



A Review on Production and Marketing of Fish Farming in Haryana

Dr. JASPREET DAHIYA

Professor, Department of Management and Commerce
Baba Mastnath University, Rohtak

PRIYANKA

Research Scholar, Department of Management and Commerce
Baba Mastnath University, Rohtak

ABSTRACT

This article provides an extensive analysis of fish farming production and commercialization in Haryana. In recent years, aquaculture in Haryana has experienced substantial expansion, with village and privately-owned ponds enhancing fish productivity. The state holds the second position nationally for fish output per hectare, achieving an average yield of 7,000 kg per hectare¹. Notwithstanding this achievement, obstacles in marketing infrastructure and post-harvest facilities endure, resulting in increased expenses for fish farmers who frequently must transport their products to adjacent states and markets. The analysis examines multiple facets of aquaculture, encompassing the species of fish raised, cultivation methods, and the economic repercussions on residents. It also analyzes the marketing channels employed by fish farmers, the efficacy of these channels, and the obstacles encountered in the production and marketing processes². The document emphasizes the necessity of enhancing post-harvest infrastructure and creating more fish markets inside the state to guarantee that fish farmers obtain profitable pricing for their products. This review seeks to elucidate the status of fish farming in Haryana by examining existing literature, case studies, and empirical data, while also proposing enhancements for production and marketing techniques. This study's findings can be a significant resource for policymakers, aqua culturists, and stakeholders in the fisheries industry, aiding in the sustainable growth of fish farming in the region.

Keywords: Fish Farming, Production, Marketing, Haryana, Post-Harvest Infrastructure, Economic Impact, Fisheries Sector.

1. INTRODUCTION

Fish farming in Haryana has experienced considerable expansion in recent years, with the state government vigorously endorsing aquaculture as a viable revenue source for farmers. The advantageous climate and accessibility of water resources have rendered Haryana an optimal site for aquaculture. Moreover, technological developments and improved farming procedures have enhanced the productivity and profitability of aquaculture in the state. Due to the rising demand for fish products, aquaculture in Haryana is anticipated to prosper in the forthcoming years. Additionally, the government has offered subsidies and financial support to incentivize more farmers to engage in fish farming as a supplementary revenue source. This has resulted in the creation of multiple fish farms throughout the state, generating employment possibilities for many citizens. With enough training and assistance from governmental bodies, farmers in

¹ [Fish Marketing | Fisheries Department, Haryana.](#)

² <https://krishikosh.egranth.ac.in/items/36e65ec0-56cf-4296-80c8-d4207f28db2e/full>

Haryana may implement optimal practices in aquaculture and guarantee the sustainability of their enterprises. As consumer preferences transition towards healthier protein alternatives, the demand for fish products is anticipated to increase, hence propelling the expansion of the fish farming sector in Haryana.

The primary purpose of commercial fish breeding is to produce sustenance, which is conducted in fish tanks or other man-made enclosures such as fishponds. It is a specific form of aquaculture that involves the controlled cultivation and harvesting of aquatic animals, such as fish, crustaceans, and mollusks, in either a natural or artificial environment. A fish hatchery is typically a facility that releases young fish into the wild for recreational angling or to increase the population of a species. Carp, catfish, salmon, and tilapia comprise the top four fish species that are cultivated in fish farms worldwide. Globally, there is an increasing demand for dietary fish protein, which has led to the pervasive exploitation of wild fisheries, a substantial decline in fish stocks, and in certain regions, the complete depletion of fish resources. Fish farming enables the establishment of artificial fish colonies that are well-nourished, protected from natural predators and threats from rival fisheries, accessible to veterinary care, easier to harvest when necessary and typically unaffected by the sustainable yields of wild fish populations due to their separation from them. China is responsible for the production of 62% of the world's farmed fish, even though fish farming is a global practice. Aquaculture was responsible for the production of over 50% of all seafood as of 2016. Aquaculture has been a significant contributor to the expansion of fisheries and aquaculture production over the past three decades, with an average annual growth rate of 5.3 percent from 2000 to 2018 and a record-breaking 82.1 million tonnes in 2018.

