

## **Rainbow Trout Farming in Helambu, Sindhupalchok through Producer's Perspective: Challenges and Opportunities**

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DOI: <https://doi.org/10.3126/ssmrj.v1i1.71259>

### **Abstract**

*Rainbow trout farming is a relatively new industry in Nepal. It is possible in Nepal around the year under natural environmental conditions. In terms of social and economic points of view, trout farming is beneficial for farmers due to the availability of a natural cold stream and the existence of a favorable environment. Finding out the opportunities and challenges of rainbow trout farming in Helambu rural Municipality is the main concern of this article. It is based on both primary and secondary sources of data. Primary data were collected through interviews with 3 farmers involved in trout farming. Due to its rich source of nutrition, alternative source of income, and high commercial value, it has high prospects. Due to climate change, lack of experienced labor, and an imperfect market, it has challenges. By expanding aquaculture, generating self-employment opportunities, and maintaining the protocol of sustainable development, trout farming may become a lifeline for rural areas. The concerned authority must be accountable for formulating effective policies for the promotion of trout farming for rural development.*

**Keywords** - trout, aquaculture, labor-intensive, rural development, lifeline.

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## **Introduction**

Aquaculture technology of cold-water Rainbow trout (*Oncorhynchus mykiss*) has been popular among farmers in the hills and mountains of Nepal. The production of rainbow trout started on government and private farms in 1995 and 1998. At present rainbow trout farming has expanded in several mountain districts with rapidly growing demand in other adjacent areas (Gurung et al, 2014). Rainbow trout farming has become increasingly popular in Nepal. Trout is an immigrant fish. It is a species of freshwater fish in the salmonid family. It is native to cold water streams in North America.

At first, rainbow trout aquaculture was introduced in Nepal in the 1970s after the fish was first gifted to the Nepali King Mahendra by the British government. Unfortunately, its further was unable to gain any foothold in the Nepali hills due to a lack of aquaculture infrastructure. However, attempts at establishing aquaculture were revived through a collaboration with the Japan International Cooperation Agency (JICA) and the Nepali Government's National Agricultural Research Corporation (NARC). Through this international cooperation, the trout made its splash in the Trishuli Fisheries Research Station.

Trout farming has also been integrated with pico hydropower generation, resort, livestock, and floriculture (Lamsal et al., 2008). The integrated approach of rainbow trout farming has created additional attraction on mountain slopes. Trout farming is an economically viable practice (Nepal et al., 2002; Voorhees, 2011). Trout has been consumed as a nutritious food and dietary supplement in Nepal. Although having some problems during production and marketing there is a huge prospect of trout farming in Nepal. It helps to solve the unemployment, underemployment, and malnutrition problems of Nepal. Small-scale trout farming provides opportunities for disadvantaged groups i.e., landless, rural women,

illiterate, adolescents, old age and physically disabled people, scheduled caste people, and indigenous people.

Aquaculture has been playing an important role in the economic development front on account of its contribution to food and nutritional security, national income, employment opportunities as well as generating livelihood options (Kumar and Shivani, 2014). Being landlocked, Nepal is impoverished of any oceanic resources and fish production is dependent on inland water resources. It has a diverse variety of fish with more than 200 species recorded, among which around 190 are indigenous species and the remaining are exotic (Bogati, 2018). Trout farming is an alternative form of agriculture. It is an effective and popular sector for income generation. It plays a vital role in informal employment creation. It plays an effective role in economic development, especially in rural areas. National Level, State level, and local level governments of Nepal should formulate effective plans and policies for the promotion of trout farming.

### **Objectives and Methodology**

This article is prepared to assess the opportunities and challenges of trout farming in Helambu Sindhupalchok Nepal. For this, it employs a descriptive and analytical research design to identify the prospects and constraints of trout farming in rural areas from the producers' perspective. Sindhupalchok district Helambu rural municipality is a study area where 6 households practice trout farming. Among them, 3 households were selected as respondents through a purposive sampling procedure for a detailed study of trout farming in its natural real-life context. It is based on both primary and secondary data. The primary data were collected through in-depth face-to-face structured interviews and observations. The secondary data were collected by reviewing trout farming-related literature through search engines. After Pretesting the question of an in-depth structured interview, Data were collected with minute observation by the active initiation of the researcher himself. The collected data has been checked, coded, categorized, organized, and converted into a master data

sheet. Data was presented in Table by using MS Word and MS Excel. Data is analyzed descriptively through the Likert scale.

