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HILLS TO HARVESTS: TRANSFORMING LIVELIHOODS THROUGH INTEGRATED FISH FARMING IN NAGALAND

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DHALONGSAIH REANG[1]*, ANGUN WANGSHU[2], H. MANDAKINI DEVI[1], LEESA PRIYADARSANI[1] AND TAPAS KUMAR GHOSHAL[1]

[1] ICAR-Central Institute of Fisheries Education, Kolkata Centre, West Bengal, India.

[2] Sub-Divisional Fishery Inspector, Department of Fisheries, Government of Nagaland, India.

Corresponding Author's Email: dhalongsaih@cife.edu.in

ABSTRACT

Integrated fish farming offers a sustainable approach to improving agricultural productivity, resource-use efficiency, nutritional security and livelihood opportunities in the hilly regions of Northeast India. The present article documents the success of Shri Khrietuo Seyie, a progressive farmer from Tuophema Village, Kohima district, Nagaland, who has developed a diversified integrated farming system by combining aquaculture, duck rearing, poultry farming, paddy cultivation and horticulture. Initially established with a single fish pond through personal investment, the farm was subsequently expanded to five ponds with financial assistance under the Blue Revolution scheme and Pradhan Mantri Matsya Sampada Yojana (PMMSY). The farming system integrates carp polyculture duckery, poultry birds, paddy cultivation and various fruit and vegetable crops. The strategic arrangement of farming components along the natural hill slope facilitates the utilization of nutrient-rich water and organic manure, promoting nutrient recycling and efficient use of available farm resources. The farm produces approximately ₹2.1–2.2 lakh, demonstrating the economic potential of diversified farming activities. In recognition of his achievements, Shri Seyie received the Best Fish Farmer Award of Kohima district in 2020. This success story highlights the potential of integrated fish farming, supported by government interventions and farmer-led innovations, to diversify income sources, strengthen household food and nutritional security, and promote sustainable rural livelihoods in the hill ecosystems of Nagaland.

Keywords: Integrated fish farming; Livelihood diversification; Sustainable aquaculture; PMMSY; Nagaland; Success stories; Rural development.

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INTRODUCTION

The fisheries sector has emerged as a critical component of India's agricultural economy, food security, livelihood strategies and rural development. This sector contributes to nutritional security by supplying high quality animal protein, support a large number of livelihoods in rural areas. Nagaland, a predominantly agriculture-dependent state with nearly 70% of its population engaged in agriculture and allied activities for their livelihood, faces a considerable gap in fish production and consumption. Despite having a geographical area of about 16,579 sq. km, the fish production stands at 11158.90 MT (Government of Nagaland, 2024) and the per capita availability of fish in Nagaland remains low at 7.16 kg which is lower to World Health Organization (WHO) recommended per capita fish consumption of 11.0 kg (WHO, 2021; ICAR, 2022). Aquaculture, which possesses vast potential in Nagaland, remains largely underutilized. The state has immense opportunities for fish production and yield from its abundant water resources. At present, only 12.64% (3,793 ha) of the estimated total potential area of 30,000 ha has been brought under aquaculture, leaving a substantial untapped potential of 87.52%. Similarly, seasonal paddy fields, with an estimated total area of 82,500 ha, offer tremendous scope for augmenting fish production, with productivity levels ranging from 335–500 kg/ha/year (NFDB, 2022). In addition, the Doyang reservoir, with a water spread area of 2,258 ha, has the potential to yield 123 kg/ha/year of fish (DoF Govt of Nagaland, 2023). In response to the growing demand for fish consumption, a comprehensive roadmap has been outlined to enhance fish production through the creation and scientific development of water bodies, with special emphasis on compact area development in potential pockets across the state. The strategy envisages the inclusion of more water bodies under semi-intensive and intensive aquaculture systems, which would help achieve the targeted levels of fish production while simultaneously generating gainful employment opportunities in the near future (DoF Govt Nagaland, 2023). The projected average productivity levels of fish production are 2,150 kg/ha/year from ponds and tanks, 335–500 kg/ha/year from paddy-cum-fish culture, and 123 kg/ha/year from reservoir fisheries, respectively.

PRADHAN MANTRI MATSYA SAMPADA YOJANA (PMMSY)

The Pradhan Mantri Matsya Sampada Yojana (PMMSY) is a flagship fisheries and aquaculture development scheme launched by the Government of India under the Ministry of Fisheries, Animal Husbandry and Dairying. It was launched in September 2020 as part of the Aatmanirbhar Bharat package with an estimated investment of ₹20,050 crore for the period 2020–21 to 2024–25. The scheme aims to increase fish production and productivity through various fisheries schemes including the integrated fish farming. It aims at generating employment opportunity in the extremely rural areas like Nagaland. The scheme is benefitting the most marginal farmers who never had access to government schemes. It includes fish farmers, fishermen, entrepreneurs, fisheries cooperatives, self-help groups (SHGs) etc. Generally, PMMSY provides 40% subsidy of the eligible project cost for General category and 60% subsidy for SC, ST, Women, and other identified beneficiary groups.

