

The methodology section, describes the research design, data sources, sampling procedures and methods of analysis to estimate the economic value of inland fisheries to the growth of the rural GDP and livelihood sustainability in the Himalayan regions. Clear methodological framework guarantees reliability and validity of the research results (Wang & Sun, 2025). The research is a quantitative study that is facilitated by primary and secondary sources of data. The methods used to evaluate the contribution of fisheries production to the generation of rural income, the creation of employment opportunities and the general economic development in the study area are statistical and economic analysis.

4.1 Description of the Study Area

The research paper targets the chosen areas in the Himalaya that are endowed with plenty of freshwater that is viable in the development of inland fisheries. Such areas are mountainous districts, where rivers, reservoirs, lakes, and village ponds are used to produce fish and engage in aquaculture. Himalayan ecosystem does offer Himalayan fisheries an appropriate habitat where various cold water fish species like trout and native hill fishes prosper.
In most districts of the Himalayas, geographical conditions and scarcity of arable land limit agriculture. This has led to fisheries being a significant secondary livelihood activity of rural people. The economic importance of fisheries in the areas has been enhanced further by government programs that are encouraging cold-water fisheries, trout farming and reservoir aquaculture. The study area thus offers a pertinent environment to explore the contribution of inland fisheries to rural economic development and livelihood sustainability.

4.2 Research Design

The research design is quantitative and analytical which will be used to analyze the role played by inland fisheries in rural livelihoods and GDP growth. This research design is descriptive and involves analysis of production patterns, income generation and creation of employment in relation to fisheries activities.
The research will be a combination of primary survey data gathered through fish farmers and secondary data through government fisheries statistics and other related reports. Quantitative analysis will help to identify economic relationships between economic activities of fisheries and rural development indicators.

4.3 Data Sources

The study will use primary and secondary data.

Primary Data

Primary data is gathered using well-structured questionnaires and field interviews with fish farmers and fisheries stakeholders. The survey collects data concerning fish production, cost of aquaculture, fishery earnings, employment, and livelihood status of rural households.

Secondary Data

Government publications, fisheries department reports, agricultural statistics, and policy documents are some of the sources of secondary data. These are useful sources of information on fish production trend,

fisheries infrastructure and the economic indicators in the region.
Combination of primary and secondary data provides more depth to the study.

4.4 Sampling Technique and Sample Size

The study is carried out through a multi-stage sampling method of selecting respondents.
Stage 1: Districts with active inland fisheries activities will be selected.
Stage 2: The choice of villages or fisheries clusters in the selected districts.
Stage 3: Selection of fish farmers that are randomly engaged in fisheries production.
The following formula is used to determine the required sample size:

$$n = \frac{Z^2 p(1-p)}{e^2}$$

Where

- n= required sample size
- Z= Z value at desired confidence level
- p= estimated population proportion
- e= margin of error

4.5 Data Collection Methods

Structured questionnaires and field interviews with the stakeholders of the fishery sector and fish farmers are used to gather primary data. The questionnaire will be categorized into various sections to get appropriate information to be used in the study.
The demographic section includes demographic data like age, education, household size, and occupation. The second part is devoted to the fisheries activities, such as fish species that are grown, the volume of production, and aquaculture activities. The third section collects economic data concerning the cost of production, revenue and income earned in fisheries. The last segment measures livelihood indicators including income diversification, food security and employment opportunities (Ainsworth et al., 2023).
Field visits are made to confirm practices of production as well as get the correct information of the respondents.

4.6 Variables and Indicators

The paper explores various variables in order to determine the relationship between fisheries development and rural economic development.

Independent Variables

- Fisheries production volume
- Aquaculture investment
- Fisheries infrastructure availability
- Fisheries employment opportunities

Dependent Variables

- Rural household income
- Contribution to rural GDP
- Livelihood sustainability index

Control Variables

- Education level of fish farmers
- Household size

- Access to markets and transportation

These variables are used in evaluating the economic and social consequences of inland fisheries development.

4.7 Data Analysis Techniques

Data collected are analysed in an economic and statistical way.

Descriptive Statistics

The levels of fish production, pattern of income, and employment caused by fisheries activity are summarized using descriptive statistics like mean, percentage, and standard deviation.

