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Study the Impact of Pradhan Mantri Matsya Sampada Yojana (PMMSY) in Infrastructure Development in Tripura

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ABSTRACT

This study examines the impact of the Pradhan Mantri Matsya Sampada Yojana (PMMSY) on infrastructure development within Tripura's fisheries sector. Employing a mixed-methods approach that integrates both qualitative and quantitative data, the research assesses the implementation status of PMMSY in enhancing fisheries infrastructure, including the establishment of finfish hatcheries, biofloc units, feed mills, and new pond construction. A sample of 26 beneficiaries voluntarily participated in the study. Additionally, the research identifies perceived challenges associated with the implementation of PMMSY in Tripura. Currently, all units established under the scheme are active and operational. The initiative has significantly contributed to the development of aquaculture infrastructure, resulting in increased fish production and economic benefits for beneficiaries. However, challenges such as power outages, water quality issues, machinery malfunctions, and site constraints for pond construction have adversely affected fish productivity. The findings of this study will provide a deeper understanding of the impact of PMMSY on infrastructure development in Tripura's fisheries sector, informing policy decisions and future interventions.

Keywords: Mixed-methods approach, Infrastructure development, Fisheries sector, Economic benefits, PMMSY

INTRODUCTION

The aquaculture sector in Tripura has exhibited substantial growth, with significant potential for further advancements in fish production. The state possesses rich aquatic resources, including both culture and captive fisheries, and has witnessed an increase in the number of fish hatcheries as well as the expansion of water resources utilized for fish culture. Furthermore, the adoption of polyculture techniques has diversified fish species. Among the various fish species, carps constitute the largest share (84.98%) of Tripura's total fish production (Government of Tripura, 2009a). Private fish farmers make the highest contribution to the overall fish production from culture fisheries. Despite a recorded fish seed production of 4,280.79 lakh units (DoE&S, 2024), which exceeds local demand, spawn and fry production remain concentrated in specific pockets of the state, with limited availability of fry and fingerlings. Recent data indicate that Tripura's fish production reached 85,805.68 metric tons (MT) and the per capita fish consumption in the state was recorded at 27.73 kg in 2023–24 (DoE&S, 2024). Time-series data on culture water resources and fish production highlight exponential growth in the past decade, including the procurement of fish from inter-state sources. While the implementation of PMMSY has yielded promising results in the fisheries sector, several challenges persist in achieving sustainable development (FAO, 2020). A significant number of eligible beneficiaries remain unaware of the scheme and its associated benefits, limiting its overall impact in certain areas. Furthermore, post-harvest losses remain high due to inadequate cold storage facilities, necessitating the modernization of the fisheries value chain. Additionally, overfishing in specific regions has led to ecological imbalances. The sector also faces challenges related to limited access to quality fish seed and an existing gap between fish demand and production (Debnath *et al.*, 2013).

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Government-Aided Fisheries Development Schemes:

Central Government Schemes:

1. **Pradhan Mantri Matsya Sampada Yojana (PMMSY):** Launched by the Department of Fisheries under the Ministry of Fisheries, Animal Husbandry, and Dairying, this scheme aims to develop the fisheries sector in an ecologically sustainable, economically viable, and socially inclusive manner.
2. **Pradhan Mantri Anusuchit Jati Abhyuday Yojana (PM-AJAY):** Implemented in 2021–22 through the integration of three schemes, this initiative focuses on improving the socio-economic conditions of the Scheduled Caste (SC) community by enhancing income levels, literacy rates, and infrastructure.
3. **Rashtriya Krishi Vikas Yojana (RKVY-RAFTAAR):** This scheme seeks to transform agriculture into a profitable enterprise by strengthening farmers' efforts, mitigating risks, and fostering agri-business entrepreneurship.
4. **Special Economic Development Package (SEDP) under NLFT (SCA-TSS):** This package provides economic benefits to Scheduled Tribe (ST) beneficiaries as part of a broader special economic development initiative.
5. **North Eastern Council (NEC) Fisheries Enhancement Program:** This initiative focuses on increasing fish productivity by rehabilitating ponds and mini-barrages for sustainable fisheries development.

