A STUDY ON FISH FARMING IN SUDDHODHAN RURAL MUNICIPALITY OF RUPANDEHI, DISTRICT

A Thesis

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By

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LETTER OF RECOMMENDATION

This thesis entitled **A STUDY ON FISH FARMING IN SUDDHODHAN RURAL MUNICIPALITY OF RUPANDEHI DISTRICT** has been prepared Mr. Govinda Yadav under my supervision. I hereby recommend this thesis for examination to the Thesis Committee as partial fulfillment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS.

Date: 19/02/2076
02/06/2019

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Prof. Dr. Sohan Kumar Karna
(Thesis Supervisor)

APPROVAL LETTER

We clarify that this thesis entitled **A STUDY ON FISH FARMING IN SUDDHODHAN RURAL MUNICIPALITY OF RUPANDEHI DISTRICT** submitted by Mr. Govinda Yadav to the Central Department of Economics, Faculty of Humanities and Social Sciences, Tribhuvan University, in partial fulfillment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS has been satisfactory in scope and quality. Therefore, we accept this thesis as a part of the said degree.

Thesis Committee

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(External Examiner)

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Date: 29/03/2076
July 14, 2019

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ABBREVIATIONS/ ACRONOMYS

GDP	:	Gross Domestic Product
MMT	:	Million Metric Ton
MOAD	:	Ministry of Agricultural Development
USA	:	United States of America
VDC	:	Village Development Committee

CHAPTER I

INTRODUCTION

1.1 Background of Study

The essential source of food in prehistory, which become commercial activity from antiquity. Evidence shows that early humans have been catching since 40,000 years ago or so. Deep-sea fishing first emerged in the 15th century but really took off with the arrival of steamboats in the 19th century. The use of various fishing techniques includes hand gathering, Spearfishing, netting, angling and trapping. However, nowadays fishing has been established a profession including commercial activity throughout different places.

The industry of fishing refers to any industry or activity concerned with taking, culturing, processing, preserving, storing. It further includes transporting marketing or selling fish or fish products. The fish farming industry is defined by the food and agriculture organization as including recreational substance and commercial fishing and the harvesting processing and marketing sectors.

There are many purposes of the fish farming industry, which are conducted by different cooperation and farmers throughout the world. Especially, the commercial activities are aimed at the delivery of fish and other seafood products for human consumption or as input factors in other industrial processes. People of developing countries depend on fisheries and aquaculture. A survey fishery indicates that the livelihood of over 500 million people, directly and indirectly, depend on such industries through they are small or big companies.

Nepal, a landlocked country, has large numbers of rivers and freshwater lakes. Water supply to these freshwater bodies is melting snows of Himalayas. There are many water resources in Nepal with about 6,000 rivers flowing north to south. These rivers are characterized by low water temperature, high dissolved oxygen, and high turbulent fast current in the higher mountainous and hilly region. On the other hand, high water temperature, low dissolved oxygen, low turbulence is normal for the river in Terai.

Traditional Fish Farming in Nepal

Traditional fishing is carried out by using various methods cast net, gill net, loop, line and hook and basket. Some unconventional fishing has emerged in recent years using explosives, electricity and poison, which is destroying the aquatic life indiscriminately (Fish Mahotsav-2071 B.S.). In the context of Nepal, about 142,000 males and 223,000 females depended on subsistence capture fisheries in rivers, lakes and swamps during 2000/01. In 1980s, people engaged in fisheries were estimated about 80,000. The recent dramatic increase in the population engaged in capture fishery probably reflects unemployment due to the increased population in the country. Water bodies in Nepal are usually uncontrolled for local access, and usually, the poorest most deprived people are known to harness nearby natural resources such as water bodies or forest for their livelihood. Nowadays, of forests are managed through a community approach involving local inhabitants, for conservation as well as for the benefit from the forest. However, rivers and few natural water bodies have yet been managed in such a way and must remain a "free-for-all". A few lakes in the mid-hills have been stocked with cultivable carp for increased production as strategies to reduce the fishing pressure on thinly populated native species without losing the fisher's employment and income opportunities until measures for conservation practices of locally vulnerable species are developed (www.wikipedia.com).