Estimation of Fisheries Contribution to Rural GDP

The fisheries contribution to rural GDP can be estimated by the following formula:

$$GDP_f = \sum_{i=1}^{n} (Q_i \times P_i)$$

Where

- GDP_f= GDP contribution from fisheries
- Q_i= quantity of fish produced
- P_i= market price of fish

Net Income from Fisheries

The net income earned by fisheries activities is determined as:

$$I_f = TR - TC$$

Where

- I_f= net income from fisheries
- TR= total revenue from fish sales
- TC= total cost of fish production

Livelihood Sustainability Index

Composite index is used to measure livelihood sustainability:

$$LSI = \frac{\sum_{i=1}^{n} W_i X_i}{\sum_{i=1}^{n} W_i}$$

Where

- LSI= livelihood sustainability index
- X_i= value of livelihood indicator
- W_i= weight assigned to each indicator

The index encompasses a variety of livelihood sustainability indicators, including income stability, job security, and food security.

5. Results and Findings

This part gives the findings of the survey on fish farmers and the analysis of the economical indicators of fisheries in the study area. Findings revolve around the production patterns, income, job creation and role of inland fisheries in supporting rural GDP and livelihood. The data collected is interpreted using descriptive statistics and economic calculations. To summarize the main findings, tables are given, and graphical representations are proposed to demonstrate patterns and correlations between variables. The findings are useful to assess the contribution of inland fisheries to the rural economic growth in the context of the Blue Economy.

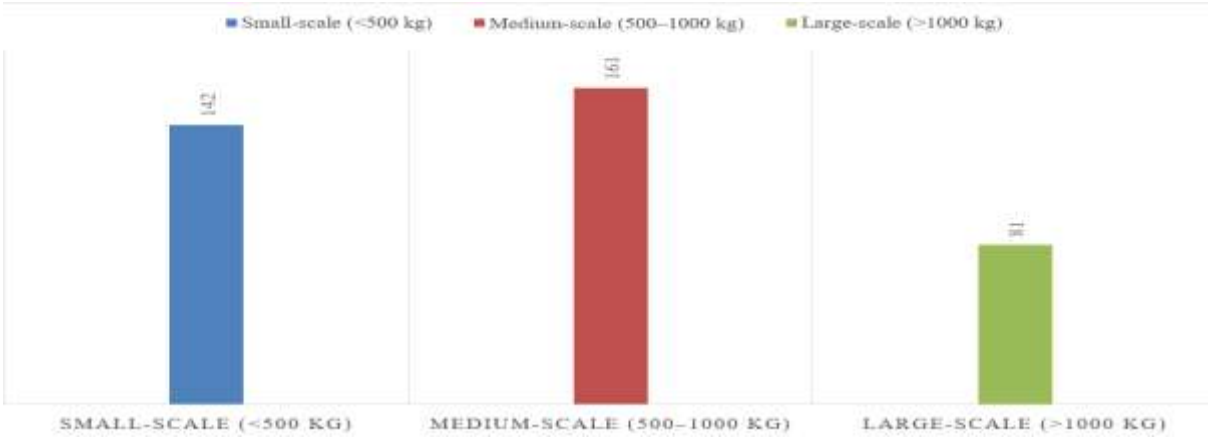
5.1 Fisheries Production Trends

The production of fish in the study area was examined to learn about the magnitude and economic prospects of the inland fisheries activity among the sampled households.

Table 5.1: Average Annual Fish Production by Fish Farmers

Production Category	Number of Farmers	Percentage (%)	Average Production (kg/year)
Small-scale (<500 kg)	142	36.9	350
Medium-scale (500–1000 kg)	161	41.8	720
Large-scale (>1000 kg)	81	21.3	1350
Total	384	100	—

Figure 5.1: Distribution of Fish Production Levels Among Surveyed Farmers



Interpretation

The findings show that most fish farmers are of the medium-scale production. The average production of fish per year is about 41.8 percent of 500-1000 kilograms. The small-scale producers contribute 36.9 percent of the respondents with only 21.3 percent being large scale producers. These results imply that inland fisheries in the Himalayan region are mainly small to medium scale that can be expanded.