Fish are housed and safeguarded in fish enclosures in lakes, bayous, ponds, rivers, and oceans until they can be collected. The method is also known as "offshore farming" when the enclosures are submerged in the water. A diverse array of materials may be employed to construct them. They are artificially fed and confined in cages until they reach market size, at which point they are harvested. Fish aquaculture can coexist with recreational fishing and other water uses in a diverse array of waterways, such as lakes, rivers, and filled quarries. A diverse array of fish can be bred and confined fish can be raised. It is also becoming increasingly popular to farm fish in enclosures in open waters. Pond systems are frequently perceived as simpler to establish and manage due to concerns regarding disease, poaching, and poor water quality. Concerns have also been expressed regarding the culture of non-native fish species in dam or open-water enclosures because of cage failures that have resulted in escapes in the past. A commercial fishery in Washington State's Puget Sound experienced a severe cage failure on August 22, 2017, resulting in the release of approximately 300,000 Atlantic salmon into non-native waters.

This is believed to be a hazard to the Pacific salmon species that inhabit the area. Marine Scotland has been monitoring the escape of fish from enclosures since 1999. 3,795,206 fish have fled into fresh and salt water, as indicated by 357 fish escape incidents that were reported. One enterprise, Dawn Fresh Farming Limited, was responsible for 40 distinct incidents in which 152,790 Rainbow Trout escaped into freshwater lochs. There is still a concern regarding the potential for storm-related damage and escape in the cage industry, despite the significant technological advancements that have been made in recent years.

2. TYPES OF FISH FARMING

A. Catfish Farming

In milder climates, catfish are straightforward to cultivate. Catfish are primarily raised in freshwater ponds and are fed soybeans, maize, and rice. Catfish are frequently regarded as one of the more sustainable fish species for the purpose of fish aquaculture. The cultivation of catfish was initiated in the 1900s and was commercialized in the 1950s. Catfish is a popular species due to its health benefits and market demand. Farm-raised catfish are typically harvested at 18 months of age, while untamed catfish typically grow to a significantly larger size. There are numerous catfish species, but the three most notable ones are the blue catfish, channel catfish, and flathead catfish.

B. Tilapia Farming

Tilapia is the third most frequently used fish in fish farming or aquaculture, following carp and salmon. They have gained popularity as a result of their high protein content, vast size, and growth potential. Tilapia is a tropical fish that necessitates warmer water to survive. Typically, the optimal water temperature falls within the range of 28 to 30 degrees Celsius. This is a challenge for the management of tilapia fish species

for agricultural purposes, as they are known to reproduce swiftly. Fish will aggressively contend for food if they are not managed properly, which may lead to stunted growth. Consequently, males are utilized almost exclusively. Tilapias are capable of resisting parasites and maladies. Tilapia fish farming is a prevalent practice in the Philippines, Indonesia, Honduras, and Papua New Guinea, and it has its roots in Africa. Tilapia fish are classified as one of the most invasive fish species, despite the fact that they do not consume other fish and require a cereal-based diet.

C. Salmon Farming

Atlantic salmon is the most frequently cultivated of the popular fish species, salmon. Chinook and Coho are two additional Pacific salmon species that are also cultivated. Farmed salmon are vaccinated to prevent disease outbreaks, and they only necessitate additional medications on rare occasions. The distinctions between natural and farmed salmon are frequently the subject of inquiry. It is important to note that farmed salmon are not dyed; rather, their color is derived from their diet. Salmon feed is manufactured to preserve wild salmon populations.

D. Tuna Farming

Tunas are saltwater fish that are crucial to the commercial fish aquaculture industry. Japan is the world's largest tuna consumer and has allocated a substantial quantity of research resources to the study of the fish. Bluefin, yellowfin, and albacore are among the various tuna species. Overfishing has resulted in a substantial decline in the populations of blue fin tuna in certain regions. Tuna farming is a complex process due to the fish's high activity and "massive" size, which makes it exceedingly challenging to replicate their natural environment. Most of the tuna intended for human sustenance are captured in the wild and subsequently bred in a facility to enhance their weight. Tuna are carnivorous and consume other fish. Tuna is typically raised in net cages offshore and, in certain instances, in recirculation systems (Dash, 2009).

