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S&T REVIEW

A COMPREHENSIVE REVIEW: CURRENT STATUS AND FUTURE PROSPECTS OF FISH PRODUCTION IN NEPAL

Govind Singh Yadav*

PG Scholar, Department of Agricultural Economics and Agribusiness Management, Faculty of Agriculture, Agriculture and Forestry University, Rampur, Chitwan

*Corresponding author email: ydvsingh22@gmail.com

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ABSTRACT

Nepal has abundant water resources creating significant opportunities for freshwater fish production. In Nepal, the primary source of income is covered through agriculture-based activities where about 2/3rd of the country's population depends. This review assesses the current status of fish production in Nepal, highlighting trends, challenges, and opportunities. According to recent data, it shows the fisheries sector contributed 0.44% to GDP and 1.83% to AGDP. Madhesh Province is at the top in both production and productivity with 44,170 mt. and 5,787 kg/ha. The total fish production in Bara district is highest with 11,675 mt. (7,202 kg/ha). Secondary information sources about fish and fish products were gathered from online and print sources like articles, journals, and official reports and were reviewed. The trend of fish production is increasing in Nepal. Mainly from India, China, and Bangladesh, Nepal imports more fish and fish products than imports. The analysis underlines the need for government intervention to support local production, increase productivity, and ensure the sustainability of the fishing industry. Most farmers practice carp polyculture, and the production area is distributed only in the Terai region. Recent indication in increasing the area of production in fisheries shows the country is moving toward self-sustainability in fish production.

KEYWORDS

Aquaculture, Fisheries, Production, fish farming

1. INTRODUCTION

Fish is a rich source of protein, essential amino acids, calcium, vitamin A, and vitamin B12. A cereals-based diet is not enough to meet the body's requirements, so including fish would be beneficial. Aquaculture not only supplies dietary essentials but also provides huge opportunities for employment and income improvement, especially in rural areas. In recent data, the total national fish production is 113,736 Mt of which 80% is contributed from aquaculture and 20% is contributed by capture fisheries (CFPCC, 2023). Aquaculture and capture fisheries have generated employment for 520,964 individuals (CFPCC, 2023). Out of total fish seed production/distribution, only 23.8% is contributed by the public sector, and the remaining 76.2% comes from the private sector (MOALD, 2023).

Asia made the biggest contribution to aquatic animal production with 70% and China is in first position both in Asia and in the world where China alone contributes 56.4% to total world fisheries production in the year 2021 (FAO, 2024). The rank of Nepal is quite lower in terms of production but the share of aquaculture in the national GDP cannot be ignored as 1.87% of the nation's agricultural GDP is contributed by aquaculture and fisheries (CFPCC, 2023). The contribution of aquaculture to the GDP has increased in the past few years and this also attracted farmers toward aquaculture (Ranjan, 2019). Ever since the health benefits of fish foods have been known to the general public, national and international demand for fishery products has risen in recent years. The increasing population and the inevitable need to solve the crisis of food hunger have confirmed that this trend is supposed to continue in upcoming decades as well (Garcia and Rosenberg, 2010). For effective operation of industries related to fish, quality and quantity improvement through different activities like technology incorporation, technical support, input management, and timely availability is crucial. Even though Nepal is rich in natural water resources, the freshwater bodies have not been utilized to their full potential. The fishery sector holds great potential for the nation's economic growth as well as a sector providing employment opportunities

but has a lot of challenges in the successful operation of fish farming. That makes it very important to identify problems dragging it back to bring desirable economic and technological advancement in the fish farming sector.

In Nepal, Indian Major Carps, and Chinese Carps are the major species cultivating in the aquaculture system and these carp species are stocked in the polyculture system while Tilapia (*Oreochromis niloticus*), catfish (*Siluriformes*) and common carps (*Cyprinus carpio*) have also been found to be stocked in polyculture system (Kunwar, 2020). 12 communities of ethnic groups in Nepal are involved in fisheries (Gurung, 2013). Nepal is in the lowest position in terms of per capita fish production in the world. The production should be increased three to four-fold to be comparable to our neighbors. Most of the domestic fish demand in Nepal is fulfilled by neighboring country India. Fish that are imported from India is cheaper than the fish from Nepal and live fish get higher prices in the market (Gurung, 2014).

