

Women nurtured transformative aquaculture in rural Bengal

Urna Banerjee¹ and Pratap Mukhopadhyay²

1. Formerly of fisheries science, Alagappa University, Alagappa University; 2. Retired Principal Scientist, ICAR-CIFA, Bhubaneswar – 751002, India. (www.cifa.in). Email: urnabanerjee1234@gmail.com



Women engaged in ornamental fish rearing.

In traditional agriculture, women have long been involved from sowing seeds to harvesting crops. However, rural aquaculture has historically been male dominated. Changes in rural environments, with men migrating to cities for better opportunities, have led spirited rural women, mostly housewives, to step up. Despite the challenges, they've acquired vocational skills through training in aquaculture, supported by farmer agencies.

Fortunately, Krishi Vigyan Kendras (KVKs) and local R&D institutions like ICAR have collaborated with these women. They've provided hands-on training in ecological aquaculture, focusing on resources like *Azolla*, lotus, ipomoea, lily, and

makhana. Seasonal leafy vegetable farming on pond dykes, sometimes integrated with duck farming, has also been introduced to make them self-reliant. This collaborative effort empowers women to engage in agro-ecological farming, utilising local inputs like green manure and neem-based phytoremediation products. They've tapped into the traditional knowledge of elderly farmer-scientists in the villages.

This cooperative approach has allowed them to systematise production processes at a reasonably low cost, overcoming various challenges and reviving local production. Their commitment and capability are evident in their contributions to family earnings without neglecting routine household activi-



Hatchery net preparation by rural women.

ties. Organisations like the National Fisheries Development Board (NFDB), State Directorate of Fisheries, and NGOs have stepped in to support fish seed production, providing benefits like doorstep input availability, fry to fingerling stage rearing, and farm-made pelleted fish feed preparations. This includes using local agro-based residues such as oil seed cakes, rice polish, and corn dust. They've also embraced farm tools and implemented management to assess water and soil indices to maintaining ambient water quality in culture ponds.

Women team leaders, dedicated to serving fellow rural women, form self-help groups with the cooperation of local panchayats. They have access to unconventional water resources like canals, swampy ponds, village ditches, and wetlands, which were previously unutilised. Equipped with training, sincerity, and exposure to successful farms and hatcheries, these women have developed expertise in various aspects of aquaculture including breeding, pond preparation, feed formulation and storage. They use mobile communication tools, such as Android handsets, to stay connected and continue strengthening the fish production system.

Their strengths shine through their passion and commitment, as reflected in their continuous engagement with local fisheries and aquaculture institutions, Krishi Vigyan Kendras, and various aquaculture-related capacity-building centers. This harnessing of potential is a step towards realising the vision of an 'Atmanirbhar Bharat' and bringing positive changes to the quality of life in rural areas, including Gangasagar block

in Sundarbans, coastal villages of Tamluk in Purba Medinipur, and Kaliaganj block in Uttar Dinajpur district in the north Bengal region.

Significant role of women in diverse domains of aquaculture

The significant roles played by women in diverse domains of aquaculture are strikingly noticeable. The proverb, 'The belly rules our mind,' has been a universal truth for centuries. In ancient times, when wild resources were the primary source of food, providing a regular supply of 'biological fuel' to empty bellies was crucial for sustaining life. As humanity evolved into the modern era with a new definition of food, exploration of various food sources became paramount.

Agriculture, primarily involving the rearing and growing of staple crops and vegetables in green fields, was a conventional approach confined to terrestrial farming. However, with technological advancements and a rapidly increasing population, the concept of scientific rearing of crops under water, specifically aquatic life, gained prominence. This innovative idea presented a lucrative opportunity for middle-class individuals, offering employment and income prospects.



Rural women clearing off the unwanted plant cover for healthy fish culture.

The agricultural system, whether on land or water, heavily relies on human intervention, playing a pivotal role in numerous aspects. Unfortunately, socio-economic backgrounds and cultural orthodoxy have contributed to a significant rise in male participation in agriculture, often overlooking women categorised under the "Below Poverty Level" (BPL). Recent shifts in this scenario, driven partly by male migration from rural areas to enhance their standard of living, have led to a noteworthy increase in women's participation in aquaculture.

This paradigm shift owes its success to the active engagement of women in various aspects of aquaculture, including fish rearing, hatchery management, ornamental fish nurturing, and fish processing. Despite limited educational qualifications, as evidenced by degrees from colleges or universities, women have strengthened their roles through intensive scientific and technical hands-on training. This positive development is evident in the aquaculture landscape in India, showcasing the resilience and capability of women in this field.

Role of women in fish culture

Women play a crucial role in fish culture, an integral aspect of aquaculture. The process begins with the release of fish into ponds or designated culture sites, followed by the meticulous

scientific care of the fish, culminating in the harvest of matured fish for household consumption or national and international marketing.

