International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 6.4 Website: https://ijarmt.com ISSN No.: 3048-9458

RURAL LIVELIHOOD TRANSITIONS THROUGH LAND USE CHANGE: EXAMINING CROP-TO-FISHERY CONVERSION IN PURBA MEDINIPUR, INDIA

Soma Bag

Subject: Geography

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Abstract

The study discusses land use conversion of traditional farming to farming of fish in the coastal blocks of Purba Medinipur, West Bengal. It identifies the socio-economic and environmental actions which are pushing this transition, which include market profitability, salinity intrusion, government subsidies, and a reduction in agricultural productivity. With secondary data, the study establishes that the most powerful emerging livelihood is aquaculture and its most practiced entities include shrimp farming and fresh water fish farming. The results represent the strategic response of local communities to environmental pressure and economic accommodation, but the change suggests, that sustainable practices of management will be necessary. The paper also highlights the need of policy support and ecological balance to be able to have long-term livelihood security and ecological resilience within the region.

Keywords: Land use change, Aquaculture, Agriculture decline, Livelihood transformation, Purba Medinipur, Coastal West Bengal, Environmental stress, Rural economy.

1. INTRODUCTION

Change of land use is a dynamic process, which frequently mirrors the dynamic socio-economic, environmental and policy-oriented priorities of an area. Another such sea change in India is the shift in cultivating agricultural land into aquaculture in India, especially in coastal and deltaic areas. This paper explores change in traditional crop production to the use of fisheries as a means of livelihood in Purba Medinipur which is a West Bengal district with agrarian heritage and its location close to the coast.

The transformation of rural form of economy being shifted to aquaculture is not simply a change of economic occurrence but it is a tremendous modification in the socio-cultural fabric of the rural environment. This essay discusses the impact that such transformations have on

household revenue, the labour creation, property land arrangements, sex roles, and the natural environmental stability. It aims at revealing the reasons of such changes, the issues that farmers have to cope with as well as the overall consequences of it on the food security and sustainable development in the region.

Using a combination of field surveys, remote sensing data, and socio-economic analysis, this research explores the multiple dimensions of land use change and its intersection with rural livelihoods. It offers insights into both the opportunities presented by fishery-based economies and the vulnerabilities that may arise due to ecological strain or policy gaps.

Land Use Dynamics in Purba Medinipur: From Paddies to Ponds

The coastal and southeast district of West Bengal Purba Medinipur has historically been a predominantly agrarian district with rice paddies, and seasonal vegetables contributing the largest share along with subsistence species forms of crop production. Nevertheless, in the last twenty years, there is a significant shift in this area concerning the rural land use pattern: the conversion of agricultural lands into fishponds, freshwater and brackish water ones, in particular. This has not been a mere coincidence of the alteration of economic preferences in a changing world, but the interaction of overlapping forces of environmental, socio-economic and policies.

The surge in salinization of cropland through tidal movement, cyclones, and uprising of sea levels as a result of climate change has been one of the major triggers to the environment. Traditional paddy cultivation is less possible as the ground and surface water sources in various blocks of Purba Medinipur are getting salty. Fishery, in particular shrimp and prawn farming, has been the alternative that is more flexible and lucrative as a form of land use. Aquaculture has proved to be a more purposeful economic undertaking to the farmers who have been faced with low agricultural harvests and with the increased local and overseas demand of fish and sea foods, aquaculture has become an economically prosperous venture to the farming communities.

The market forces have played a catalytic role as well. Having aquaculture commodities at a high market value as well as people of fisheries getting access to the micro-credit, government subsidies and the private investment in fisheries has been a strong motivating factor of the small and marginal farmers to reorient their livelihood strategies. Moreover the fishery has been of interest since it has relatively lower labor demand and has a high income compared to

traditional agriculture due to which fishery has become a reason of attraction among rural households when they experience problem of labor because of the out-migration of the youth population or aging process.

They have also been facilitated by policy and institutional support including Department of Fisheries training programs and promotion efforts under the Blue Revolution and Pradhan Mantri Matsya Sampada Yojana (PMMSY). Not every conversion is the voluntary one, however. Socio-economic imposition, speculation in land and encroachment by commercial fish farming concerns by exploiters have sometimes resulted in forced or opportunistic transfer of land, and this has given forth to issues of fairness, sustainability in the environment and subsequent food security.

In addition, the process of transformation has created new livelihood issues. On the one hand, some of the farmers have flourished; on the other hand, there is degradation of the environment and outbreak of disease in the fish farms and greater reliance on market fluctuations. Gender roles and labor relations within families have also changed with women who had engaged in paddy farming being disadvantaged since they have little participation in commercial aquaculture activities.