5.2 Contribution to Rural Household Income

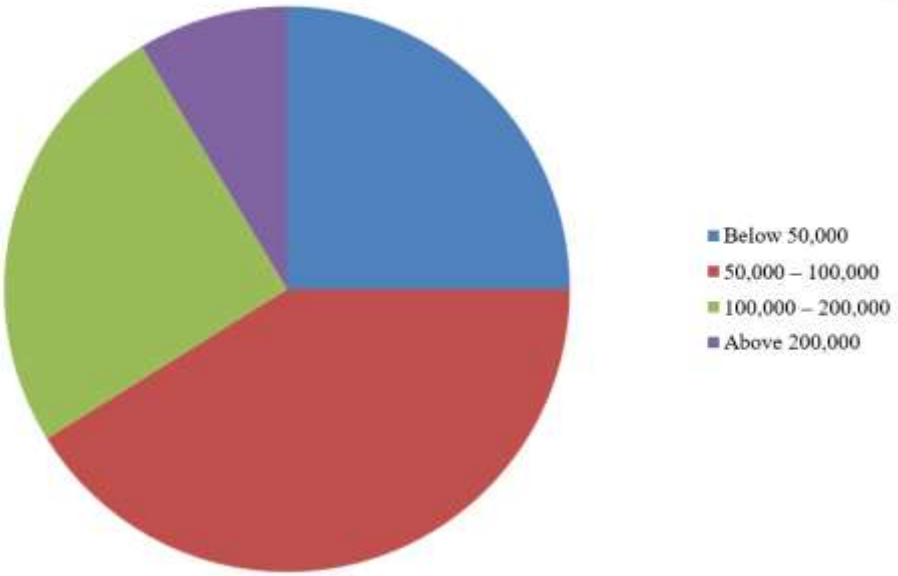
The fisheries-generated income was examined to reveal how much fisheries contribute to household income.

Table 5.2: Annual Household Income from Fisheries

Income Range (INR/year)	Number of Households	Percentage (%)
Below 50,000	96	25.0
50,000 – 100,000	158	41.1
100,000 – 200,000	97	25.3

Above 200,000	33	8.6
Total	384	100

Figure 5.2: Distribution of Fisheries Income Among Households



Interpretation

The statistics show that fisheries is a significant source of income to rural households. The highest proportion of the respondents (41.1) indicated a range of fisheries income between 50,000 and 100,000 every year. About a quarter of the households have incomes below 50,000 rupees with an even smaller percentage of farmers earning a higher income of over 200,000 rupees per year in fisheries. The results indicate the increasing importance of fisheries as an income earner to rural households.

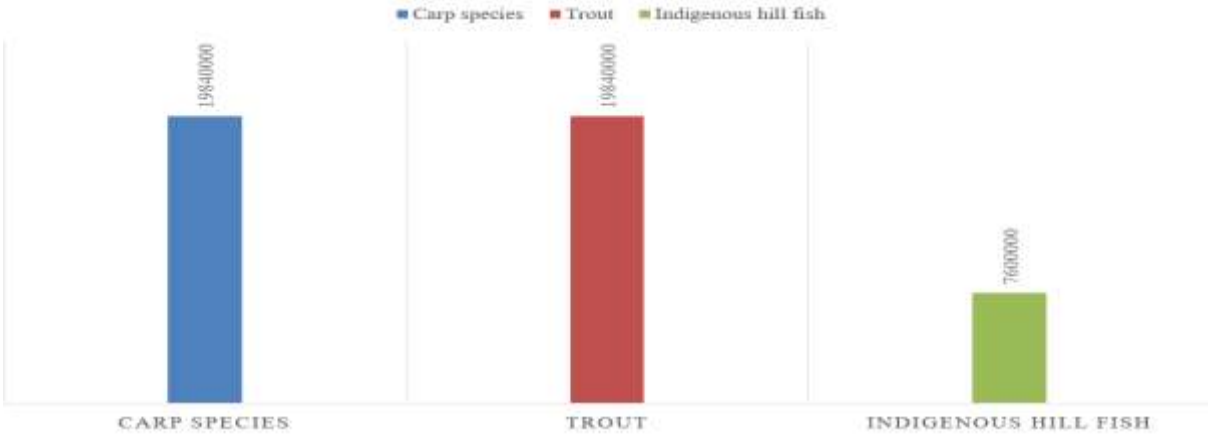
5.3 Contribution to Rural GDP

Economic contribution of fisheries to the rural economy was estimated using the quantity of fish production and the market prices.

Table 5.3: Estimated Fisheries Production Value

Fish Species	Average Production (kg/year)	Average Market Price (INR/kg)	Total Value (INR)
Carp species	124,000	160	19,840,000
Trout	62,000	320	19,840,000
Indigenous hill fish	38,000	200	7,600,000
Total	224,000	—	47,280,000

Figure 5.3: Economic Value Contribution by Fish Species



Interpretation

The surveyed region is estimated to have an annual economic value of ₹47.28 million through inland fisheries production. The shares of carp and trout in the overall production value are the highest, as they have high production, and their demand is high in the market. These results show that inland fisheries have a great potential to contribute to local economic output and growth in rural GDP.