E. Eel Farming

Eel fish aquaculture was introduced in the early 1950s and is now regarded as one of the most profitable sectors of the fishing industry in terms of export value. Nevertheless, the profit value is primarily determined by the Asian markets and is culturally specific. Eels are catadromous and carnivorous fish, which means that they reside in freshwater during their juvenile years. However, they migrate to the sea to reproduce, spending anywhere from 8 to 30 years in freshwater prior to their migration. Asia is the region where the majority of eel aquaculture occurs, with China, Japan, and Taiwan being the world's largest producers. Glass eels are preferred over elvers due to their ease of transport and ability to be weaned onto artificial diets. Eel aquaculture can be conducted in either high-intensity recirculating tanks (indoors) or intensive pond facilities.

F. Aqua Farming

Aquaculture, also referred to as "aqua farming," is the cultivation of aquatic organisms, including fish. Aqua aquaculture involves some degree of intervention in the natural growth process to increase production. According to the United Nations' Food and Agriculture Organization, aquaculture has expanded at a rate that is three times greater than that of land-based animal agriculture.

3. ISSUES IN FISH FARMING

A. Feeding

Feeds have been a contentious issue in the context of fish aquaculture. Tilapia, carp, catfish, and numerous other cultured fish can be maintained on a diet that is exclusively herbivorous. Conversely, top-level carnivores (particularly those of the Salmonidae family) rely on fish nutrition, with a significant proportion of it sourced from wild-caught fish (e.g., anchovies, menhaden). In the diets of carnivorous fish, vegetable-derived proteins have effectively supplanted fish meal in the feed. However, vegetable-derived oils have not been successfully integrated into the diets of carnivores. Research is currently being conducted to address this issue, with the goal of ensuring that vegetable products can be successfully fed to salmon and other

carnivores. According to a report published by Wired in February 2017, the F3 Challenge (Fish-Free Feed Challenge) is a competition to sell 100,000 metric tons of fish meal without the fish. This month, start-ups from Pakistan, China, and Belgium demonstrated feed produced from seaweed extracts, yeast, and algae cultivated in bioreactors at the Google headquarters in Mountain View, California, in addition to their American competitors. The diets for carnivorous fish, such as specific salmon species, are not only controversial due to the inclusion of wild-caught fish, such as anchovies, but they are also detrimental to the fish's health, as is the case in Norway. Aldrin et al. investigated three infectious diseases in Norwegian salmon fish farms from 2003 to 2007: pancreas disease, infectious salmon anemia, and heart and skeletal muscle inflammation.

B. Stocking Density

Secondly, farmed fish are maintained in concentrations that have never been observed in the wild, such as 50,000 fish in a 2-acre (8,100 m²) area. Nevertheless, fish are also known to form large congregations at a high density. Schooling species are the most successful aquaculture species, as they do not exhibit social issues at large densities. Aqua culturists believe that operating a rearing system beyond its design capacity or beyond the social density limit of the fish will result in a decreased growth rate and an increased feed conversion ratio (kg dry feed/kg of fish produced). This, in turn, leads to an increase in costs and a higher risk of health issues, as well as a decrease in business profits. The concept of and measurement of stress must be viewed from the perspective of the animal using the scientific method, but it is not desirable to stress the animals.