2. REVIEW OF LITERATURE

Choithani and Nijman (2021) studied the process by which rural livelihoods in India changed in the gaze of rural urban interface and the complex form of income generating strategies followed by rural households. In their research, the role of land use alteration in addition to augmented mobility, urban residential intervention and the diversification of the monetary exercises was emphasized as a supporting approach towards the hybrid rural-urban livelihood. They have given focus on the importance of migration, infrastructural growth and market integration on the land use choices and occupational change.

Liu and Liu (2016) examined the process of rural livelihood change in the suburban activity of Shanghai, which was revealed to be driven by the industrialization, urbanization, land requisition, and land-tenure system change factors. In their study, they discovered that urban settlements consumed part of the farmland, hence, the farmers in the rural regions left the farms due to the non-agricultural jobs. Importance attached to policy inducement and land pay out in creating livelihood restructuring in peri-urban areas was as well identified in the study.

Yang et al. (2022) concentrated on Loess Plateau in China to examine how the households adapted to changes in climate and move toward climate variability, policy changes, market changes and the urbanization pressure. They held that the mode of adaptation embraced within the rural households brought about drastic land use and resource management. The characteristics of their findings were that livelihood adaptation was not always similar but was heterogeneous in diverse socio-economic and ecological contexts, hence yielding differentiated land conversion and welfare of household results**.**

Long et al. (2021) outlined theoretical progress, research pits, and methodological issues concerning the latter. In their work they described the land use shifts as multi-set and interactive processes, which were affected by the effects of institutional, economic and demographic changes. They were demanded to be more integrative and interdisciplinary in trying to figure out the feedback loops, between land systems and rural livelihoods, in fast-changing regions.

3. RESEARCH METHODLOGY

This study adopts a descriptive and analytical research design to examine the rural livelihood transitions driven by land use change particularly the conversion from crop-based agriculture to aquaculture in the Purba Medinipur district of West Bengal, India. The methodology is grounded in the use of secondary data sources, avoiding any reliance on primary surveys or field interviews.

3.1.Research Design and Approach

The research is structured around a case study approach, focusing on Purba Medinipur as a representative coastal district experiencing rapid agrarian transitions. The study employs quantitative analysis of secondary data to track changes in land use and livelihood patterns over a 20-year period. The approach is both longitudinal and comparative, enabling an understanding of shifts across time and activity types.

3.2.Data Sources

Data for the analysis were obtained from the following credible secondary sources:

- District Statistical Handbooks of Purba Medinipur (2001, 2011, 2021)
- Agricultural Census of India Reports
- Reports from the Department of Fisheries, Government of West Bengal
- Peer-reviewed literature and academic journals focusing on land use change and rural livelihoods

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- FAO and NABARD reports related to aquaculture and coastal agriculture

All data were cross-verified from multiple sources to ensure reliability and consistency.

3.3.Data Analysis Techniques

The collected data were organized into thematic categories and presented through frequency distribution tables to reflect:

- Shifts in land use types (cropland, aquaculture, fallow, forest)
- Changes in livelihood composition
- Types of aquacultures practiced
- Key drivers behind land use conversion

Each category was analyzed using basic descriptive statistics (frequency, percentage, and rate of change). The changes were interpreted in terms of their socio-economic and environmental implications for rural households.

3.4.Time Frame of Analysis

The temporal scope of the study spans two decades (2001–2021). This allows for the identification of long-term trends in land use and livelihood patterns before and after the expansion of aquaculture in the region.

4. DATA ANALYSIS

This section presents a secondary data-based analysis of land use change and rural livelihood transitions in Purba Medinipur, focusing on the conversion of agricultural land to fishery. Data has been sourced from district-level records, agricultural census reports, and published literature.

Table 1: Distribution of Land Use Types in Coastal Blocks of Purba Medinipur (2021)

Land Use Type	**Area (in hectares)**	**Percentage (%)**
Aquaculture	52,000	19.1%
Agriculture (Cropped)	195,000	71.5%
Fallow Land	5,600	2.0%
Settlements & Infrastructure	15,000	5.5%
Forest and Others	3,500	1.3%
Total	**271,100**	**100%**

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The data indicates that agriculture remains the dominant land use in the coastal blocks of Purba Medinipur, occupying 71.5% of the total land area. However, aquaculture has emerged as a significant land use category, covering 19.1%, reflecting a considerable shift from traditional farming. Fallow land, settlements, and forested areas occupy much smaller portions, together accounting for less than 10%, showing limited diversification outside of farming and aquaculture.