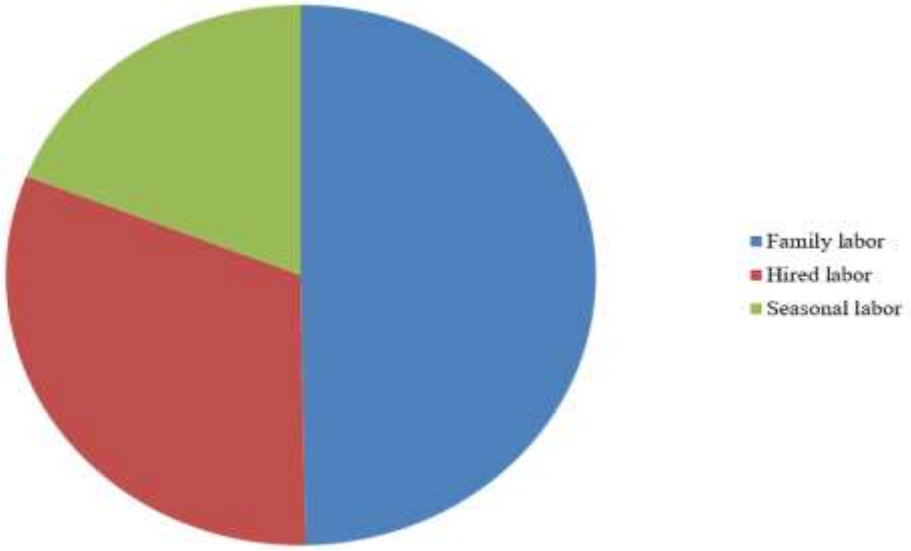
5.4 Employment Generation

The fisheries industry also contributes significantly in creation of jobs in the countryside.

Table 5.4: Employment Generated Through Fisheries Activities

Employment Type	Number of Workers	Percentage (%)
Family labor	298	49.7
Hired labor	187	31.2
Seasonal labor	114	19.1
Total Workers	599	100

Figure 5.4: Employment Structure in Inland Fisheries



Interpretation

The results suggest that fisheries activities have a significant effect on the employment of rural communities. In the fisheries business, almost half of the work force is comprised of family members, which is a characteristic of the household-based aquaculture sector. The presence of hired workers and seasonal workers also plays a significant role in fisheries production, which means that the sector also supports direct and indirect jobs.

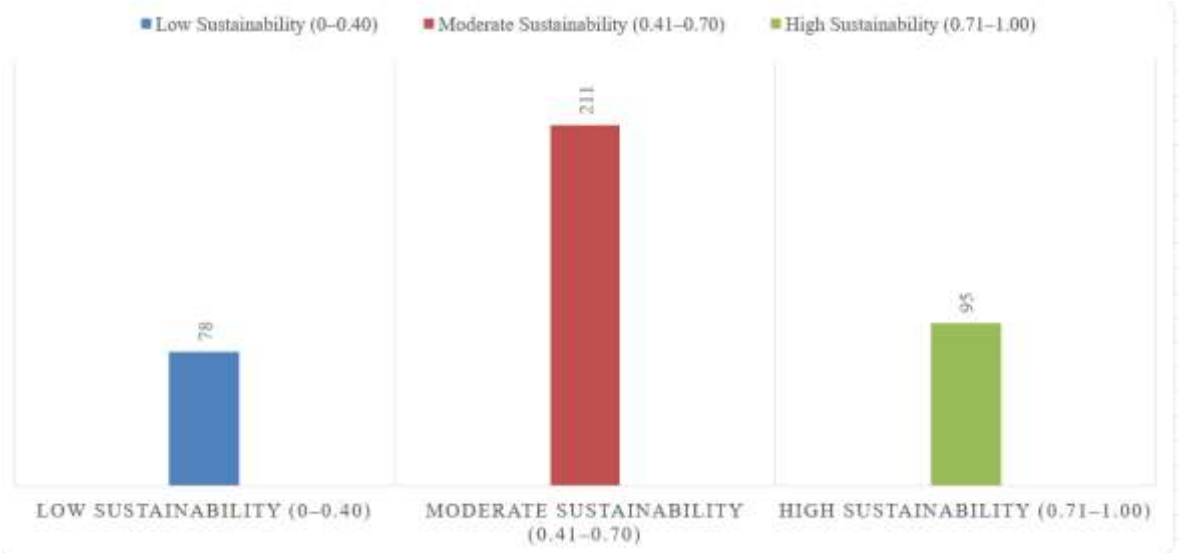
5.5 Livelihood Sustainability Analysis

The Livelihood Sustainability Index (LSI) was used to assess livelihood sustainability of fish farmers, and it employs indicators like income stability, employment opportunities and food security.