In rural settings, the predominant focus is often on either consuming the fish within households or selling it in the local market. The activity of releasing fish into ponds holds paramount importance and significantly influences the overall success of aquaculture. In many areas, women have taken on the responsibility of this critical task, challenging traditional social structures and cultural norms.

During the harvest, women continue to contribute by assisting their male counterparts, enhancing the efficiency of fish harvesting to its maximum potential. Additionally, there are situations where fish need to be harvested by dragging them with fine nets, and then the collected fish are concentrated in net bags. In these cases, women actively participate in these activities, exemplified by recent images captured in urban settings. This shift in gender roles within aquaculture highlights the evolving dynamics and contributions of women in various aspects of the industry.

Role of women in hatchery management

Women play a crucial role in hatchery management as aquaculture embraces modernisation and applied research in the life sciences. Traditional ponds, which have been

the age-old sites for fish culture, are gradually giving way to a new concept—culturing fish in more confined areas to produce healthier fish seed under controlled conditions, mimicking natural ecosystems.

Hatcheries have emerged to address the challenge of obtaining robust and healthy fish seed, a key factor in the success of aquaculture. Hapa hatcheries, known for their easy installation and management, have seen increased involvement of women, particularly in the preparation of nets resembling inverted mosquito nets.

The aquaculture industry in India heavily relies on carp farming, with carp seed being a critical component for rural farmers sustaining their livelihoods. Chinese carp hatcheries have become significant players in addressing the timely and adequate supply of carp seed. A vital element in these hatcheries is the spawning chamber, featuring a double-walled structure where eggs hatch, and fingerlings are collected in the inner chamber, protected by a fine mesh. In the preparation of these nets, women from various communities have stepped forward, showcasing their efficiency in contributing to the success of aquaculture.

Role of women in nutrition

Women play a vital role in fish nutrition and feeding, contributing significantly to the effective growth and survival of fish. The discussion highlights the importance of factors such as biological tuning, particle characteristics, color, and odor in fish feed. Women take the lead in feed formulation, and for procurement of natural fish feed items like such as phytoplankton and zooplankton.

Extensive training, encompassing theoretical knowledge and hands-on experience, has positioned women as experts in various aspects of aquaculture, including choosing feed ingredients, mixing them with additives, and shaping them into noodles using hand pelletisers. Beyond feeding, women actively engage in other critical aspects of aquaculture, such as providing proper nutrients for soil activity, releasing natural feed for fishes, checking the efficiency of aqua instruments, and conducting periodic water quality assessments to prevent deterioration using tools such as pH meters, salinometers and the Winkler method.

Women also contribute significantly to the preparation of biofertilisers or home-based fertilisers, strategically placing them in ponds either directly or by assisting their male counterparts. In addressing the high cost of fish feed, women play a crucial role in the home-based preparation of feeds, adapting simple steps with minimal economic and labor costs. *Azolla*, a small floating aquatic fern of the taxonomic family 'Salvinaceae,' holds significance as a common and valuable feed ingredient for fish feeds due to its high nutritional content.

Cultivating *Azolla* involves utilising small ponds or traditional unutilised ponds, clearing undesired weeds, and using ditches or pits excavated in backyards. Women actively engage in managing these organic feed ingredients, conducting daily routine monitoring of the cultured mass, and making nutrient medium additions when needed. Their contribution is enhanced through participation in vocational skills training programs conducted widely in their native areas.



Feed check-tray management by rural women.

Role of women in fish processing technology

In the domain of fish processing technology (FPT), women play a crucial role, particularly in the post-harvest section. They are actively involved in preserving harvested fishes by allowing them to dry under the sun. This simple yet effective technique is a common practice among many rural women in coastal areas of India, such as Digha Mandarmani beach areas. Harvested fishes are often laid out over horizontally placed bamboo poles in lines for sun drying. The provided picture associated with this aspect in the article helps provide a clear idea. Additionally, in the ornamental sector, including ornamental fish rearing, cage culture of fishes, and the management of feeding trays, women actively contribute to a considerable extent.

Looking towards the long-term sustainability and future expansion of aquaculture, there is a need to focus on developing farming systems that enhance overall efficiency in natural resource use and rely on primary renewable resources. This approach holds both economic and ecological viability, establishing the genuine 'magical effects' of women's participation in aquaculture. It is crucial to utilise available water bodies under all panchayets/talukas for the production of edible aquatic organic food sources. Introducing social aquaculture, akin to social forestry, with a local women participatory approach wherever possible, utilising small indigenous fish species, can serve a dual purpose. This includes the conservation of species, some of which are becoming endangered, and the production of an inexpensive yet high-quality edible animal product for better human health.