C. Parasites and Disease

Infestations of both farm-grown and wild salmon can be fatal due to sea lice, particularly *Lepeophtheirus salmonis* and various *Caligus* species, including *C. clemensi* and *C. rogercresseyi*. Open-net salmon farms with a high population density can generate exceptionally high concentrations of sea lice. As a result, numerous juvenile wild salmon are infected and die when they are exposed to river estuaries with a high concentration of open-net farms. Adult salmon may endure sea lice infestations that would otherwise be fatal; however, adolescent salmon that are small and have thin skins and are migrating to the sea are exceptionally susceptible. In certain regions of the Pacific coast of Canada, the mortality rate of pink salmon due to louse infestations is frequently greater than 80%. Between 2016 and 2019, over nine million fish were lost in Scotland due to disease, parasites, bungled treatment attempts, and other issues on fish farms, according to official figures. One of the remedies for parasite infestations involved immersing fish in hydrogen peroxide. However, this treatment can be detrimental or fatal to farmed fish if the chemical concentration is excessive or the fish are unwell.

4. MARKETING OF FISH FARMING IN HARYANA

Commonly farmed fish in Haryana include Rohu, Catla, and Mrigal. Methods such as cage culture and pond culture are frequently employed for fish breeding and rearing in the area. It is essential for aqua culturists to uphold optimal water quality and temperature in their facilities to guarantee the health and growth of their fish. Efficient marketing techniques can enhance the sustainability and prosperity of fish farming in Haryana, thereby benefiting both the sector and the local population. Through the implementation of methods including branding, promotion, and collaborations with local marketplaces, fish farmers in Haryana can enhance awareness and demand for their products. This may result in increased profitability and a steadier income for farmers, along with an enhancement of the local economy. By emphasizing the quality of their fish and enhancing their marketing strategies, fish farmers in Haryana may position themselves as dependable providers of premium seafood in the region. The success of fish farming in Haryana will help the industry and community while enhancing food security and economic development in the region.

By emphasizing sustainable methods and creative technology, fish farmers in Haryana may elevate the reputation of their products and broaden their consumer base. Through the use of effective agricultural practices and technological investments, farmers can enhance both the quality and quantity of their yield, thereby augmenting their market competitiveness. Moreover, partnering with local authorities and groups can facilitate farmers' access to resources and support for the advancement of their enterprises. Collaborating towards shared objectives will enable the fish farming sector in Haryana to prosper and substantially influence the region's economy and food security. Fish farmers in Haryana can establish cooperatives to

jointly acquire high-quality fish feed and equipment at reduced costs, so enhancing their overall production and profitability. Moreover, by engaging in training programs and workshops facilitated by government entities and NGOs, farmers can remain informed about the newest trends and innovations in the sector, so assuring sustainable growth and success. Moreover, cooperation among fish farmers can facilitate the exchange of best practices and expertise, hence enhancing the quality of fish farming in Haryana. Through the aggregation of resources and skills, farmers may collaboratively tackle obstacles like disease management and market access, thereby enhancing their resilience and competitiveness within the sector. By collaborating and providing mutual support, fish farmers in Haryana may establish a prosperous and sustainable enterprise that enhances both their livelihoods and the local economy. This collaborative strategy can facilitate cooperative marketing initiatives, enabling farmers to access broader markets and secure improved prices for their crops. Collaborating to enhance the quality and sustainability of their fish products enables farmers to acquire a larger consumer base and establish a robust market reputation. This may result in heightened demand for Haryana's fish products, hence enhancing the industry's growth and profitability. Furthermore, collaboration may encompass research and development, wherein farmers jointly invest in innovative technology and techniques to enhance production efficiency and environmental sustainability. Through these collaborative endeavors, fish farmers in Haryana can establish themselves as industry leaders, fostering enduring success and prosperity for all stakeholders involved. For instance, by establishing a cooperative, fish farmers in Haryana can consolidate their resources to collectively promote their products to larger shops and wholesalers. This can assist companies in obtaining superior rates for their products and drawing more customers in search of high-quality, locally sourced fish. Moreover, via collaborative research and development efforts, farmers can implement innovative techniques like sustainable aquaculture operations or sophisticated feed formulations to enhance productivity and mitigate environmental effects.