State Government Schemes:

1. **Chief Minister Swanirbhar Parivar Yojana (CMSPY):** This scheme aims to uplift rural families by providing financial assistance to improve their economic status through horticulture and fisheries.
2. **Promotion of Cage Culture in Dumbur Reservoir:** Funded by the Rural Infrastructure Development Fund (RIDF) through NABARD, this initiative promotes cage culture fisheries in large water bodies.
3. **Mukhya Mantri Nibir Matsyachash Prakalpa (MMNMP):** This scheme facilitates infrastructure development to enhance fish production using biofloc technology, supported by RIDF funding.

Implementation Status of Pradhan Mantri Matsya Sampada Yojana (PMMSY) in Tripura:

The Pradhan Mantri Matsya Sampada Yojana (PMMSY), launched in 2020, is a flagship initiative of the Government of India aimed at fostering sustainable and responsible fisheries development (Borah *et al.*, 2019). The scheme seeks to augment fish production, strengthen fisheries infrastructure, and promote sustainable fishing practices. PMMSY envisions a Blue Revolution in India through an investment of Rs. 20,050 crore over five years for the holistic development of the fisheries sector, ensuring the welfare of fishers. The scheme is operational across all states and union territories. In 2023–24, a new sub-scheme was introduced under PMMSY, with an investment of Rs. 6,000 crore, focusing on enhancing value chain efficiencies and expanding fish markets. In Tripura, PMMSY has facilitated infrastructure development by supporting the construction of fish seed hatcheries, fish markets, and pisciculture knowledge centers. The initiative also includes the establishment of mini finfish hatcheries, freshwater finfish hatcheries, new pond construction, biofloc technology implementation, and feed mills. Additionally, it aims to double farmers' incomes by promoting sustainable fisheries in natural and open water bodies, such as the Dumbur Reservoir, through the ranching of high-quality fingerlings and the adoption of high-yielding aquaculture practices.

PMMSY also provides training on scientific pisciculture, breeding techniques, and seed production for members of cooperatives, self-help groups (SHGs), joint forest management committees (JFMCs), and non-governmental organizations (NGOs). Furthermore, the scheme has initiated the development of a Gene Bank facility for potential fish species in Tripura and facilitates the distribution of fish transportation vehicles to unemployed youths and entrepreneurs. Additionally, PMMSY offers financial assistance to fishers by compensating for the three-month fishing ban during the breeding season in Dumbur Reservoir. The scheme also supports soil and water quality testing through laboratory assessments and health camps, providing necessary recommendations for improving fish productivity. Moreover, eligible fish farmers and fishers can avail credit loans under the Kisan Credit Card (KCC) scheme. The study aims to:

- Assess the impact of PMMSY on fisheries infrastructure development in Tripura.
- Identify challenges encountered in the implementation of the scheme.

METHODOLOGY

The study was conducted in all the eight districts of Tripura. The secondary data on various schemes (Central and State) in fisheries and list of beneficiaries under PMMSY scheme were collected from the Department of Fisheries, Government of Tripura. A semi structured interview schedule was prepared and administered to the different beneficiaries. A sample of 26 beneficiaries was willingly participated in the study. After collecting the responses, the primary data was tabulated and descriptive statistics for different socio-economic variables were analyzed to explore the general information about the beneficiaries as well as the various aspects of PMMSY scheme in terms of infrastructure development.

RESULTS AND DISCUSSION

Status of Infrastructure Development of Beneficiaries under PMMSY:

The survey, conducted among 26 beneficiaries under the Pradhan Mantri Matsya Sampada Yojana (PMMSY) scheme in Tripura, provides insight into the current state of infrastructure development. Table 1 highlights the distribution of various infrastructure facilities among the beneficiaries.

Table 1 : Status of Infrastructure Development of Beneficiaries under PMMSY (N=26)

Sr. No.	Infrastructure	Total Beneficiaries	Sampled Beneficiaries
1.	Biofloc Unit	92	14
2.	Mini fin fish hatchery	07	03
3.	Fin fish hatchery	26	07
4.	New pond construction	02	01
5.	Feed mill	01	01
	Total	128	26