## **Result and Discussion**

### **1. Opportunities of Trout Farming**

Fisheries production in Nepal is mainly utilized by the domestic market. Also, some export happens but this is still limited and imports highly exceed exports (Labh et al.,2017). The Nepal Agriculture Perspective Plan (APP) has assumed fisheries and aquaculture in Nepal as a minor but indispensable and potential sub-sector of agriculture (FAO,2020). Due to urbanization and awareness, when people knew the health benefits of trouts, they started trouts farming widely. Farmers can cultivate trout whole year-round in natural environments in Nepal. To select a suitable site for aquaculture, ecological factors, biological factors, and economic, and social factors have to be considered (Pillay, 1977). It is a fast-growing sector of agriculture practices because of its low input and high return in a short time. Hence trout farming could be a milestone in the traditional agriculture system of Nepal.

Table 1 clarifies that all farmers agreed that trout is a rich source of nutritious food. 90 percent of farmers consider it as the optimum utilizer of local resources. 70 percent of farmers realized the prospects of trout farming as the source of additional income and the best food available. 65 percent of farmers confirm that it generates wealth from water, and it can supply various kinds of nutrients. 60 percent of farmers view the prospects of trout farming as low input and high output. The majority of respondents realized that it is the generator of self-employment, it has medicinal value and it is sustainable farming.

**Table 1: opportunities of trout farming**

SN	Categories	(1)	(2)	(3)	(4)	(5)	Total
1	Rich sources of Nutritious food	45 %	45 %	10%	-	-	100 %
2	Optimum utilization of local things	50 %	40 %	10 %	-	-	100 %
3	Source of additional income	40 %	30 %	10 %	10 %	10 %	100 %

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SN	Categories	(1)	(2)	(3)	(4)	(5)	Total
4	Generator of self-employment	25 %	35 %	20 %	15 %	5 %	100 %
5	Development of new food products	20 %	45 %	10 %	15 %	10 %	100 %
6	Low input and high output	25 %	35 %	25 %	10 %	5 %	100 %
7	Improved food security	30%	40 %	15 %	10 %	5 %	100 %
8	Generating wealth from water	25 %	40 %	15 %	10 %	10 %	100 %
9	Sustainable farming	30 %	20 %	20 %	15 %	15 %	100 %
10	Best fish available	40 %	30 %	10 %	10 %	10 %	100 %

Source: field survey,2024 Strongly Agree (1), Agree (2), Don't Know (3), Disagree (4), Strongly Disagree (5)

Trout farming is a way of generating wealth from cold streams. Thus, trout farming promotes sustainable farming. Trout farming not only produces quality food but also creates a healthy environment. It leads to employment generation and women empowerment. Trout farming utilizes parallel space and requires minimal land making it possible to promote in rural areas. Trouts are considered to be the highest protein and other essential nutrient producers. In the past, Trouts were considered the food for the high class. Nowadays trouts have become available to all level of people. Trouts are quality food that has health benefits. Trouts are among the best food available. Trouts are a rich protein source.

Trout farming in rural areas has emerged as an important activity for educated, school dropouts, women, landless people, etc. Considering the demand for quality foods, trout has emerged as an important avocation. Many commercial units that grow trouts under controlled conditions have also been set up in different parts of Nepal. Trouts are a high-calorie food rich in fibers and hence good for the intestine and digestive system. These are also a very good source of protein and healthy fat.it is rich in minerals including calcium, zinc, potassium, phosphorus, and magnesium.