A. Target Market for Fish Products in Haryana

It could also be augmented by focusing on consumer demographics, such as health-conscious folks, who are progressively seeking fresh and organic food alternatives. By emphasizing the health advantages of consuming locally sourced fish, the cooperative may distinguish its products in the marketplace and cultivate a dedicated consumer base. Additionally, by providing value-added products like ready-to-cook fish fillets or marinated seafood, businesses may address the needs of convenience-oriented consumers and enhance their sales potential. By comprehending and adeptly addressing the many demands and preferences of the market, the cooperative can optimize its profitability and sustainability throughout time.

Furthermore, the cooperative may pursue collaborations with local restaurants and grocery stores to enhance their distribution channels and broaden their audience reach. Collaborating with local businesses enhances brand visibility and fosters a mutually beneficial support network. This comprehensive marketing and distribution approach will enhance sales development and solidify the cooperative's status as a reliable supplier of premium seafood products. By remaining innovative and adaptable in its business methods, the cooperative can persist in flourishing within a competitive market landscape. By adopting technology and utilizing online sales platforms, the cooperative can expand its reach and serve a broader client base. Moreover, by emphasizing sustainable methods and showcasing their dedication to environmental conservation, they can appeal to eco-conscious consumers and distinguish themselves from competition. By constantly fulfilling their commitments to quality and reliability, the cooperative may cultivate a loyal client base and establish itself as a market leader in the seafood sector.

B. Importance of Production and Marketing in Industry

Fish farming in Haryana has shown consistent growth, with the state government introducing numerous initiatives to incentivize farmers to engage in the industry. The cultivation and promotion of fish are essential for the economy, generating employment and enhancing regional food security. With the increasing customer demand for fish, the industry's performance is contingent upon efficient production techniques and successful marketing tactics to satisfy market requirements. The government is enhancing fish farming infrastructure in Haryana by building fish markets and supporting sophisticated technology in aquaculture. This has enhanced the total production and quality of fish produced in the state. The fish farming sector in Haryana is positioned for enhanced growth and success in the forthcoming years by concentrating on both production and marketing elements. A fish farming enterprise in Haryana has adopted automated feeding systems and water quality monitoring technology to enhance production and safeguard

fish health. They have employed social media platforms to market their products and expand their client reach, leading to heightened sales and brand recognition. These initiatives have enabled the company to broaden its activities and position itself as a prominent competitor in the local market.

5. REVIEW OF LITERATURE

Amin, Gosh, 2024, “An Analysis of Fish Farming Profitability and Marketing Efficiency of Selected Fish Species in Bangladesh”

Researcher examined that aiding developing nations like Bangladesh in their pursuit of food security required careful analysis of marketing costs and margins as well as farmer profitability. Therefore, this study delved into the profitability and marketing intricacies of four prominent fish species in Bangladesh's aquaculture sector namely rohu, catla, Nile tilapia, and pangas. Through extensive face-to-face surveys involved 200 fish farmers and 212 market actors in aquaculture-rich districts, the research uncovered valuable insights. The findings unveiled varying profitability, with catla fish emerging as the most lucrative, boasting a substantial benefit cost ratio (BCR) of 2.77, while Nile Tilapia trailed with a BCR of 1.08. The highest expense was incurred for feed, followed by fingerlings. The study highlighted the existence of multiple routes for transferring fish from producers to consumers, notably direct sales to middlemen and the active involvement of intermediaries like wholesalers, and facilitators. Farmers sold 41% of their fish directly to middlemen. With facilitators' commission standing out as the most important cost component, wholesalers bore an excessive portion of the marketing expenses.

Yadav, Sharma, 2023 “Marketing Strategies of Fish and Fishery Products in India: An Empirical Study of Market Intermediaries”

Researchers studied the cutting-edge marketing strategies employed in the fisheries sector and derived lessons from their accomplishments for expansion and duplication in comparable socio-political-economic situations across the country. To help understand fish markets, self-help organizations (SHGs), producer organizations, fisheries development firms, fisherman organizations, and private organizations had all taken part. Fish marketing was getting fish or fish derivatives from the producer to the consumer. Marketing frequently aimed to close the gap in revenue between regions with a fish scarcity and those with an abundance. Some characteristics and elements related to the branding of fish products necessitate using specialist skills. The popularity and availability of fish goods in the marketplace and other industries were characterized by the food spoilage of fish products and unsatisfactory and subpar processing plants. However, instead, poor quality prepared foods, among others, could indeed be lessened by paying consideration to the essential advertising and factors that influence buying and selling.