Biofloc technology, a modern aquaculture technique, was the most prevalent infrastructure, with 14 beneficiaries adopting it. This indicates a significant interest in advanced, sustainable fish farming methods among the beneficiaries. The popularity of biofloc systems may be attributed to their cost-effectiveness, efficient use of water, and ability to enhance fish production in limited spaces. However, the relatively low adoption among the remaining beneficiaries suggests potential barriers such as lack of technical knowledge, high initial investment, or inadequate training programs. Only three mini fin fish hatcheries were developed under the scheme, highlighting limited growth in small-scale hatchery infrastructure. While these units can serve as critical support systems for seed production, their low numbers may indicate challenges in establishing or scaling up these facilities, such as financial constraints or lack of local expertise. The establishment of seven fin fish hatcheries reflects moderate progress in supporting large-scale fish seed production. These hatcheries are essential for meeting the growing demand for quality fish seed in the region. However, the number is still insufficient to cater to the state's rich aquatic diversity and potential for expanding aquaculture. Only one new pond was constructed under the scheme, pointing to minimal development in expanding aquaculture water bodies. Given Tripura's rich aquatic resources, the low uptake of pond construction projects suggests significant obstacles, such as limited land availability, bureaucratic hurdles, or insufficient funding under the scheme. The establishment of just one feed mill emphasizes the need for better feed production infrastructure. The availability of quality feed is critical for enhancing fish productivity. The limited number of feed mills may result in dependency on external sources, increasing costs for local fish farmers (Fig. 1 to 4 and Table 2).

Fig. 1 : Biofloc constructed under PMMSY

Socio-economic Status of PMMSY Beneficiaries:

The socio-economic profile of the beneficiaries provides critical insights into the inclusiveness and reach

Fig. 2 : Feed mill constructed under PMMSY

Fig. 3 : Finfish hatchery constructed under PMMSY

of the Pradhan Mantri Matsya Sampada Yojana (PMMSY) in Tripura. The data presented in the Table 4 shows that 65.38% of beneficiaries are male, while 34.61% are female. This indicates a gender gap in participation, suggesting that men dominate the aquaculture sector in the state. The presence of female beneficiaries is encouraging, but further efforts can be made to enhance women's participation in this field.

Fig. 4 : New pond constructed under PMMSY

General category beneficiaries constitute 50% of the total, followed by Scheduled Castes (SC) at 26.92% and Scheduled Tribes (ST) at 23.07%. This fairly balanced representation shows that the scheme has reached marginalized communities. More targeted efforts may be required to further uplift SC and ST communities, who often face greater financial and technical barriers. The distribution of beneficiaries across districts highlights uneven participation: Sepahijala (19.23%) and Gomati (19.23%) have the highest number of beneficiaries, followed by Khowai (15.38%) and North Tripura (15.38%). Districts like Dhalai (7.69%), West Tripura (7.69%), and Unokoti (3.85%) have comparatively fewer beneficiaries. This disparity may result from differences in awareness levels, access to resources, or aquaculture potential in different regions. Focused outreach and training programs in underrepresented districts could improve equitable participation. It can be concluded from the Table 4 that 65.38% of beneficiaries have less than 5 years of experience in aquaculture, while 26.92% have 5 to 10 years, and only 7.69% have over 10 years of experience. It highlights that most beneficiaries are

Table 2 : Profile of Project cost and Social Category wise share (Rs. in Lakhs)

	Project cost	Govt. Share	Beneficiary Share
Infrastructure			
Fin Fish Hatchery for GEN	25	10	15
Fin Fish Hatchery for SC	25	15	10
Fin Fish Hatchery for ST	25	15	10
Mini Fin Fish Hatchery ST	15	7.5	7.5
Mini Fin Fish Hatchery GEN	8.4	3.36	5.04
Biofloc for GEN	7.5	3	4.5
Biofloc for SC	7.5	4.5	3
Biofloc for ST	7.5	4.5	3

Table 3 : District-Wise Distribution of Infrastructure Development under PMMSY

Sr. No.	District	Biofloc	Mini Fin Fish hatchery	Fin Fish hatchery	Feed Mill	New Pond construction
1.	Dhalai	2	1	1	0	1
2.	West Tripura	9	0	1	1	1
3.	South Tripura	6	1	6	0	0
4.	Khowai	4	1	3	0	0
5.	Seepahijala	26	1	6	0	0
6.	North Tripura	9	1	1	0	0
7.	Gomati	9	1	7	0	0
8.	Unokoti	27	1	1	0	0
	Total	92	7	26	1	2

relatively new to aquaculture, reflecting the scheme's success in attracting fresh entrants. However, the lack of experienced participants may pose challenges in effectively utilizing advanced techniques and infrastructure. Structured training and mentorship programs by experienced practitioners can bridge this gap and enhance productivity among newcomers.