Aquaculture is a high-potential agriculture sub-sector if it is done with proper information and technique this can bring great contribution to the national economy (Koirala et al., 2021). Nepal is a landlocked country, the fish production is mainly based on inland water resources due to which fish demand is unable to meet the country (Khanal et al., 2020). The study helps to find the current level of fish production in Nepal. local people who are interested in fish farming can benefit from this information. The poor farmers can participate in fish farming as if they see benefits in fish farming. The farmers will know where they invest and which fish species are successful in Nepal. The students interested in the research project will also be able to gain valuable information about the status and current status of fish production in Nepal.

2. MATERIALS AND METHODS

The review studies the status of fish production in Nepal and the relevant

information sources were collected from articles, journals, reports, etc., and were reviewed to collect the required information. Organizations like the Ministry of Agriculture Development (MOALD), Nepal Agricultural Research Council (NARC), and websites were visited to find related information. The reference manager's MS Word reference section was used for the proper citation and referencing of the articles and Microsoft Word and Excel were used while collecting, analyzing, and presenting the collected data.

3. RESULT AND DISCUSSION

3.1 Fish Production Trend in Nepal

Production report of different years in Nepal shows, there is increasing in the production of fish. The total fish production in the fiscal year 2014/15 was 41,481 mt. and this reached 77,320 mt. in fiscal year 2021/22 showing continuous growth as shown in the figure. The increasing production is also due to farmers getting attracted toward the fish farming business and more area under fish farming where in the fiscal year 2014/15 total of 14,154 ha were under fish farming and reached 22,380 ha in the fiscal year 2021/22 (MOALD, 2023). Fish productivity in different fiscal years as shown in Figure 1 shows that there is a continuous increase which is a result of the active support of different organizations, training, proper manure and fertilizer application, and effective management of feed and fish disease.

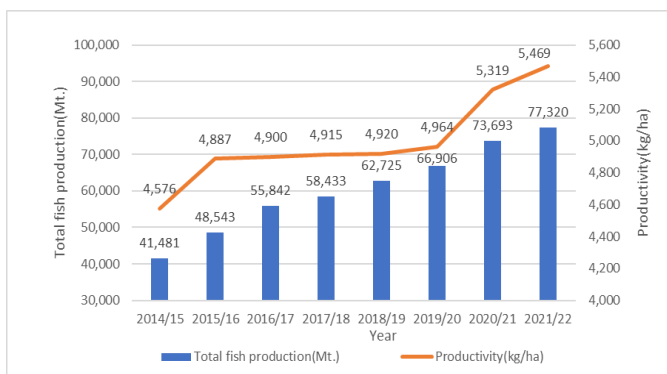


Figure 1: Fish Production and Productivity in Nepal (MOALD,2023)

3.2 Fish Production in Different Provinces

Madhesh Province is at the top in both production and productivity with 44,170 mt. and 5,787 kg/ha respectively where whereas Karnali Province has the lowest production and productivity with 67 mt. and 2,544 kg/ha respectively. The reason for the highest production in Madhesh Province is due to farming in a large water surface area of 7,632 ha. and low in Karnali province with 26 ha. only (MOALD, 2023).

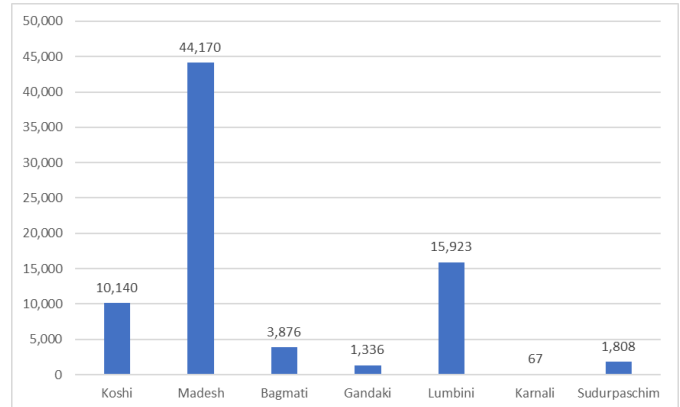


Figure 2: Fish production of the different provinces in fiscal year 2021/22 (MOALD,2023)

3.3 Top District with High Fish Production

Among all the 77 districts in Nepal, all are not actively involved in fish production as it is not possible due to different unfavorable conditions in different regions for fish growth and development. In the figure, the top 10 districts show the highest share in total fish production in Nepal and all districts are from the Terai region. This top 10 district covers about 74% of total fish production in Nepal in fiscal year 2022 (MOALD, 2023). The total fish production in Bara district is highest with 11,675 mt. (7,202 kg/ha.) followed by Rupandehi with 8,310 mt. (6,344 kg/ha.) and Dhanusha with 7,985 mt. (6,109 kg/ha.) in fiscal year 2021/2022 (MOALD, 2023). The main reason for these 10 districts with the highest fish production is due to the large area under fish farming.