Table 5.5: Livelihood Sustainability Index Classification

LSI Category	Number of Households	Percentage (%)
Low Sustainability (0–0.40)	78	20.3
Moderate Sustainability (0.41–0.70)	211	54.9
High Sustainability (0.71–1.00)	95	24.8
Total	384	100

Figure 5.5: Distribution of Livelihood Sustainability Index Among Households



Interpretation

Most households (54.9) occupy the moderate livelihood sustainability category which implies that fisheries are a positive factor contributing to the rural livelihoods, though it might need a boost in productivity, infrastructure and market access. Among the respondents, about a quarter of them can be said to be of high livelihood sustainability which implies that properly handled fisheries activities can provide a substantial boost to the economic stability and food security of the rural household.

5.6 Summary of Findings

The findings show that inland fisheries have a great role to play in the rural economic development in Himalayan states. Production of fish is a great source of family revenue and a contribution to the local economy. The industry will also create job opportunities to both the family and hired workers and

enhance the livelihood sustainability among the rural communities. The findings suggest that the inland fisheries can contribute significantly to the growth of rural GDP and align with other development strategies related to the Blue Economy and the Viksit Bharat 2047 vision.

6. Discussion

The results of this paper underscore the increased relevance of inland fisheries as a major source of rural economic and livelihood sustainability in Himalayan countries. Through examination of fish production, household earnings, job creation, livelihoods, the study illustrates that fisheries activities can empower the rural economies as well as promote sustainable development objectives (Elsira et al., 2025). It is in the context of current literature and policy frameworks related to the Blue Economy and national development vision Viksit Bharat 2047 that the findings were interpreted to discuss them as a matter of the national strategy.

6.1 Interpretation of Findings

The study findings indicate that inland fisheries is a significant economic activity among rural households in the Himalayan region. A large percentage of the surveyed farmers are involved in small scale and medium scale production of fisheries meaning that fisheries activities can be available to the rural population with relatively low capital expenditure (Diriba et al., 2026). Availability of freshwater sources like rivers, reservoirs and ponds gives prospects of aquaculture and capture fisheries which contributes to the livelihoods of the locals.

The revenue statistics have shown that fisheries have a significant impact on household income. There was a fair amount of fisheries income of between 50,000 to 100,000 annually as indicated by many respondents, indicating that fisheries is an additional means of livelihood (Novák et al., 2025). Even though fisheries give higher incomes to some households, most of them are at the middle income levels implying that the industry has a lot of room to grow through better infrastructure, greater market accessibility and technology.

In addition, the researchers discovered that fisheries activities create a high number of jobs. A high proportion of the workers in fisheries activities is family labor, which indicates the household basis of aquaculture activities in rural settings (Tabassum et al., 2025). The existence of hired and seasonal workers also shows that fisheries are not only a way of generating employment, but also at the level of the individual households, thus contributing to the overall economic activity in the rural communities.

6.2 Comparison with Previous Studies

The results of this study are in line with the past studies that indicate the significance of fisheries as a rural development driver. Previous research has also proved that fisheries bring about income diversification, food insecurity and job creation in communities in rural areas. The current research showed similar trends as fisheries activities were a source of additional income and jobs to a significant percentage of sampled households (Ma et al., 2026).

Nevertheless, the findings also shed some light on some regional peculiarities of the Himalayan fisheries systems. In contrast to large commercial fisheries, which are usually carried out along the coasts, inland fisheries in mountainous areas are usually small-scale and depend on the household labor to a large extent. These structural features affect the economic performance of fisheries business and underline the necessity to develop the regions in a region-specific way (Amillano-Cisneros et al., 2025).

In addition, though past studies focused mostly on marine fisheries or large aquaculture systems, the current study is a contribution to the literature as it studies inland fisheries in the context of Himalayan

ecosystems. This view can fill a key research gap by offering empirical evidence on the role of freshwater fisheries in rural economic development in mountainous areas (Hansen et al., 2025).

6.3 Role of Inland Fisheries in the Blue Economy

In the context of the entire concept of the Blue Economy, inland fisheries can be viewed as one of the areas that can establish a sustainable economic environment and ensure ecological balance. The above results of the research show that fisheries activities have an economic value in form of fish production, marketing, and other economic activities (Diriba et al., 2026). These economic advantages are consistent with the aims of the Blue Economy, which aims at utilizing aquatic resources to create economic, social, and environmental benefits.

The inland fisheries also play a role in food security by being sources of affordable protein to the rural communities. Fish availability as a locally produced food resource helps minimize reliance on external food and enhances food system resilience of rural areas (Ainsworth et al.,
2023). Moreover, sustainable fisheries activities can also help in conserving the environment by promoting sound management of fresh water environments.

The inland fisheries have the potential to be at the core of the objectives of Blue Economy in the mountainous regions through the combination of fisheries development and sustainable management of these resources (Elsira et al., 2025).