### 2. Challenges of Trout Farming

Trout farming is a rising industry in the context of Nepal. It requires low-cost labor. Initially, it requires a huge investment. There are unstable farm-gate prices and profit margins. Despite all, the supply to the market is poor, and the increasing price of input materials. Similarly, there is a high risk of poor-quality trout fry and the threat of diseases and fungus attacks. There

are no clear policies that have been formulated for trout farming, trade, and quality control in Nepal. Plans and policies presented by the Nepal Government are not adequate and perfect. So, it's a huge challenge for producers.

**Table 2: Challenges of Trout Farming**

SN	Categories	(1)	(2)	(3)	(4)	(5)	Total
1	Lack of quality ponds	-	-	10 %	50 %	40 %	100 %
2	lack of capital	50 %	40 %	10 %	-	-	100 %
3	Fungus attack	40 %	30 %	15 %	10%	5 %	100 %
4	Lack of high-quality water	40 %	30 %	10 %	5 %	5 %	100 %
5	The high price of raw materials	45 %	25 %	20 %	5 %	5 %	100 %
6	Lack of modern equipment	35 %	45 %	10 %	5 %	5 %	100 %
7	Lack of trained and experienced labor	40 %	40 %	10 %	5 %	5 %	100 %
8	Heavy rainfall during monsoon	40 %	40 %	10 %	5 %	5 %	100 %
9	Temperature variation	45 %	35 %	20 %	-	-	100 %
10	Lack of quality fry	25 %	25 %	40 %	5 %	5 %	100 %

Source: field survey,2024

Strongly Agree (1), Agree (2), Don't Know (3), Disagree (4),

Strongly Disagree (5)

Still, lack of awareness and knowledge about it among the fish farmers, and lack of government support both technically and financially constitute a significant constraint (Rahaman et al., 2013). Based on the table, there are no problems with the quality of ponds. During production, 90 percent of farmers face the problem of capital shortage.80 percent of farmers face problems of temperature variation, lack of experienced labor force, and heavy rainfall during monsoon season .70 percent of respondents were confronted with insect attacks, lack of quality fry, and lack of modern equipment Heavy during the production and harvesting of trout.

### **3. Challenges for Marketing**

To further increase fish production, the various underutilized water bodies need to be explored and utilized sustainably. Understanding the socioeconomic problems of the farmers, promotion, and adoption of a robust and modern aquaculture system, upgraded infrastructure facilities, and improved management policies are required for the sustainable

development of aquaculture in the state (Ngasotter,2020). According to Table 3, 90 percent of farmers agreed that the absence of storage facilities is a barrier to marketing.70 percent of respondents believe that high transportation costs, a large number of middlemen, a very limited wholesale market, and a lack of branding and quality problems during the marketing of trouts.60 % of respondents indicate a lack of advertisement as a barrier to the marketing of trouts. There are no problems in the market.

**Table 3: Challenges for Marketing**

SN	Categories	(1)	(2)	(3)	(4)	(5)	Total
1	Lack of available markets	5 %	5 %	45 %	25%	20 %	100 %
2	High transportation cost	35 %	35 %	20 %	5 %	5 %	100 %
3	A large number of middlemen	40 %	30 %	20 %	5 %	5 %	100 %
4	Very limited wholesale market	205%	45 %	15 %	5 %	10 %	100 %
5	Unknown product to general consumers	-	-	25 %	25 %	50 %	100 %
6	Lacking advertising	15%	45 %	25%	10%	5 %	100 %
7	Absence of storage facilities	45 %	45 %	10 %	-	-	100 %
8	Lack of branding	40 %	30 %	20 %	5%	5%	100 %

Source: field survey,2024

Strongly Agree (1), Agree (2), Don't Know (3), Disagree (4),

Strongly Disagree (5)

#### 4. Measures to Promote Trout Farming

Trout fish grow fast, and they have high market value. High demand for trout fish and availability of good weather conditions, though farming is a profitable business in Nepal. The fish has a good shelf life and can be stored long without losing quality. The trout aquaculture technology could be expanded in areas having pristine, cold, and clean water resources having road access for market destinations close to urban areas of all Trans Himalayan countries as a means to food and nutritional security, and employment opportunities in mountainous regions(Gurung et al,2014)

Fish, being an excellent source of protein and many other essential fatty acids and micronutrients, plays a particular role in human nutrition by providing a valuable and nutritious contribution to a diversified and healthy diet. With the ongoing changes in dietary trends, which continue to increase towards a greater variety in food choices along with improved health, nutrition, and diet concerns. The overall demand for fish for consumption

is expected to increase, with more and more people shifting their food habits towards protein-rich diets. (Saha and Paul, 2020).