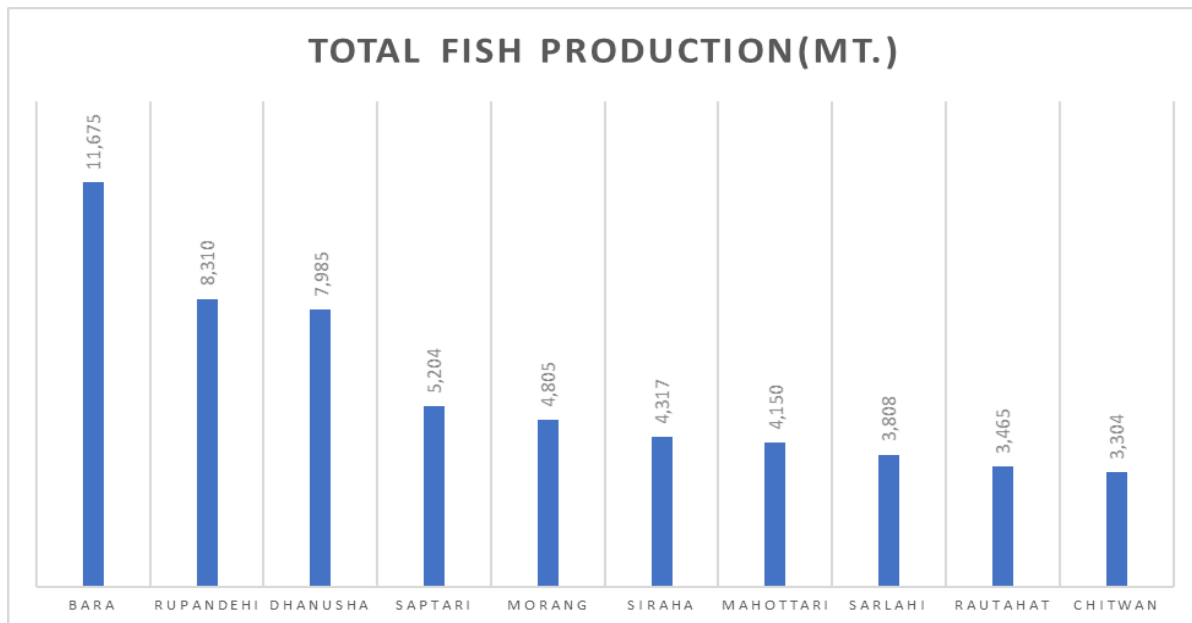


Figure 3: Top 10 districts with high production (MOALD,2023)

3.4 Import and Export Status of Fish and Fish Products

Import status-based species of fishes, Indigenous major carps are on top imported (51.6%) followed by Pangas (23.6%), different local species (13.0%), exotic carps (6.0%) and African catfish (5.8%) which was found by the survey conducted (Ranjan, 2019). the value of import of commodity fish and crustaceans, mollusks, and other aquatic invertebrates to Nepal totaled \$ 6.36 million in 2022 of which about \$ 6 million was from fish and fish products (TrendEconomy, 2024). In 2014 total export of \$ 48 thousand was found and in 2019 just \$ 8 thousand was exported which is

very low as compared to import data and in years 2021 negligible export was found (TrendEconomy, 2024). All this shows that domestic production is not enough to meet Nepal's domestic demand. The high import status may be due to a lack of public awareness of the importance of fish and fish products, lack of experts on fish production increment, open border with India, low price of Indian fish, and problems in the market system. Nepal is a rich country in the case of water bodies like rivers, lakes, and ponds which can be best utilized for higher production and minimizing import and promoting export potential.

3.5 Employment by Aquaculture and Capture Fisheries

Nepal is experiencing employment problems like other developing countries so a large number of people are moving toward foreign countries for a better future. To minimize this migration fishery sector be as best employment-providing sector. Aquaculture helps in the nation's economy by employing thousands of individuals in Nepal. Aquaculture and capture fisheries have provided employment opportunities to more than 58 million people in the world according to data provided by FAO in 2021. Among the records where time use is indicated, full-time and part-time workers make up 76 percent of fishing employment, while occasional workers account for 24 percent (FAO, 2024). 122,772 people are estimated to be involved in aquaculture directly or indirectly where 67% were male and 33% were female. Similarly, 462,067 individuals were dependent on capture fisheries where females were 60% and males 40% (Gautam, 2015).