By tradition, Nepalese society has distinctly identified ethnic communities for fishing, which, entirely depend upon fishing and water-related occupations such as boating and fishing net mending as a family profession. However, with a few exceptions, such traditional occupations are not financially rewarding enough for sustaining a family. The ethnic communities involved for fishing traditionally are the Jalari or Pode, Majhi, Malaha, and Bote. They live in villages near the water resource. The fishing occupation within the caste system by tradition can be attributed both to abundant water resources in the country, and honoring fish as a valuable food resource in the past. In general, all communities in the country accept fish as delicious food and considered auspicious among many communities.

Improved fish production technology of fish includes the following essential component to produce the quality fish, which provide appropriate employment to the concerned fish farmers.

- Improved techniques in pond constructions and maintenance,
- Introduction of modern fish hatchery equipment,
- Provision of inlet and outlet device in ponds,
- Introduction of improved fish species for the optimum yield,
- Aerated containers for transporting the fingerlings to reduce stress and mortality,
- Techniques to improve water quality in fish,
- Fertilization and liming of fish ponds,
- Fish preservation and storage techniques,
- Prevention and control of fish disease,
- Controls of predators in the fish pond,
- Techniques of hatchery and fingerlings production,
- Fish farming for increased fish production,
- Integrated fish farming for increased income and employment,

  Though fish farmers are warmed up the profession as producing different sorts of fishes they may face various problems for preserving, preventing in fish farms.

Aquaculture is a new activity in Nepal. Nepal is being a small landlocked mountainous country, richest among in terms of water resources, which make Nepal a country with potential fish farming. There is about 12500 ha of such area available in the country of which approximately 1225 ha are currently being used for aquaculture. In Nepal, 200 fish species are available in which around 190 are indigenous species and remaining are exotic species. The formal types of fish farming begin in Nepal from 1947 for economic purpose. There are 11 types of fish are found and grown up for marketing purposes in the Terai area. It has been seen most favorable and adaptable fish such as Silver carp, Grass carp, Common carp, Rohu, Naini, Vakur, Bighead carp, Tilapia, Bikase mangur, Baikhi and Puntius. There are 29,270 fish ponds in the country. The Terai is plain alone contained 95 per cent of total fish ponds and the area dedicated to fishery amounts to more than 10,718 hectares with the total fish production reaching 65,770 tonnes in 2017/2018 fiscal year (www.wikipedia.com).

The new technology and environmental requirements favor large scale capital intensive operation at the expense of traditional and small scale commercial fishing. Thus, it is of paramount importance to study the farmers' perception and awareness on adoption of improved production technology of fish and its' on the yields and income of fish farmers (Delgado, 2003).

The Rupandehi has been one of the zones (500 he) for fish and four blocks (100 he) for two commodities: 1 for rice and 3 for fish and 60 pockets (10 he) of various commodities. Aquaculture is the breeding and rearing of fish, Shellfish, or plants in ponds, or any enclosure for the direct harvest of the product, which is an area of activity growing rapidly. Fish is acclaimed to be the principal source of animal protein for over one billion people globally as it is the cheapest source of animal protein, providing many important nutritional and health benefits (FAO, 2004).

The efforts of government in order to research and extension services, there is still a deficit in the supply and demand for fish. Other problems facing domestic fish production in Nepal are innovation adoption, inadequate research and extension, high cost of fisheries inputs, preservation and storage technologies, fish seed, lack of credit and insurance cover for fisheries enterprises. Despite the fact that fish farming accounts for the highest percentage of Nepal's annual fish production output, fish workers are often among the poorest people and they generally operate small scale fishing units using traditional fishing practices (FDF, 2005).

The related sources among the various sources of protein, fish stand out as the most important in terms of food security because its price, relative to the price of other high-quality protein sources such as milk, meat and eggs is very competitive. Furthermore, fish have been found to have self-life, which is readily enhanced through low-cost sustainable technologies such as smoking, drying and salting (FAO, 2009).

In Nepal, fish demand as estimated by FAO, 2012 was about 62,500 tons at 2.3 kg per capita consumption. The poor performance of the fishery sub-sector in Nepal is most clearly evidenced by the low standard of living of the small-scale fish farmers.