6.4 Implications for Viksit Bharat 2047

Viksit Bharat 2047 vision focuses on inclusive economic development, rural development, and sustainability in resource use. The findings of this paper show that inland fisheries can play a great role in supporting these national development objectives. The fisheries activities can enhance the livelihoods of the communities in the Himalayan areas by creating income and job opportunities and strengthening the rural economies (Hansen et al., 2025).

The economic contribution of inland fisheries could be further increased by expanding fisheries infrastructure, enhancing access to markets and encouraging modern technologies in aquaculture. Government programs of enhancing cold-water fisheries and aquaculture systems may be a key to the realization of the full potential of this industry (Mahmud et al., 2025). Moreover, capacity-building initiatives towards fish farmers and better fisheries management practices can also be used to ensure that economic development is done in a sustainable and environmentally friendly fashion.

Altogether, the inland fisheries development is in line with Viksit Bharat 2047 priorities as it will contribute to rural economic development, the improvement of livelihood security, and sustainable utilization of natural resources (Chakrabarti, 2025).

7. Policy Implications

The research results show that inland fisheries have a great potential of boosting the rural economies, creation of employment opportunities and livelihood sustainability in the Himalayan areas. Nevertheless, the complete economic advantages of fisheries development would only be achieved in terms of supportive policy structures, institutional support and specific investments (Basurto et al., 2025). Policy interventions should therefore be implemented effectively to deal with the challenges that are currently present in terms of infrastructure, technology, access to markets and management of resources. The section presents important policy implications that could help the fisheries sector to become stronger and contribute more to the GDP growth of the rural population as a part of the broader context of the Blue Economy and the vision Viksit Bharat 2047 (Quintanilla-Pineda et al., 2024).

7.1 Fisheries Development Policies

The design and enforcement of developed fisheries development policies in accordance with the peculiar ecological and economic conditions of Himalayan areas are among the most important policy priorities. These policies ought to aim at enhanced sustainable aquaculture, increased fish production, and maximization of freshwater resources (Novák et al., 2025).

Government initiatives that are meant to facilitate fisheries development ought to offer financial aid, technical training and capacity building to fish farmers. Small-scale farmers can be assisted in acquiring better technologies in aquaculture with access to credit and subsidies and increase their production capacity (Liu et al., 2025). Moreover, institutional support to fish farmers can be enhanced by the creation of fisheries cooperatives and community-based management systems to improve the management of resources.

7.2 Infrastructure and Institutional Support

Inland fisheries require infrastructure development to enhance productivity and economic viability of inland fisheries in mountainous areas. The efficiency of fisheries can be greatly improved by investing in hatcheries, fish seed production units, cold storage and transportation networks (Tabassum et al., 2025).

Post-harvest losses can also be minimized through better infrastructure and fish farmers can reach bigger markets. In most areas of Himalayas, fisheries activities are less profitable due to inadequate storage and transport facilities. Increasing the supply chain infrastructure and creating structured fish markets can be used to enable farmers to receive higher prices on their products and even raise their levels of income (Zeleke & Gubale, 2026).

It is also important that the fisheries departments, research institutions, and extension services provide institutional support. Training sessions and technical support can assist fish farmers to embrace better aquaculture methods, control diseases and enhance production efficiency (Hahlbeck et al., 2022).

7.3 Sustainable Aquaculture Strategies

Sustainable aquaculture practices are important in order to have long term development of inland fisheries without destruction of fresh water ecosystems. There should be policies promoting sustainable methods of aquaculture which reduce water pollution, safeguard aquatic biodiversity and maintain ecological balance (Ma et al., 2026).

Integrated aquaculture systems, species diversification, and feed management can help to enhance productivity and mitigate environmental effects. Moreover, fisheries management approaches that are conservation based need to be exercised to ensure that the natural fish habitats are not destroyed as well as to make the Himalayan freshwater systems ecologically sustainable (Amillano-Cisneros et al., 2025).

Aquaculture should also be made climate resilient to combat the possible effects of climate change on fisheries production. These measures may involve better water management, the breeding of resilient species of fish, and adaptive management measures that enable fish farmers to deal with changes in the environment (Petersen et al., 2026).

8. Conclusion

The paper discussed how inland fisheries contribute to the rural GDP growth and livelihood sustainability in Himalayan areas on a larger scale of the Blue Economy and national vision Viksit Bharat 2047. Through the study of the fish production trends, household earnings, employment rate, and livelihoods, the study offers an empirical study on the contribution of inland fisheries to rural economic growth. The results indicate that besides providing income to rural households, inland fisheries also lead

to the formation of employment and better livelihood conditions among the mountainous populations where economic options are usually scarce (Natarajan et al., 2022).