Reshma, 2023 “Fish Production and Marketing in India”

Researcher presented that fish production and marketing in India was vital sector that played a significant role in the country's economy and food security. With a vast coastline and numerous inland water bodies, India had immense potential for fish production. The sector provided employment opportunities for millions of people, particularly in coastal and rural areas. However, the sector was undergoing a transformation, with increased adoption of modern technologies and practices to improve productivity and quality. The government had also launched various schemes and initiatives to support the sector. The marketing of fish in India was primarily conducted through traditional fish market, retail shops, and online platforms. With the growth of the e-commerce industry in India, many fish producer and retailers had started using digital platforms to reach a wider audience. However, there was still a need for further investments in technology, infrastructure, and research to enhance the sector's efficiency and profitability.

Suresh, Kumar Panda and Chandrasekar, 2023, “Export of fishery products from India: status, challenges and the way forward”

Researcher presented that India's top source of steady foreign exchange earnings had been marine products. This report outlined the future direction and evaluated the current state and trend of India's export of marine products. Enacting supportive policies were all necessary to increase exports without compromising local nutritional security.

Pathak, Thapa, 2023, "Fish Farming and Marketing System in Bara District, Nepal"

Researchers examined that fish produced in Bara was marketed to distant markets along with the local market. However, the marketing system, actors in the fish market and their benefits were studied. Thus, the present study was carried out to understand and analyze the marketing system of fish produced in Bara district. The study was done by survey using questionnaire. A total of 76 farmers along with 30 traders were selected randomly for the survey. In present study area, mainly males (98.7%) were involved in fish farming with little involvement of females as entrepreneur. The major culture system followed was carp polyculture with some changes to produce huge volume of fish. This fish included the production and marketing of advanced fingerlings (30-50 g size) of Rohu and Mrigal. Different actors in the fish marketing channel included farmers, wholesalers, and retailers. Altogether four different types of marketing channel were found in the present study. Chhadi fish produced in study area was mainly exported to larger markets like Kathmandu, Pokhara, and Chitwan while local market was dominated by silver carp due to its comparatively lower price. Price of fish at different stages of market depends on size as well as fish species. The general trend was that the higher the price of it fell on the market. Wholesalers made a profit of around 4-8% while retailers made about 9-16% profit. According to this system, farmers provided 30% more fish as compensation to traders as fish are weighed live.

Reshma, Kalluraya, 2023, "Fish Production and Marketing in India"

Researcher examined that India's fish industry was an important one that contributes significantly to both the nation's economy and food security. India had a huge amount of potential for fish production because of its extensive coastline and multitude of inland water bodies. Millions of people, especially in rural and coastal areas, might find work in this industry. To raise efficiency and quality, industry was changing, though, as more contemporary methods and technology were being adopted. In India, retail stores, internet platforms, and traditional fish markets were the main channels used for fish marketing. Many fish producers and retailers had started using digital channels to reach a wider audience because of the expansion of the e-commerce sector in India. To increase the sector's productivity and profitability, more spending on infrastructure, technology, and research was still required.

Vishwanathan, Yadav, 2023, "Marketing Strategies of Fish and Fishery Products in India: An Empirical Study of Market Intermediaries"

Researchers studied the marketing strategies employed in the fisheries sector and to derive lessons from their accomplishments for expansion and duplication in comparable socio-political-economic situations across the country. To help understand fish markets, self-help organizations (SHGs), producer organizations, fisheries development firms, fisherman organizations, and private organizations had all taken part. Fish marketing was getting fish or fish derivatives from the producer to the consumer. Marketing frequently tried to close the gap in revenue between regions with a fish scarcity and those with abundance. Some characteristics and elements related to the branding of fish products necessitate using specialist skills. The popularity and availability of fish goods in the marketplace and other industries were characterized by the food spoilage of fish products and unsatisfactory and subpar processing plants. However, instead, poor quality prepared foods, among others, could indeed be lessened by paying consideration to the essential advertising and factors that influenced buying and selling.