The government of Nepal has introduced and implemented numerous policies and programs aimed at empowering the small scale fish's farmers to get out of the

‘poverty trap’. This include, dissemination of improved fish production technology such as adequate pond construction, water management, adequate stocking rate, use of nutritious and floating feed, and improved fish feed to the farmers. The technology is as ways of applying scientific and organized knowledge into the practical task. In view of this increased application of advanced technological tools could certainly revolutionize fish farming (Ideba, Otu, Essien and Iniobong, 2013).

Finally FY 2017/18, the gross value added of the fishery sector is estimated to grow by 7.4 percent. Such growth was 8.0 percent in FY 2016/17. The contribution of the fishery sector to GDP is estimated at 0.5 percent in 2017/18 (Economic Survey, 2075).

Fish and fishery product represent a valuable source of nutrition such as omega-3 fatty acids, fat-soluble vitamin D and high protein. These essential nutrients keep our heart and brain health. Fish can be used as a daily diet to meet the essential nutrient required by the body. The Government of Nepal has recommended at least 30g per day fish or animal protein diet but fish intake is still far below than the recommended amount. The fish production and consumption of fish and fishery product have growth.

Agriculture, Forestry, Fishery, Mining and Quarrying are the major sources of the income in the Nepalese economy. One of them is fishery business food for human life. Fishing farming deals with the practice of the scientific method of fishing keeping feed, management and disease control for getting the best economic return from them.

Improvement of fisheries in rivers and lakes offer a great opportunity for self-employment and income generation among poor - mostly landless - people living close to such waters. An increase in capture fisheries in natural waters would benefit poor rural people by raising their economic status, and could there by enable these people to invest in other income generating activities such as aquaculture. The common aquaculture practices applied in Nepal are carp polyculture in ponds, polyculture of carps in lake enclosures, cage culture of herbivorous carps (major species: silver carp and bighead carp) in lakes and reservoirs, rice-fish culture with common carp, and the extensive method of carp polyculture in ghouls. These

aquaculture production systems are categorized based on production input levels and outputs. Over the years, a change from extensive to semi-intensive and intensive farming methods has been occurring in all aquaculture production systems in the country.

The main objective of the study to find out income from the fish farming occupation identify the employment and find problems and recommend some solutions. The researcher reviewed some works and researches conducted by different researchers of universities. Likewise, articles, books, researches of Tribhuvan University, resources materials of the Central library have been included in this study.

Nowadays fishing business became one of the commercial businesses, which help to generate income and provide employment as well as its contribution increase on GDP and support demand and supply of fish food in the country. Fish farming is simple business and minimum investment give a high return if the government provides education and training knowledge to the farmer than they can successes for handling this business, which support their economic living standard life.

1.2 Statement of the Problem

Fish farming is a viable option to increase farm income and hence alleviate widespread poverty. It is impossible to obtain higher productivity without proper knowledge of fish production techniques. Besides this, the research area of Rupandehi district, Siyari Rural Municipality (Chappiya Zone) is well known for fisheries production and related activities. Majority of households are involved in aquaculture in which 85 percent of farmers have adopted composite carp culture. At the same time, recently PMAMP has been identified in this area (Chhapiya) as a fish zone with a long-term vision of increasing production and making Nepal self-sustain in fish production. However, lack of proper knowledge and awareness about improved production technology of fish possessed a huge challenge to fish production. Considerable attention has not been given in this sector, which is hindering its betterment. Research and findings related to the farmers' perception and awareness of fish production technology are very limited. Fish farming is a way to create a much larger amount of fish much more quickly cheaply and efficiently them with wild caught fish when something seems too good to be true but if it pollution seems the

density of fish creates problems like disease and pollution. Accumulation of fish waste and uneaten food into the water of the rivers and the sea can degrade the quality of the surrounding water. Likewise, aquaculture can have a negative impact.

So to understand the baseline information about the existing scenario of fish production, its current progress, future potentialities, possibilities and the role of improved production technology on outcome of fish farmers, this research survey can be a fruitful approach.

However, in the Shuddhodhan rural municipality area, research in fishing farming has been not done yet. Therefore, farmers are facing various problems. Especially, the small farmers are uneducated and they are unknown about the modern developments in the fishing system. Some actual farmers have not to land. Distribution of land is not scientific and systematic becomes it take more land area for doing this business. Underground water pumping needs high amount, which is not affordable by lower and medium class business farmer's not able high bride (bhurra). There is a lack of organized products and market system. Farmers are using traditional record system of their income and expenditure. How many people are employed in the business? Therefore, this study is relevant to find out the cost, revenue and employment situation of this business.