.Provision of the trout wholesale market and effective distribution channel is essential to support the sustainable development of trout farming and profit sharing of the farmers. Skilled development training about trout farming, awareness-raising programs regarding the importance of trout, provision of subsidies for grassroots level people involved in trout farming, and Workshops by trout experts to farmers and the young generation should be managed to increase the healthy trout production. The concerned authority must be serious on various issues of trout production, distribution, and consumption.

**Table 4: Measures to Promote Trout Farming**

SN	Categories	(1)	(2)	(3)	(4)	(5)	Total
1	Strengthening technical support	40 %	30 %	15 %	10 %	5 %	100 %
2	Easy procedures of capital supply	20%	35 %	35 %	5 %	5 %	100 %
3	Provision of soft loan	40 %	60 %	-	-	-	100 %
4	Provision of quality raw materials	25 %	35 %	30 %	10 %	-	100 %
5	Provision of the labor force	15 %	35 %	25 %	15 %	10%	100 %
6	Provision of quality fry	50 %	50 %	-	-	-	100 %
7	Establishment of a perfect market.	40%	50%	10%	-	-	100 %
8	Promotion of trouts in new areas	20%	35%	35%	5%	5%	100 %
9	Establishment of storage facilities	50%	40%	10%	-	-	100 %
10	Strengthening the institutional framework	20 %	35 %	20 %	15 %	10%	100 %
11	Provision of insurance facilities	35 %	25 %	30 %	10 %	-	100 %
12	Provision of training /workshop	50%	40%	10%	-	-	100 %

Source: field survey,2024

Strongly Agree (1), Agree (2), Don't Know (3), Disagree (4),

Strongly Disagree (5)

Concerned authorities, within their jurisdiction, should formulate more extension programs to increase the production, distribution, and consumption of trouts. Based on the above table, almost all respondents agreed that the provision of soft loans and the provision of quality fry help to promote trout farming in Nepal. 90 percent of respondents agreed that it is essential to establish an effective and perfect market as well as establish storage facilities and provision of training for the promotion of trout farming. 70 percent of respondents have an opinion on strengthening technical support. 60 percent of respondents support the provision of



insurance facilities and provision of quality raw materials for the promotion of trout farming. The majority of respondents give their opinion on strengthening the institutional framework, promoting trout farming in a new area, provision of the labor force, and easy procedures of capital supply for the promotion of trout farming.

### **Conclusion**

Fisheries and aquaculture are one of the fastest-growing industries in the World (Tacon, 2020). In Nepal, trout production is economically attractive and naturally viable. It supports and follows the principles of sustainable development. Due to its high commercial and nutritional value, it has become popular day by day in Nepal. The demand for trout is increasing rapidly in the domestic market in a fresh form. Farmers, all concerned stakeholders, and government bodies must play effective roles through policy intervention for the promotion of the market, dissemination of knowledge, and intensification of the capacity of trout farmers.

As compared to aquaculture-developed nations of South Asia, the history of aquaculture in Nepal is considered relatively short, i.e., 60 years (Shrestha, 2018). Local government should play an active and major role in advocating to the people about various aspects of trout farming, providing training, and different forms of incentives such as distributing prizes, providing soft loans to farmers, producing booklets on trout technology, and providing other essential services free of cost. developing new products and technology, and building up networking with other agri-food industries. An appropriate market-distorting approach in the longer term could increase the scale of local markets and it could become a competitive and more significant agribusiness. Innovation of year-round fry production technologies will make rainbow trout farming one of the leading aquaculture commodities of Trans Himalayan countries.

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