3.6 Fish Species Cultivated in Nepal

Nepal primarily cultivates seven carp species, Rohu (*Labeo rohita*), Catla (*Catla catla*), Mrigal (*Cirrhinus mrigala*), Common carp (*Cyprinus carpio*), Grass carp (*Ctenopharyngodon idellus*), Silver carp (*Hypophthalmichthys molitrix*) and Bighead carp (*Aristichthys nobilis*) have been cultured. Few farmers incorporate catfish mostly *Clarias batrachus*, *Clarias gariepinus*, and *Pangasius pangasius*. Recently goldfish (*Carassius auratus*) was introduced as a recreational species in Nepal (Shrestha, 1999). In the lower mid-hill or cold-water zone, carp along with cool-water fish species such as Mahseer (*Tor spp*) and Katle (*Acrossocheilus hexagonolepis*), Asla or cold-water cyprinids (*Schizothorax spp*) and rainbow trout (*Oncorhynchus mykiss*) can be cultivated. In Nepal rainbow trout (*Oncorhynchus mykiss*) was introduced from Japan in 1988 (Bhandari, 2016). Recently, Nile tilapia (*Oreochromis niloticus*), Java barb (*Barbonymus gonionotus*) and giant river prawn (*Macrobrachium rosenbergii*) have also on the starting phase of their potential for commercial farming (Shrestha, 1999). Nepal has the potential for diversification through using different climatic regions will help to expand the market and enhance production.

3.6 System of Fish Culture

In Nepal, all the cultivated fish species are cultured in fresh inland water. Most of the farmers practicing in the earthen pond for mostly carp polyculture and other culture systems are also adopted like paddy cum fish culture, cage fish culture, and trout in raceway (MOALD, 2023). Cage fish culture was first started at Phewa Lake in 1972 in Nepal and this system is most favored in lakes and rivers (Swar and Pradhan, 1992). In the fiscal year 2021/22 pond fish culture was carried out in 14,542 ha. which is the highest of all types of adopted systems of culture and cage fish culture was adopted in 73,803 m² of the total area (MOALD, 2023). In Nepal especially in the Terai region with well-developed infrastructures like irrigation, availability of fingerlings and most of the lands allotted for rice farming provides a high opportunity for rice cum fish farming (Subedi and Paudel, 2020). There is an increase in rice production in rice cum fish farming system by decreasing pests, weed and can be the safest alternative over pesticides (Gurung and Subedi, 2002).

3.7 Exploring Potential and Prospects for Aquaculture Development in Nepal

Aquaculture in Nepal presents great opportunities and prospects due to having favorable climate, soil conditions, and abundant underutilized water resources (Khanal et al., 2020). This sector is not only for employment but also provides a great source of nutrients with protein, vitamin D, vitamin A, zinc, calcium, iron, and omega-3 fatty acids (Troell et al., 2019). There is rising demand for fish products, both domestically and internationally, which creates opportunities for expansion within the sector and abundant water resources provide ample opportunities for aquaculture expansion, with the potential for sustainable utilization. Women empowerment has also emerged as a significant opportunity in the aquaculture sector where women can contribute to household incomes and gain economic independence. Byproducts obtained from fish are major sources of high-protein ingredients that can be used as fertilizer for agriculture, home gardening, aquaculture feeds, animal feeds, and fish oil used for both human and animal consumption (Hardy, 1992). With advancements in aquaculture technology helps in increasing production and productivity. Improved breeding techniques, disease management strategies, and sustainable farming practices can contribute to the growth and sustainability of the sector.

4. CONCLUSION

This review highlights the increasing trend in fish production and the area under fish production in Nepal. There is a large import and very few export status in fish. This indicates that there is a high demand for fish at a domestic level providing an opportunity to expand the area of fish production and necessary improvement through technical, input materials, and market support from both public and private levels. Nepal has a large water surface area for fish production which can be effectively utilized with proper guidance and support by the nation. Most farmers practice fish farming in the Terai region only while mid hill also has potential for cold fish farming like Nile Tilapia whose area for production is needed to improve. Fish and fish products are imported in huge quantities from India probably due to the open border and low price of Indian fish to Nepali local fish which directly also influences the fish market in Nepal. For better utilization of Nepal's rich water resources and promotion of self-sufficiency in fish production, effective strategies focusing on farmers-friendly technology, market development, and policies supporting fish farming should be improved. This review article is expected to be important to traders, scholars, fish farmers, and policymakers, and it can also be a foundation reference material for future research.

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