8.1 Key Findings

Fisheries production analysis showed that inland fisheries in the study area are majorly small and medium sized-fisheries. These fisheries activities, though of relatively small size, bring a lot of economic value and also a lot of contribution to the rural income. A significant percentage of the households surveyed indicated that they earned additional income through fisheries, which implies that the sector contributes significantly to enhancing the financial stability of households.

Results also indicate that the fisheries activities provide a source of employment to the family members and those employed. This job creation helps to diversify rural households and decreases the economic vulnerability of households. Moreover, the approximate cost of fisheries production shows that inland fisheries have a role in the local economy and have the potential to boost the GDP of the rural area.

The livelihood sustainability analysis also indicates that fisheries activities enhance the resilience of households by diversifying incomes, improving food security and also providing employment (Wang & Sun, 2025). These results are in line with the overall aims of sustainable development, and they point to the possibility of fisheries to nurture the long-term rural economic stability.

8.2 Research Limitations

Despite the fact that the study offers useful information on the economic contribution of inland fisheries within the Himalayan areas, it is important to note that there are a number of limitations. It is analyzed on the basis of the data gathered in the selected districts and, thus, it might not reflect the situation in all Himalayan areas. Regional variations in ecological features, access to infrastructure and access to markets could affect fisheries development and economic performance.

Besides, the quantitative indicators that are mainly considered in the study include fish production, income, and employment. Although these indicators can give valuable economic information, qualitative variables like institutional governance, social dynamics, and cultural practices can also determine fisheries development (Aguión et al., 2025). These aspects can be included in future research in order to come up with an all-inclusive concept of fisheries-based livelihoods.

8.3 Future Research Directions

The findings of this study can be further developed in the context of research in the future by looking at other aspects of fisheries development in mountainous areas. The comparative analysis of various Himalayan states would allow gaining a better understanding of the local differences in the productivity of fisheries and its contribution to the economy. The longitudinal studies on the variations in fisheries production and income with time would also aid in the evaluation of the long term effects of fisheries development on rural economies.

Moreover, the use of technological innovations, climate-resilient aquaculture, and better market integration could also be explored in future research to improve the economic performance of inland fisheries. Incorporating the environmental sustainability indicators with the economic analysis would also contribute to ensuring that the development of fisheries is in line with the principles of the Blue Economy (Das et al., 2026). This kind of research would help in better policy-making and help in the sustainable development of inland fisheries as a strategic sector to help rural development.

REFERENCE

1. Aguión, A., Basurto, X., Funge-Smith, S., Gorelli, G., Iversen, E., Mancha-Cisneros, M. del M., &

Gutierrez, N. L. (2025). Five archetypes of small-scale fisheries reveal a continuum of production strategies to guide governance and policymaking. Nature Food, 6, 1020–1031. https://doi.org/10.1038/s43016-025-01237-5

