Challenges and Opportunities of Fisheries Sector Development in Nepal

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Abstract

Purpose: This study was done to analyze the current status of fisheries production and discuss the opportunities and challenges of fisheries sector development in Nepal.
Methods: Published and gray literature including government documents, related reports and policies on fisheries and aquaculture were extensively reviewed; contents/findings were presented and discussed.
Results: The production and productivity of fisheries is Nepal is gradually increasing. However, this promising sector is facing several challenges, including low investment, inadequate legal tools/protocols, limited market access, increasing disease outbreaks, lack of skilled human resources, low productivity compared to neighboring countries. Additionally, the fisheries sector in Nepal is facing challenges from other emerging issues, including antimicrobial resistance. In order to systematically develop this sector, the Government of Nepal endorsed the National Fisheries Development Policy in September 2022 with the objective of commercializing the fisheries sector, achieving self-sufficiency in fisheries production, and eventually exporting fish. However, there is a lack of a dedicated action plan to turn this vision into reality.
Conclusion: A combination of an enabling policy environment, dedicated investments from both the public and private sectors, and an effective implementation of triad-research, extension, and education would be important to consider in achieving the vision outlined in the National Fisheries Development Policy.

Keywords: Antimicrobial resistance; Diseases; Education; Fisheries; Policy

1 Introduction

More than 3.3 billion people across the world depend on aquatic food, and this covers around 20% of the animal protein and is estimated to be worth USD 472 billion in 2022 (FAO, 2022). To further enhance its growth at the global level, Food and Agriculture Organization of the UN, has put forward a roadmap for 2022-2030 known as "Blue Transformation" to ensure the sustainable use of aquatic food system thereby contributing to the food security and livelihood of people by addressing challenges of environmental degradation and overfishing (IBID, 2022). This global roadmap will serve as a guiding document for developing countries like Nepal where aquaculture is an important sub-sector of the national agricultural system. In this paper, the current trend of fisheries and aquaculture including its opportunities and challenges will be discussed.
Agriculture is the backbone of the Nepalese economy with a contribution of nearly 24% to the national economy and is providing employment to nearly 60% of the total population (Yogi et al., 2025). The aquaculture and fisheries sub-sector are estimated to contribute around 0.44% to the national gross domestic product (GDP) and 1.83% to the agricultural GDP (CFPCC, 2023). This sub-sector is providing direct employment opportunities to nearly half a million people in Nepal (CFPCC, 2023).
The prevalence of malnutrition and undernourishment is high in Nepal with 5.7% of the population undernourished, 24.8% children under five are stunted, 7% of children under 5 are wasted and 2.7% children die before their fifth birthday (GHI, 2024). Fish and fish products, easily digestible protein, can make a significant contribution in tackling these malnutrition issues in

the country. Currently, more than 113,000 t of fish are produced in Nepal, with limited imports of around 3,700 t annually (CFPCC, 2023). However, there is a scope to increase this production given the huge untapped water resources in the country and increasing demand from the consumers across the country.
In this context, an extensive review of pertinent and available published policy papers and reports were done with the main objective to analyze the context, opportunities and challenges of fisheries production in Nepal aiming to recommend appropriate policies and strategies in order to develop overall fishery sector of Nepal.

2 Materials and methods

Published and gray literature including government documents on fisheries and aquaculture were reviewed. The data were cleaned using the sort, filter and pivot table tools of the Excel function. Descriptive analysis and graphs were created using Microsoft Excel. GIS maps were created using open access QGIS software. All the analyzed information was narrated into findings; discussed pertinent issues, and conclusions were drawn as the basis for extracting concrete policies recommendation.

3 Results

3.1 Overview of fisheries sector development in Nepal

In the past 50 years or so, Nepal did not have scope of rearing fishes in ponds commercially, yet fishing is a century old tradition in Nepal. There are communities whose livelihood depends on traditional fishing from streams, rivers, lakes and local water reservoirs. However, the history of commercial fish farming in Nepal is relatively shorter. It began in 1947 and since then have been continuously expanding reaching to more than 55 out of 77 districts of Nepal (Gurung, 2014). Introduction of Common carp (Cyprinus carpio) in 1950s and its successful breeding in mid 1960s marked a significant milestone in the fisheries sector development in Nepal (Kunwar and Adhikari, 2016). During 1960-65, fourteen fish farms were established by the Government of Nepal in different geographies of Nepal where spawning and seed production focusing on carp species were done (Gurung, 2003). After the baseline created for commercial fish farming during 1950s to 1980s, fisheries sector development in Nepal have been described in three different timelines as below for easier understanding:

1980-2000: This is the phase during which the fisheries sector developed at an exponential rate. This is primarily due to the expansion of the ponds, especially in the Terai region of the country, thanks to the government support and funding from different development projects. This period was crucial in creating a baseline of fisheries sector development in Nepal.