Infrastructure Development under PMMSY:

The infrastructure development status under the Pradhan Mantri Matsya Sampada Yojana (PMMSY) in Tripura demonstrates progress in enhancing the state's aquaculture capabilities. The Table 3 summarizes the year of development and the current status of key infrastructures.

Table 4 : Socio-economic status of PMMSY beneficiary

Sr. No.		Variables	Frequency (n)	Percentage (%)
1.	**Gender**			
		Male	17	65.38
		Female	9	34.61
2.	**Category**			
		General	13	50.00
		SC	7	26.92
		ST	6	23.07
3.	**District**			
		Dhalai	2	7.69
		West Tripura	2	7.69
		South Tripura	3	11.54
		Khowai	4	15.38
		Seepahijala	5	19.23
		North Tripura	4	15.38
		Gomati	5	19.23
		Unokoti	1	3.85
4.	**Experience (years)**			
		<5	17	65.38
		5 to 10	7	26.92
		>10	2	7.69

Fin Fish Hatchery:

The establishment of the fin fish hatchery in 2021 marks a significant step toward ensuring a consistent supply of quality fish seed for aquaculture. Currently, all the units are active and operational. The early establishment of this infrastructure provides a foundation for supporting aquaculture expansion in the region. The cultivated species are Rohu, Catla, Common Carp, Mrigal, Prawn. Continued maintenance and monitoring are necessary to ensure its sustained performance.

Mini Fin Fish Hatchery:

The mini fin fish hatchery, developed in 2022, supports small-scale seed production. Currently, all the units are active and operational. This infrastructure benefits small and medium-sized farmers by providing locally available, cost-effective seed stock. Its presence reduces dependency on external seed suppliers. It cultivates mainly Rohu, Catla, Mrigal throughout the year.

Feed Mill:

The feed mill, developed in 2023, represents a critical addition to aquaculture infrastructure by providing high-quality feed for fish farming. Currently, all the units are active and operational. The availability of a local feed mill reduces input costs for farmers, enhances productivity, and contributes to the self-sufficiency of the aquaculture industry. However, it is essential to monitor its production capacity and quality standards.

New Pond Construction:

The construction of a new pond, developed in 2022, demonstrates efforts to increase the area under aquaculture. Currently, all the units are active and

operational. Expanding the aquaculture area aligns with the scheme's objective of boosting fish production. Identifying more suitable sites for pond construction can further enhance production potential.

Biofloc:

Biofloc units developed in 2022, represent modern aquaculture practices aimed at improving productivity. Currently, all the units are active and operational. Biofloc technology has gained popularity for its efficient water usage and high production in limited space. Continued training for beneficiaries is crucial to maximize the technology's benefits. It has been observed that the entire infrastructure under PMMSY completed. The Table 5 detailed data on fish production, yearly operational costs, species cultivated, and the functional status of key aquaculture infrastructures under the Pradhan Mantri Matsya Sampada Yojana (PMMSY) in Tripura.

The infrastructure developed under PMMSY in Tripura has significantly enhanced aquaculture production, with fin fish hatcheries and biofloc systems being the primary contributors. From Table 5 it is evident that fin fish hatcheries produce 4 tons annually, supporting major carp species, while biofloc units cultivate Singhi, Magur, and Koi efficiently at a lower operational cost, despite challenges with two non-functional units. Mini fin fish hatcheries and feed mills, though critical, face high operational costs, indicating a need for cost optimization. New pond construction has shown promise with high production at minimal costs, making it a viable option for aquaculture expansion. Addressing issues like non-functional units, high costs, and providing targeted training and technical support can further enhance the scheme's impact, ensuring sustainable growth of aquaculture in the state.