2. Ainsworth, R. F., Cowx, I. G., & Funge-Smith, S. J. (2023). Putting the fish into inland fisheries: A global allocation of historic inland fish catch. Fish and Fisheries, 24(2), 263–278. https://doi.org/10.1111/faf.12725
3. Amillano-Cisneros, J. M., Fuentes-Valencia, M. A., Leyva-Morales, J. B., Savín-Amador, M., Márquez-Pacheco, H., Bastidas-Bastidas, P. d. J., Leyva-Camacho, L., De la Torre-Espinosa, Z. Y., & Badilla-Medina, C. N. (2025). Effects of microorganisms in fish aquaculture from a sustainable approach: A review. Microorganisms, 13(3), 485. https://doi.org/10.3390/microorganisms13030485
4. Basurto, X., Gutierrez, N. L., Franz, N., Mancha-Cisneros, M. M., Gorelli, G., Aguión, A., Funge-Smith, S., Harper, S., Mills, D. J., Nico, G., Tilley, A., Vannuccini, S., Virdin, J., Westlund, L., Allison, E. H., Anderson, C. M., Baio, A., Cinner, J., Fabinyi, M., … Thilsted, S. H. (2025). Illuminating the multidimensional contributions of small-scale fisheries. Nature, 637, 875–884. https://doi.org/10.1038/s41586-024-08433-6
5. Chakrabarti, S. (2025). Rural roads and economic development: Insights from India. Transport Policy, 168, 305–318. https://doi.org/10.1016/j.tranpol.2025.04.023
6. Das, B. K., DebRoy, P., & Yateesh, D. C. (2026). Small-scale inland fisheries of India: Trends, transitions, and the road ahead. In B. K. Das, P. DebRoy, & P. K. Nayak (Eds.), Small-scale inland fisheries in India (pp. 1–18). Springer. https://doi.org/10.1007/978-981-95-3849-2_1
7. Diriba, A., Derso, D., & Hashim, H. (2026). Effect of livelihood diversification on households' food security: A propensity score analysis. Sustainable Futures, 11, 101632. https://doi.org/10.1016/j.sftr.2025.101632
8. Elsira, I., Tilley, A., Samy-Kamal, M., & Aly, W. (2025). Digital transformation of Egyptian marine fisheries: A pathway to sustainable fisheries management. Marine Policy, 179, 106766. https://doi.org/10.1016/j.marpol.2025.106766
9. Hahlbeck, N., Tinniswood, W. R., Sloat, M. R., Ortega, J. D., Wyatt, M. A., Hereford, M. E., Ramirez, B. S., Crook, D. A., Anlauf-Dunn, K. J., & Armstrong, J. B. (2022). Contribution of warm habitat to cold-water fisheries. Conservation Biology, 36(3), e13857. https://doi.org/10.1111/cobi.13857
10. Hansen, A. G., Lepak, J. M., Pate, W. M., Brauch, D., & Avila, B. W. (2025). Just water over the dam? Reservoir fishery disruption following drought-mediated reoperation for environmental flows. Ecosphere, 16(10), e70412. https://doi.org/10.1002/ecs2.70412
11. Liu, Z., Wang, C., & Guo, B. (2025). Biodiversity—The cornerstone of sustainable aquaculture development: Insights from the breeding of approved fish varieties for aquaculture from 1996 to 2024 in China. Reviews in Aquaculture, 17(2), e70003. https://doi.org/10.1111/raq.70003
12. Ma, J., Wu, Z., Guo, M., & Hu, Q. (2026). Trade-offs between economic gains and ecological goals: Impact of marine ecological policy on marine fisheries efficiency. Fisheries Management and Ecology, 33(1), 142–157. https://doi.org/10.1111/fme.70014
13. Mahmud, K. T., Zaman, F., & Haque, A. B. M. M. (2025). Gender disparities and barriers for fisherwomen in the fisheries value chain system: A review of global perspectives. Gender, Technology and Development, 29(2), 304–325. https://doi.org/10.1080/09718524.2025.2509194

14. Natarajan, N., Newsham, A., Rigg, J., & Suhardiman, D. (2022). A sustainable livelihoods framework for the 21st century. World Development, 155, 105898. https://doi.org/10.1016/j.worlddev.2022.105898
15. Novák, J., Hohl, D., Stuchlík, M., Hofmann, J., Tlusty, M. F., Magalhães, A. L. B., Maceda-Veiga, A., Akmal, S. G., Yue, G. H., Kumkar, P., Mar, S. M., Sara, J. P., Stern, N., Rhyne, A. L., Furse, J. M., Kalous, L., Patoka, J., … Tlusty, M. F. (2025). Revisiting the history of ornamental aquaculture in Europe to understand the benefits
16. and drawbacks of freshwater fish imports. Reviews in Aquaculture, 17(2), e13008. https://doi.org/10.1111/raq.13008
17. Petersen, C., Ji, J., Ye, F., Ezzat, A. A., Kohut, J., Saginaw, D., Montanti, A., & Cammarota, J. (2026). Data-driven probabilistic simulation of vessel operations to support the blue economy. Ocean Engineering, 354(Part 2), 124818. https://doi.org/10.1016/j.oceaneng.2026.124818
18. Quintanilla-Pineda, M., Ibañez, F. C., Garrote-Achou, C., & Marzo, F. (2024). A novel postbiotic product based on Weissella cibaria for enhancing disease resistance in rainbow trout: Aquaculture application. Animals, 14(5), 744. https://doi.org/10.3390/ani14050744
19. Tabassum, I., Hassan, N., Amin, A., Malik, M. M., Abubakr, A., Prasad, G. S., Latief, F., & Rather, S. A. (2025). COVID-19 and global environmental change: A threat to food security and nutrition. In J. K. Sundaray, M. A. Rather, I. Ahmad, & A. Amin (Eds.), Food security, nutrition and sustainability through aquaculture technologies (pp. 437–445). Springer. https://doi.org/10.1007/978-3-031-75830-0_25
20. Wang, L., & Sun, Y. (2025). Digital dividends? Rural e-commerce policy and urban–rural income disparity in China. Telecommunications Policy, 49(10), 103058. https://doi.org/10.1016/j.telpol.2025.103058
21. Zeleke, A. E., & Gubale, A. G. (2026). Socioeconomic values and nature of floodplain river fisheries along the Alitash National Park: A management implication. Cogent Food & Agriculture, 12(1). https://doi.org/10.1080/23311932.2026.2621357