2000-2010: During this phase, significant improvement in productivity was observed which might be probably due to the increase in culture practices.

2010 onward: Expansion in production area and farm size, interventions from Prime Minister's Agriculture Modernization Project (PMAMP) programs creating zone, super zone and pockets for the development of agricultural commodities including fish were some of the activities that contributed to the development of fisheries sector in Nepal post 2010. Nepal achieved more than 15% annual growth in fish production during the last decade (Shrestha et al., 2022).

3.2 Status of fish production

3.2.1 Annual fish production and productivity by year

The annual fish production in Nepal is growing at a steady rate. The highest annual fish production has been recorded in 2022/23 with a production of 82,100 t while it was only 20,200 t in 2007/08. More than 80% of ponds are concentrated in three provinces of Nepal, Madhesh

(40%) followed by Lumbini (22%) and Koshi (20%). The lowest number of ponds are in Karnali province (1%) which makes sense given the difficult terrain, altitude and landscape of the province.

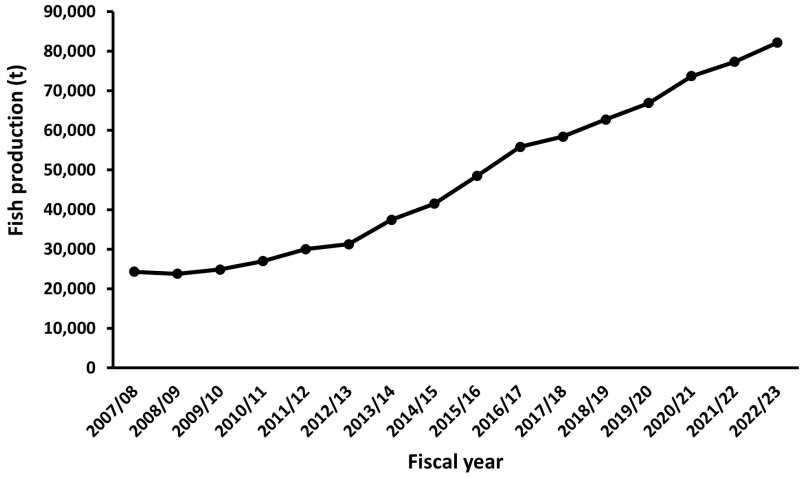

Figure 1: Fish production (in t) by year of production (2007/08 to 2022/23 AD).

The productivity of fish per hectare is also gradually increasing in Nepal. Government public data showed productivity from 3.61 t/ha in 2007/8 which reached 5.57 t/ha in 2022/23 (Figure 2).

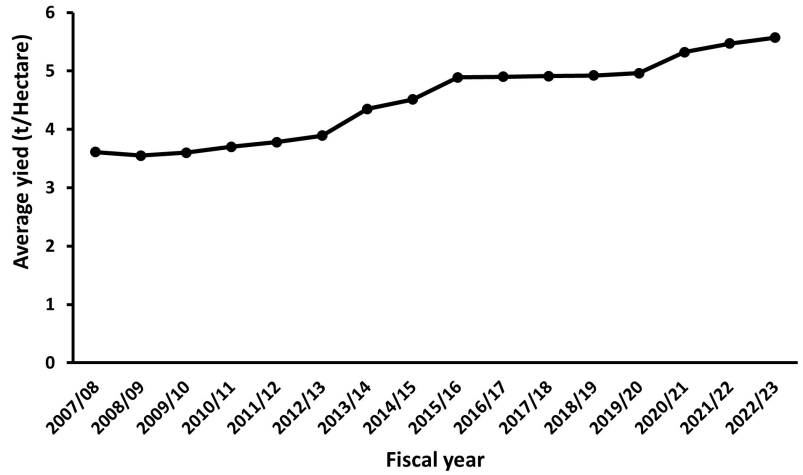

Figure 2: Fish yield (t /ha) during the years of 2007/08 to 2022/23 AD.

There is a significant variation in the total fish production and productivity by provinces. The highest fish production is in Madhesh province with 47,640 t produced in 2022/23 followed by 15,885 Mt in Lumbini and 9,919 t in Koshi province (Figure 3). The lowest fish production is in Karnali province with a total fish production of only 82 t. In terms of productivity, Madhesh province seems far ahead than other provinces with a productivity of 6.55 t/Ha in 2022/23 followed by 4.91 t in Koshi and 4.76 t in Lumbini province (Figure 3). The lowest productivity was also found in Karnali province with only a productivity of 2.54 t/Ha (Figure 3).