Lee, Liu, Huang, Chang, 2023, "Can Direct Marketing Increase Fishery Profitability and Environmental Quality? Empirical Evidence of Aquaculture Farm Households in Taiwan"

Research examined the adoption of wholesaler markets, individual wholesalers or shippers, and direct marketing among aquaculture farms. In addition, it quantified the effects of the use of different marketing channels on fishery revenues, profits, and production inputs. A sample of 25,180 aquaculture family farms in Taiwan was drawn from the fishery census survey. After estimating the simultaneous equation system model, it found that the use of multiple marketing channels generates the highest fishery revenues, which highlighted the importance of marketing channel diversity on selling fishery products. Moreover, it had found a positive effect of direct marketing on fishery revenues and profits. It also found that the use of direct marketing can reduce the use of groundwater in aquaculture production.

Hossain, Lipi, Pingki, Sarker, 2023, “Traditional Fish Farming Based on Indigenous Knowledge in Homestead Pond Can Uplift Socioeconomic Status of Coastal Rural People and Sustainability”

Researchers conducted with the following objectives: (i) to reveal the present status of traditional fish farming systems, (ii) to define the socioeconomic profile of the farmers, (iii) to identify the problems associated with traditional fish farming, and (iv) to show the inter-relationship between fish farming and socioeconomic development. For achieving these objectives, data were collected from 100 small-scale fish farmers from a rural coastal area of Bangladesh through a well-structured questionnaire, focus group discussion, and cross-check interviews. These findings showed that most of the homestead ponds were small-sized (44%) and shallow (61%) where a polyculture system was prevalent (91%). Most of the ponds (77%) were found to be perennial, 60% of which had single ownership. Socioeconomic data revealed that the highest number of farmers (42%) earned 1000.00 to 1500.00 USD annually, and 62% of the respondents took fish farming as their secondary occupation.

Uday Raj, Ashok, 2022 “Constraints of inland fish production and marketing in Northern Dry Zone of Karnataka: A Descriptive Study”

Researchers analyzed the constraints involved in production and marketing of inland fish in Vijayapura and Bagalkot districts of the Northern Dry Zone of Karnataka. The study was based on primary data and the simple random sampling procedure was adopted to choose inland fish farmers and marketing intermediaries. The major constraints faced by respondents in production and marketing of inland fish were high mortality of fish, non-availability of quality fish seed, inadequate financial assistance, high perishability of produce, huge competition, lack of proper storage facilities etc. Provision of need based training to the fish farmers could enhance the returns from fish farming as well as can encourage the farmers to invest further and providing scientific storage facilities to the marketing intermediaries helps to handle the produce in large quantity and leads to improvement in fish production.

6. SIGNIFICANCE OF STUDY

The domestic demand is met through fish aquaculture, and any surplus is sold in the market. Even though farmers in Manipur are engaged in commercial fish cultivation, it is not sufficient to satisfy the demand for fish in the state of Haryana. The government is trying to promote fish aquaculture in the state by implementing a variety of programs, including fishery extension, training, and research. Nevertheless, the production of fish in the state has not yet reached the desired level, despite the government's efforts. The current investigation illuminates the challenges and opportunities associated with fish aquaculture in Haryana. To enhance the productivity of fish farming in Manipur and enhance fish production, the most critical issues faced by fish farmers, including finance, marketing, and other infrastructural issues, are also examined. The current study discovers the diverse infrastructures and programs that fish producers have at their disposal, which can significantly increase their production. The proper analysis of the fish marketing channels will facilitate the timely availability of fish and fish products in the market, benefiting fish farmers through remunerative prices and the effective linking of farm gates to the market, thereby increasing marketing efficiency. Additionally, the investigation facilitates comprehension of the socioeconomic circumstances of fish producers.