The following research questions need to be answered.

- How expenditure and income of fish farmers are measured?
- What is the status of employment in fish farming?
- What are the problems and prospects of fish farming in the study area?

1.3 Objective of the Study

The general objective of the study is to analyze the economic aspect of fish farming with reference to the income and employment level in Shuddhodhan rural municipality. The specific objectives of the study are as follows:

- To examine the income and expenditure of the fish farmers,
- To study the status of employment in fish farming,
- To analyze the problems and prospects of fish farming in the study area,

1.4 Signification of the Study

Agriculture is the backbone of the Nepalese economy and fishery is an important branch of agriculture. Sufficient water resources available but the fish farming limited into only some interested farmers, Cast and regions. We know that fish farming is cash crop and may share remarkable GDP in the national economy.

The following points reveal the significance of the study

- Easily starting fish farming from less capital and high return.
- Today migration trend is very high from rural areas to urban areas which can be controlled by providing employment them in their rural area.
- Family, women and uneducated people can also take care of the firm easily.
- Fish farming is suitable for various type of soil with a water supply facility, if it is not suitable for agronomical crops then productivity income can be gain from fish farming.
- Nepalese climate particularly tropical and subtropical belt is most suitable for fast growing crap fishes and prescribed indigenous fishes.

The major significance of the study is to supply appropriate sources of fish farming industries throughout the consumed region. Especially fish farming is typically more efficient than other farms like cattle, pork, bees and pets of the agricultural sector. Eventually, productive fisheries and aquaculture can improve our food as well as nutrition security, yet the sustainable increase in income and improved livelihood. The research study can be a source of how to promote economic growth and protect our environment.

1.5 Limitations of the Study

The study is subjected to the following limitations:

- The study confines only Shuddhodhan rural municipality of Rupandehi district.
- The study covers the period from 2009/10 to 2018/19 due to data inconsistency.

CHAPTER II
REVIEW OF LITERATURE

Aquaculture has a relatively short history in Nepal. It was initiated in the mid-1940s on a small scale in ponds with indigenous Indian major carp seed from India. Further development began in the 1950s with the introduction of the exotic species common carp (Cyprinus carpio). It's breeding success in the 1960s followed monoculture practices and gained considerable popularity in the private sector. More progress that is significant were seen in the 1970s with the introduction and farming of three exotic Chinese carp species: silver carp (Hypophthalmichthys molitrix), bighead carp (Aristichthys nobilis) and grass carp (Ctenopharyngodon idellus). Their breeding success in captivity has been a major breakthrough in the development of aquaculture in Nepal. Similarly, the induced breeding of three commercially valuable indigenous major carps: rohu(Labeo rohita), Naini (Cirrhinus mrigala) and catla(Catla catla) were successfully established in the country. This success followed the poly culture system of production in ponds with seven species of fish with different feeding habits. This practice contributed considerably to increased production per unit area and higher economic benefits, which in turn attracted a large number of farmers. The actual developments of this practice were seen from the beginning of the 1980s with the execution of the Aquaculture Development Project supported by the Asian Development Bank (ADB) and the United Nations Development Program (UNDP).

2.1 International context

UNDP and ADB (1980) have studied the initiation of cage fish culture in lakes and reservoirs with silver carp and bighead carp in the 1970s with the support of Food and Agricultural Organization of the United Nations, United Nations Development Program (UNDP) and International Development Research Center (IDRC) was another important cornerstone in the development of fishery farming in Nepal. However, the actual development of commercial fish farming in Nepal began after the 1980s with the implementation of Aquaculture Development Project under the support of Asian Development Bank (ADB) and United Nations Development Program (UNDP). In recent years, the cultivation of high-value cold-water species

such as rainbow trout (Oncorhynchus mykiss) in some of the hilly districts has provided a new dimension in the commercial fish farming in Nepal.