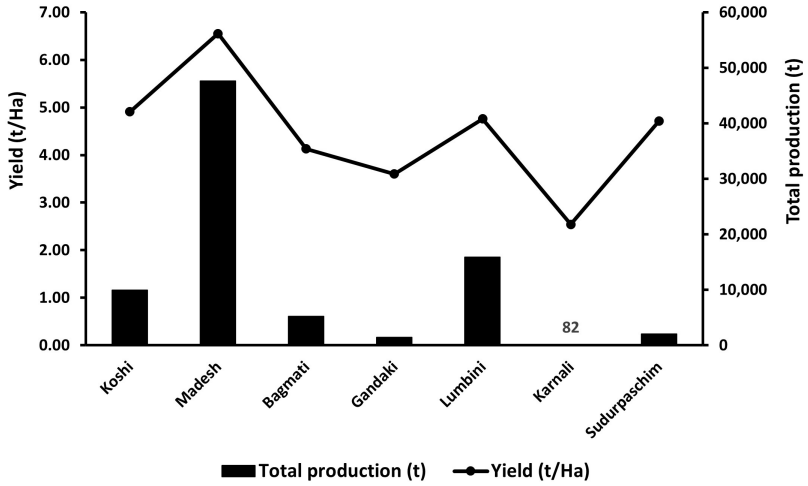

Figure 3: Province-wise production and productivity of fish in 2022/23 AD.

3.2.2 District-wise production of fish

District-wise fish production in Nepal indicates higher production from Terai districts compared to districts from other eco-zones (Figure 4). In total, 44 out of 77 districts of Nepal produces more than 10 t of fish annually. Highest production is in Bara district (¿11,000 t) followed by Dhanusha and Rupandehi districts.

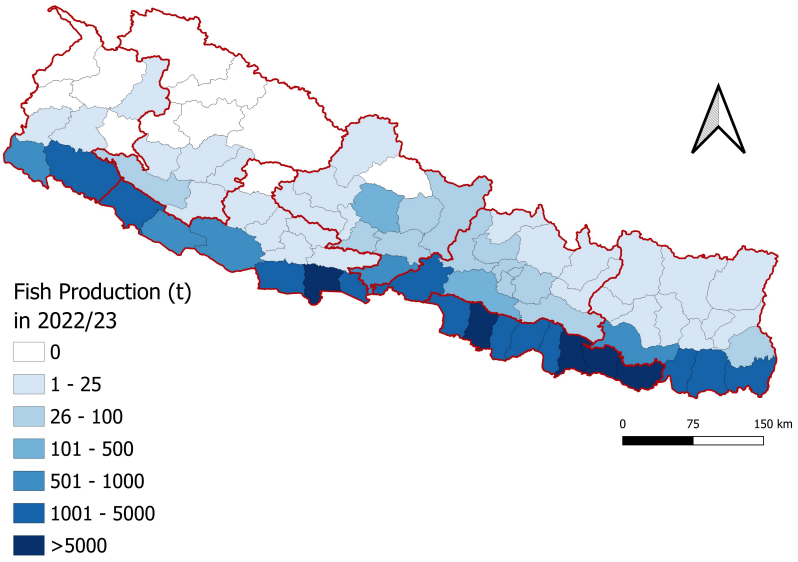

Figure 4: Province-wise production and productivity of fish in 2022/23 AD.

3.3 Opportunities and challenges of fish production in Nepal

There are several opportunities for fisheries and aquaculture sector development in Nepal that include availability of abundant water resources in the country that need to be fully exploited, presence of dedicated government structures such as the Central Fisheries Promotion and Conservation Center to drive polices and provide extension services to the farmers and government operated fish farms to produce quality seed and opportunities to introduce technologies from neighboring countries. In Nepal, paddy fields and rivers and streams constitute the biggest proportion of water bodies occupying 48.14% and 47.77% respectively (Dhakal et al., 2022). There are also numerous lakes and reservoirs across the country offering suitable sites for both

warm and cold-water fish species depending upon the location. Likewise, there is an opportunity to work in minimizing the gap in per-hectare fish productivity within various districts and provinces by learning from areas doing better by optimizing resource costs and increasing trade competitiveness (Bhandari et al., 2020) for which farmers and government extension agencies related to fisheries as the local, provincial and federal level can play a vital role. There is a scope to enhance rice cum fish culture in Nepal (Subedi and Paudel, 2020) and diversify aquaculture production in Nepal (Gurung et al., 2020) for which local fisheries related offices can work together with fish farmers. The increasing demand of fish products due to its health benefits as it is an easily digestible protein is also an opportunity to enhance fish production in Nepal. There is an opportunity to increase the per capita fish consumption in Nepal which is only around 3.5 kg compared to global average of 20.5 kg (Shrestha et al., 2022) for which government fisheries related agencies and Department of Livestock Services can launch awareness campaigns on the nutritional and health benefits of consuming fish and fish products. The establishment of a dedicated fisheries program at the Agriculture and Forestry University, Chitwan to produce competent human resources in fisheries and aquaculture also creates opportunities for the development of this sector in the coming years. Increasing involvement and investment from the private sector and potential of youth engagement in this sector offers another silver lining for the development of aquaculture and fisheries sector in Nepal.