7. CONCLUSION

This work underscores the substantial advancements and prospects of aquaculture in Haryana. The state has attained notable success in enhancing fish production via village and privately-owned ponds, securing the second position nationally for per hectare fish output. Notwithstanding these gains, the marketing infrastructure and post-harvest facilities continue to necessitate immediate repair. The report highlights the economic advantages of aquaculture, encompassing income production and enhancement of livelihoods for local communities. It underscores the necessity for effective marketing channels to enable fish producers to obtain profitable pricing and minimize the supplementary expenses related to shipping products to adjacent states. Mitigating the issues in post-harvest infrastructure and developing additional fish markets within the state are essential measures to assist fish farmers and promote the sustainability of the fisheries sector. By implementing optimal production practices and improving marketing strategies, Haryana can reinforce its status as a premier state in aquaculture. This review provides significant information for policymakers, fish

growers, and stakeholders in the fisheries sector. By cultivating a supportive atmosphere and tackling current obstacles, the state can further enhance its achievements and promote sustainable development in aquaculture.

REFERENCES

- [1] Md Ruhul Amin, Kamal Gosh, 2024, An Analysis of Fish Farming Profitability and Marketing Efficiency of Selected Fish Species in Bangladesh, *Journal of Fisheries and environment*, 102-115.
- [2] Mohit Yadav, Amit Sharma, 2023, Marketing Strategies of Fish and Fishery Products in India: An Empirical Study of Market Intermediaries, *Journal of Survey in Fisheries Sciences*, 1423-1431.
- [3] Reshma, 2023 Fish Production and Marketing in India, *EPRA International Journal of Economic Growth and Environmental*, 33-38.
- [4] A. Suresh, Satyen Kumar Panda and V. Chandrasekar, 2023, Export of fishery products from India: status, challenges and the way forward, *General Article*, 664-670.
- [5] Nabin Pathak, Bishal Thapa, 2023, Fish farming and marketing system in bara district, Nepal, *Food and agri economics Review*, 5-9.
- [6] Reshma, Dr. Shripathi Kalluraya, 2023, Fish Production and Marketing in India *EPRA International Journal of Economic Growth and Environmental Issues*, 33-38.
- [7] Niranchana Shri Vishwanathan, Mohit Yadav, 2023, Marketing Strategies of Fish and Fishery Products in India: An Empirical Study of Market Intermediaries, *Journal of survey in fisheries sciences*, 3273-3280.
- [8] Lee, T.-H.; Liu, S.-Y.; Huang, C.-L.; Chang, H.-H.; Wang, J.-H. (2023), Can Direct Marketing Increase Fishery Profitability and Environmental Quality? Empirical Evidence of Aquaculture Farm Households in Taiwan. *Agriculture*, 13, 1270. <https://doi.org/10.3390/agriculture13061270>.
- [9] Hossain, M.B.; Lipi, J.A.; Pingki, F.H.; Sarker, M.M.; Nur, A.-A.U.; Islam, M.M.; Albeshr, M.F.; Arai, T. (2023). Traditional Fish Farming Based on Indigenous Knowledge in Homestead Pond Can Uplift Socioeconomic Status of Coastal Rural People and Sustainability. *Sustainability*, 15, 13583. <https://doi.org/10.3390/su151813583>.
- [10] B. Mohan Uday Raj, Kalla Ashok, 2022 “Constraints of inland fish production and marketing in Northern Dry Zone of Karnataka: A descriptive study”, *Journal of Crop and Weed*, PP.267-271.
- [11] Ben-Chao Fu and Hao Liu, 2022, “What Do We Need to Do? The Sustainable Development of Chinese Marine Fisheries: A Legal Perspective”, *MDPI*, PP.1-20.
- [12] Yutong Li and Jianyue Ji, 2022, “Evaluation of Marine Fisheries Vulnerability in China and Its Spatial Effects: Evidence from Coastal Regions”, *MDPI*, PP.1-16.