INTEGRATED FISH FARMING

It is a sustainable farming system in which fish culture is combined with other agricultural activities such as duck rearing, livestock farming, horticulture, or crop cultivation. The system maximizes the efficient use of land, water, and farm resources by recycling nutrients and farm wastes. It helps increase overall farm productivity and reduces production costs. Integrated fish farming provides multiple sources of income and employment to rural households. It also promotes environmental sustainability while enhancing food and nutritional security.

FARMERS INTERVENTION

Shri Khrietuo Seyie, a 75-year-old farmer from Tuophema Village in Kohima district has established himself as a model integrated farmer, successfully combining aquaculture, livestock, paddy cultivation and horticulture into a sustainable livelihood system. He began his journey by constructing a single fish pond using his own resources and later expanded his farm by constructing four additional ponds with support from the Pradhan Mantri Matsya Sampada

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Yojana (PMMSY) and the earlier Blue Revolution scheme. He included duckery unit and poultry unit into the aquaculture farm. He also converted the surrounding areas into horticulture farm where crops mainly the fruit are grown.



Fig. Shri Khrietuo Seyie & his family at the farm Tuophema village, Kohima district

His farm consists of five numbers aquaculture ponds, a duckery unit, a poultry unit, horticulture farm and paddy field. He integrates fish culture with duckery and poultry while practicing paddy-cum-fish culture and applying farmyard manure for pond fertilization. He cultures Common Carp, Grass Carp and Indian Major Carps which are procured from the Fisheries Department. His horticultural produce includes fruits such as orange, lime, mango, guava, litchi, papaya, banana, gooseberry, plum, and vegetables.



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FISH CUM DUCK FARMING SYSTEM

In the slope of the hill, ponds were constructed in series. Pond size varies as the altitude of the hill increases. Fish species mainly the Indian major carp of bigger size (>100 gm) were stocked. The duckery unit is established beside the pond. There were more than 200 ducks (white pekin variety) cultured along with the fish. The ducks are mainly used for meat purpose. A small duckery unit made with bamboo and concrete pillar is constructed to protect them from wild animals. The ducks are released during the day time in the pond which will increase the dissolved oxygen in pond water due to swimming activity. The fish stocked are big enough that ducks cannot consume the fish.



Fig: Duckery unit of livestock components at the farm



Fig: Duck cum fish culture

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POULTRY CUM FISH FARMING SYSTEM

Poultry farming is also one of the component of Khrietuo Seyie's farm. Since poultry meat is highly demanded in Nagaland and also fetches high price. Poultry mainly the local breed or variety is kept for farming in his farm. Poultry is an additional income source and around 30-50 poultry birds are reared. Eggs and meat is produced as additional income in the farm. The waste material from the poultry unit is used as organic manure in the pond as well as horticultural crops.

PADDY CUM FISH FARMING SYSTEM

Paddy is cultivated on the lower slope of the farm. The waste water of the pond, poultry unit and duckery unit flows downward. The farm landscape is sloping in nature and paddy is cultivated on the lower slope. It is surrounded by other horticulture crops. Nutrient rich water from the upper slope provide fertilized water and therefore no inorganic fertilizer is required separately.



Fig. Paddy cum fish culture



Fig: Horticulture cum fish farming at the farm

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Economically, his farm generates steady income through multiple sources. He produces approximately 300 kg of fish annually, which he sells at ₹300 per kg in local markets. He also sells common carp seeds at ₹30 per piece, earning additional income. Paddy cultivation contributes significantly, with around 250 tins of local paddy sold annually at ₹250 per tin. Moreover, horticultural activities yield at least ₹50,000 annually through the sale of fruits and vegetables. Altogether, his total annual income is around 2.2 Lakhs (approx.).



Fig: Interaction with Senior FI & Shri Seyie and field visit at the farm

Shri Khrietuo Seyie's case demonstrates how integrated farming systems when supported by timely government interventions and farmer innovation, can result in sustainable livelihoods, nutritional security and enhanced rural incomes.

ECONOMIC PROFILE OF SHRI KHRIETUO SEYIE'S FARM

Component	Details	Annual Income (₹)
Fish Sale	300 kg @ ₹300/kg	90,000
Fish Seed Sale	450 pcs @ ₹35 each	15,750
Paddy Sale	250 tins @ ₹250/tin	62,500
Horticulture Crops	Sale of fruits and vegetables	50,000
Total Annual Income		2.1 – 2.2 Lakhs (approx.)

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In recognition of his innovative approach, Shri Seyie was awarded the Best Fish Farmer Award of Kohima district on National Fish Farmers Day, 2020. His farm not only ensures year-round income but also provides food and nutritional security for his household. His success has inspired neighboring farmers to adopt similar integrated farming models, highlighting the effectiveness of combining fisheries with agriculture and livestock.