Another opportunity for fisheries sector development in Nepal is the availability of various legal and policy frameworks such as the Agriculture Development Strategy (2015- 2035) with a target to increase the fish production and productivity and make Nepal self-reliant in fish production. Likewise, Fishery Development Policy in 2022 (2079 BS) Aquatic Life Conservation Act 1961 (Jalchar Sanrakshan Ain – 2017 (BS) and Animal Health and Livestock Services Act 1998 (2055 BS) also provides policy frameworks for fisheries sector development in Nepal.

While there is enormous potential for this sector to grow, it also faces a range of challenges that hinder its full potential. The huge potential of its abundant aquatic resources to transform fisheries production system in Nepal remain untapped. These include low productivity compared to other countries, inadequate infrastructure, limited access to quality fish seed and feed, lack of modern technology, insufficient research and extension services, and vulnerability to climate change (Khanal et al., 2020). Additionally, weak institutional frameworks and limited investment further constrain the sector's growth. For example, while fisheries development policy is endorsed providing theoretical base, there is an absence of dedicated action plans to translate the policy into action. implement policies. Likewise, poor market infrastructure and frequent disease outbreaks, possibility of introduction of emerging diseases and emergence of antimicrobial resistance could bring additional challenges to the fisheries sector development in Nepal. The challenges posed by climate change will also affect future fisheries development initiatives in Nepal. Migration of youth for foreign employment is also new emerging challenges affecting fisheries and overall agricultural sector of Nepal.

4 Discussion

Fish production in Nepal has quadrupled in the last 15 years (CPFCC, 2022; Dhakal et al., 2022 and Husen et al., 2024). This increase might be due to the increased number of ponds for commercial fish farming in different districts of Nepal, primarily Madhesh, Lumbini and Koshi provinces due to the enabling environment created by different government and non-governmental agencies and market demand for fish and fish products (Dhakal et al., 2022; Husen et al., 2024; Bhandari et al., 2024).

Likewise, productivity of fish has reached over 5 t in 2022/23 from 3 t around per ha in 2007/08 (CPFCC, 2022; Dhakal et al., 2022). Improved cultural practices with availability of commercial feeds and seed quality of fish might have contributed to increasing the per hectare productivity in Nepal. Supply of year-round availability of fish seed, genetic quality of available seed, reducing cost of feed and improving marketing facilities might contribute in the commercialization of fisheries sector in Nepal (Mishra et al., 2011; Gautam, 2015).

Madhesh province has substantially higher production and productivity in fish production compared to other provinces. Better cultural practices followed during fish farming might be the reason for higher productivity in the Madhesh province (Rijal et al., 2024 and Yadav et al.,

2024). If this level of productivity can be achieved in other provinces as well, it will significantly contribute to enhancing the overall fish production in Nepal and achieve the target of self-sufficiency in fish production in Nepal.
In the light of the opportunities and challenges discussed above, some of the way forward to drive fisheries and aquaculture sector development in Nepal would be to create an enabling investment environment for private sector (Shrestha et al., 2022), provide access to technologies to fish farmers including their capacity building (Bhandari et al., 2024), improve marketing infrastructure (Husen, 2019), integrated disease management (Shrestha et al., 2019), diversification of products for increased consumption of fish and its products and linking education, extension and research engaging fish farmers to solve the problems faced by this sector. Likewise, it is essential to improve the farming practices to reduce the cost of production to make this sector more competitive (Bhandari et al., 2024; Dhakal et al., 2024).

5 Conclusion

Fisheries is one of the growing sub-sectors within the agriculture sector in Nepal and is providing employment to thousands of marginalized communities and people engaged in commercial aquaculture. While the production and productivity of fish is increasing in the recent decades, fisheries and aquaculture sector in Nepal is facing several challenges such as lack of investment, inadequate technological advancement, low productivity, and inadequate policy support.

6 Recommendations

It is recommended that Government of Nepal to create a suitable investment environment to tap in the aquaculture development potential of Nepal through appropriate strategies, plans and policies. Additionally, extension agencies across the three-tiers of the government need to train farmers in adopting modern technologies of fish farming including sustainable management of fish diseases to increase the production and productivity of fish in Nepal in a cost-effective manner. Additionally, local and provincial governments need to build market infrastructure for efficient fish marketing.

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Author's contribution

The author conceptualized the study, wrote the first manuscript and edited it.

Conflict of interest

The author declares that there is no conflict of interest. Ethical consent was not required as publicly available secondary data was used in this study.

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