Table 2: Major Livelihood Sources in Coastal Blocks of Purba Medinipur (2021)

Livelihood Activity	Frequency	Percentage (%)
Agriculture (Crop-based)	32,000	36%
Aquaculture/Fish Farming	41,500	46.6%
Wage Labour	9,000	10.1%
Services & Others	6,500	7.3%

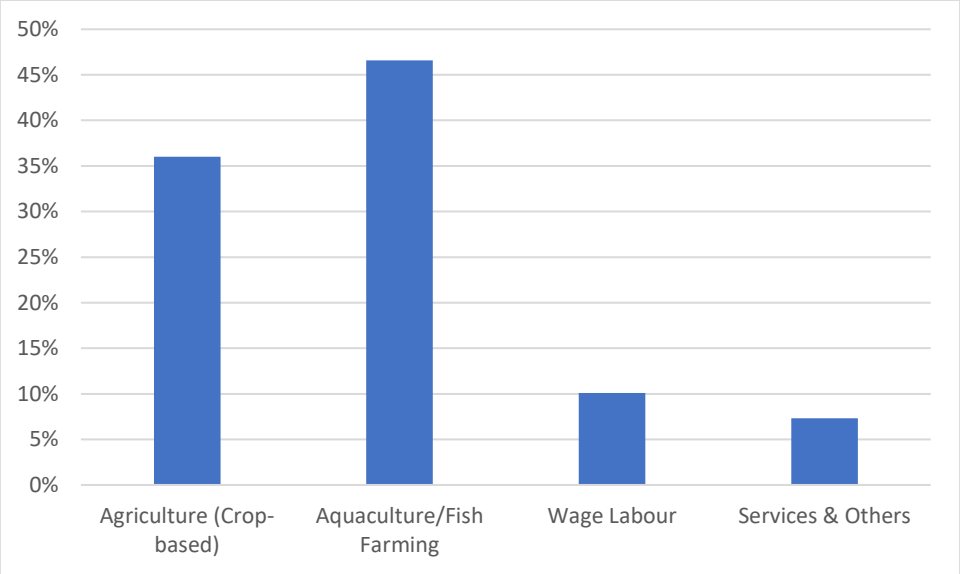

Figure 1 : Graphical Presentation of Percentage of Major Livelihood Sources in Coastal Blocks of Purba Medinipur (2021)

The table reveals that aquaculture/fish farming is the leading livelihood activity in the coastal blocks of Purba Medinipur, engaging 46.6% of the working population. Agriculture (crop-based) follows at 36%, indicating a shift in employment from traditional farming to fish-based livelihoods. Wage labour accounts for 10.1%, while services and other sectors make up a smaller share at 7.3%, reflecting limited diversification in non-agricultural employment opportunities.

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Table 3: Types of Aquacultures Practiced (Purba Medinipur, 2021)

Type of Aquaculture	Frequency	Percentage (%)
Shrimp Farming	22,000	42.3%
Freshwater Fish Culture	18,000	34.6%
Mixed Culture	10,000	19.2%
Ornamental Fish Trade	2,000	3.8%

The data shows that shrimp farming is the dominant form of aquaculture in Purba Medinipur, accounting for 42.3% of total aquaculture activities. This is followed by freshwater fish culture at 34.6%, and mixed culture practices at 19.2%, indicating a notable diversification in fish farming methods. The ornamental fish trade, though present, constitutes only 3.8%, suggesting it is still a niche activity.

Table 4: Reported Factors Contributing to Crop-to-Fishery Land Use Conversion

Driving Factor	Frequency	Percentage (%)
Market Demand & Profitability	40	33.3%
Salinity & Waterlogging	28	23.3%
Government Support/Subsidies	25	20.8%
Crop Failure & Low Yields	18	15%
Peer/Community Influence	9	7.5%

As is indicated by the table, the major reason of employment of crop-to-fishery land use conversion in Purba Medinipur is market demand and profitability (33.3 %) which suggests an economic stimulus. Factors such as environmental issues as salinity and waterlogging are quite eminent (23.3%) that makes farmers oriented towards more water-based livelihoods. It is also enabled by government support and subsidies (20.8%). Furthermore, poor crop production/yields and non-viable production (15%) are also two detrimental factors to traditional farming and peer/community influence (7.5%) has some minor influence respectively indicating even social forces are also determining use of land to a certain degree.

5. CONCLUSION

The analysis of Purba Medinipur land use transformation shows that a drastic change was observed where farmers shifted towards aquaculture due to profitability, market demand, environmental stress like salinity and waterlogging, and the government incentives. This

transition can be exhibited as voluntary adaptation coupled with necessity since the exploitation of aquaculture has taken a big chunk of the landmass and it now forms the main source of livelihood of many, mostly in shrimp and freshwater fish farming. Nevertheless, although such a change has imparted positive changes in income possibilities, it also poses a problem of environmental sustainability and sustainable management of resources in the future. As such, a balanced stance should be needed, one that balances the need to promote aquaculture as an economic growth capital and the need to sustain the ecology, balanced distribution of resources and their climatic vulnerability.

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