Rao (1983) has emphasized that an efficient fish marketing system could eliminate some of the depressed pockets of malnutrition by supplying fish at reasonable prices to people living on a subsistence level. In general, traditional methods of fish processing (dry fish), and poor quality of products hinders the ways to enter into the export market. Traditional processors are out of the export market, as they could not meet the Sanitary and Phyto-Sanitary measures and implications of Technical Barriers to Trade (TBT).

Kotler (2000) has stated that access scenario marketing is the management process of the production chain from the producer to the final consumer. Marketing identifies, predicts and meets consumer demand with a profit for the company or organization. Marketing is also defined as socio-economic activities that control the flow of ideas, goods or services chain from producer to consumers or users. Marketing also plans and designs the principles of pricing, promotion and distribution of goods, ideas and services in order to satisfy needs and wants of individuals and organizations.

Swar (2002) has summarized an increasing trend of using destructive fishing gears and the use of small-sized mesh gill nets destroy non-targeted aquatic organisms as well as small-sized fish-fry and fingerlings. Such practices may have unwanted impacts on the aquatic ecosystems and the aquatic biodiversity unless laws prohibiting the use of destructive fishing methods protect important fish habitats.

Ostrom (2002) has stated that in the open access scenario each fisherman considers his own marginal costs and revenues and overlooks, the fact that by increasing fish catch, it may have adverse effects on other fishers as well as the health of future fish stocks.

The management of the commons is a major concern not only for the economic benefits but also important for the ecological and socio-cultural regions. Common-pool resources are either natural or manmade systems used by multiple individuals and have finite quantities of resources where one person use reduces the number of resources available to others.

Ormerod (2003) has studied the biodiversity and ecological roles of fishes in aquatic conservation, ecosystem management, restoration and aquatic environmental regulations are being increasingly recognized all over.

Delgado (2003) has carried out on the soil type and water quality of the water bodies are important factors in fish production. The better soil type is a clay soil, which can hold water and support primary production in the water column with nutrients such as iron, calcium and magnesium. Red sandy soils may be acidic and are not suitable for most fishponds. Similarly, clay soils with chronically turbid waters may be unable to support aquatic productivity and these waters may have low dissolved oxygen. Large (600sq.m) perennial water bodies (ponds and ditches) which can hold more than 1m of water are considered the most suitable for carp polyculture. Consequently, it can be said that the size of water, external environment and soil types in fish farming may be unable to support aquatic productivity what the farmer expect from the fish farm.

Furthermore, he adds 'Water body Preparation' consists of repairing or strengthening pond dikes and slopes, removing aquatic weeds and cutting of hanging tree branches. Moreover, predatory and weed fishes must be eliminated either by draining the water body, using a fish toxicant or repeated netting operations. Lime should be applied to the water body at the rate of 250 kg/ ha, in powder form, if the pond/ditch is dry or dissolved in water and sprayed if the pond/ditch is filled with water. About five to seven days after lime is applied, the water body should be fertilized with organic fertilizer (cattle manure) at 3,000 kg/ha. Basal application of inorganic fertilizers (urea and TSP) at 124 kg/ha should be made four days after applying cattle manure. Only preserving those species is not the major concern of conservers but periodic repairs must be activated such as removing weeds, eliminating predators and draining the water. Similarly stocking of fingerlings four to seven days after fertilization, 7.6-10.2 cm fingerlings of the different carp species can be stocked at the rate of 6,200-7,400 kg/ha. It is very beneficial to maintain the species composition of silver carp and only catla 45 percent, big head carp 15 percent, mrigal and common carp 25 percent, rohu 10 percent and grass carp 5 percent.

Delgado (2003) has studied during the growth period, application of another 250 kg/ha of lime is advisable. The water body can be fertilized with organic (cattle and poultry manure, and compost) and inorganic (urea and TSP) fertilizers. Suggested

application rates at weekly intervals for organic and inorganic fertilizers, respectively, are 250 kg/ha and 12 kg/ha. Compost comprised a significant percentage (40%) of the required organic fertilizer application level. A cubic meter of compost pit will require 75 kg green vegetation, 500 g lime, 300 g urea, 15 kg cattle and poultry manure and 5 kg wood.

Ghiani, Laporte and Musmannno (2004) have viewed on logistics is the science of planning and implementing the framework for the management of material, service, information and capital flows. Logistics also includes storage, transportation, and design of the supply chain. Transportation is one of the key elements of logistics since it is important to meet the requirements of the customers in a timely manner.