Annual Income from Different PMMSY Infrastructures in Tripura:

The infrastructure established under PMMSY has contributed to enhancing the economic well-being of beneficiaries in Tripura. Fin fish hatcheries generate the highest average annual income at Rs. 35.9 lakhs, reflecting their crucial role in supporting large-scale fish production and meeting the demand for quality fish seeds. Feed mills contribute Rs. 12 lakhs annually, supporting aquaculture indirectly through affordable feed supply. New pond construction yields Rs. 7 lakhs annually, highlighting its potential for profitable fish farming at a lower cost. Biofloc systems, despite their innovative approach, generate Rs. 5.7 lakhs annually, indicating scope for improvement through better training and management. Mini fin fish hatcheries, with Rs. 5.33 lakhs annual income, cater to small-scale operations but require further optimization. Strengthening training, cost management, and technical support can maximize income potential across all infrastructure types. From Fig. 5 it is revealed that the average annual income is highest in Fin fish hatcheries followed by feed mill, new pond whereas average fish production is highest in Fin fish hatcheries and new pond. But the yearly maintenance cost is highest in feed mill and Mini fin fish hatcheries.

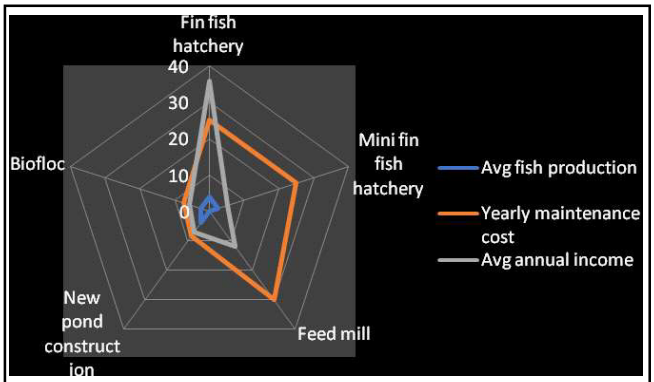

Fig. 5 : Comparison of Infrastructure developed under PMMSY scheme in Tripura

The Perceived challenges in implementing the PMMSY scheme in Tripura:

The beneficiaries under PMMSY in Tripura faces several challenges in aquaculture (Patil and Sharma, 2021) infrastructure that impact productivity. In biofloc systems, power outages during the rainy season disrupt operations,

Table 5 : Economical status of different infrastructure developed under PMMSY

Sr. No.	Infrastructure	Avg fish production (tones)	Yearly maintenance cost (lakhs)	Avg annual income (lakhs)
1.	Fin fish hatchery	4	25	35.9
2.	Mini fin fish hatchery	2.5	25	5.33
3.	Feed mill	NIL	30	7.00
4.	New pond construction	4	8.40	12.00
5.	Biofloc	2.5	7.5	5.70

highlighting the need for backup solutions such as solar panels or generators. Additionally, fluctuations in water parameters like TDS and pH hinder fish growth, emphasizing the importance of regular monitoring and water quality management. New pond construction in shallow water areas affects fish skin health, necessitating proper site selection and protective measures like pond lining. Machinery issues in feed mills disrupt production, underscoring the need for regular maintenance and operator training. Similarly, poor water quality in fin fish hatcheries affects the quantity and quality of fish produced, which can be mitigated through advanced filtration systems and water treatment protocols. Addressing these challenges through targeted interventions, capacity building, and infrastructure upgrades will improve efficiency, enhance productivity, and ensure the long-term sustainability of aquaculture in the region.

Table 6 : Perceived challenges faced by beneficiaries under PMMSY

Sr. No.	Perceived Challenges
1.	In biofloc system, electricity is the main problem during rainy season.
2.	In biofloc, increase of water parameters like TDS, pH affects the fishes growth
3.	Construction of new pond in shallow Waters affects the fish skin.
4.	In feed mill, machineries causes problems
5.	In fin fish hatchery water affects the quality and quantity of fishes.

Conclusion:

The Pradhan Mantri Matsya Sampada Yojana (PMMSY) has made significant strides in enhancing aquaculture infrastructure in Tripura, leading to increased fish production and economic benefits for beneficiaries. However, challenges such as power outages, water quality issues, machinery problems, and site limitations for pond construction have impacted productivity. The scheme has attracted new entrants, though more training and support are needed, especially for less experienced farmers. To ensure the scheme's success, addressing these challenges, enhancing training/awareness and providing better technical and financial support will be essential for sustainable aquaculture growth in Tripura.

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