Johnson and Sathyapalan (2006) have studied fishing economy primarily depends upon a range of elements including networking, access to markets, market-related information, flows of fish, capital and labor.

Ravindranath (2008) has reviewed the physical facilities and infrastructure in all types of fish markets are far from satisfactory. Some of the problems in fish marketing include high perish ability and bulkiness of materials, high heterogeneity in size and weight among species, high cost of storage and transportation, no guarantee of quality and quantity of a commodity, low demand elasticity and high price spread.

Immanuel, Narayanakumar and Ayyappan (2008) have summarized the federal government, reveals that strong bonding and cooperation within the community has successfully managed their small-scale fishery in that region. The community has a traditional government, which not only regulates ccess to marine resources but also their strong monitoring mechanism and sustainable harvesting strategies have helped the local fishers to earn their livelihood for generations. In many cases, the lives of fishers in traditional fishing communities are administered by a set of socio-cultural norms and local beliefs, which sometimes hinder their own growth and influence their social and economic lives.

World Economic Forum Report (2009) has reported the World Economic Forum indicated that when such support is rendered in a coordinated way and involves both business and other stakeholders, it could create a “virtuous cycle of increased production” consumption and entrepreneurship at the local level. Whilst soft business

support reduces uncertainty and gives reassurance, hard support reduces cost and promotes profitability. There is no doubt that businesses that are able to access such support may be able to reap some real benefits.

Ziegler (2012) has viewed these fisheries are predominately labor intensive and fishers use less capital-intensive gears to harvest a comparatively smaller catch than industrial fisheries.

Pollnac, Bavinck and Monnereau (2012) have carried out the conventional economic lens and described them as a social identity, which shapes the socio-cultural lives of many fishers. Simultaneously, fisheries have undergone drastic changes in recent times, which have also influenced fishers' satisfaction and attitudes towards the traditional occupation. For example, there are different factors such as management or fish catch that shape fishers' satisfaction and attitudes towards their traditional occupation.

Urquhart and Acott (2013) have presented the issues of Governance has emerged as one of the many challenges countries face in managing fisheries. Governance not only considers economic and ecological aspects but also the socio-cultural domain of fishing in a specific context or place. Small-scale fisheries, which are important for the survival of coastal communities' identity, culture and way of life, need to be addressed through holistic approaches that integrate management, combining ecological, economic and socio-cultural domains.

Chakravarty, Tamuli, Borah and Nath (2017) have conducted a survey to explore the understanding of the economic condition of fish farmers and fishers in Inland fisheries of Assam, a north-eastern state of India that is rich in inland fisheries resources and represent the condition of many developing countries. A survey of 60 fish farmers and 60 fishers were conducted in Kamrup, a representative district of the Indian state, from 1 October to 31 December 2015. Fish farmers and fishers are selected randomly. Ex-post-facto research designs were followed to carry out the study that has already occurred. accomplish the objectives set for the study. It is observed that fish farmers of Bazera development block are lagging behind from fish farmers of Hajo Development Block. The study also revealed that fish farmers have a better income as compared to fishers purely from fisheries sector alone and block-wise analysis

revealed that Hajo Development Block is better positioned in terms of the income of both fishers and fish farmers as compared to Bezera Development Block. This paper explores to understand the status and cause of existing income so that developmental policies and conservation measure of resource can be oriented in the right perspective.

India is the second largest fish producing and second largest aquaculture nation in the world. The total fish production during 2015-16 (provisional) is at 10.79 million metric tons (MMT) with a contribution of 7.21 MMT from the inland sector and 3.58 MMT from the marine sector. The total fish production in Assam during the year 2016-17 is 3.07 lakh tones, while the state requires 3.36 lakh tons of fish, considering a per capita requirement of kg. Rivers, particularly the mighty Brahmaputra flowing through the heart of the district and bells form the major source of capture fisheries for the fishers of the district, whereas ponds and tanks are the major sources of aquaculture. Though the exact contribution from capture and culture fisheries to the total fish production of the state and that of the district yet to segregated officially, nevertheless the present national scenario suggests that inland capture fish production has stagnated while the production from aquaculture has been on the rise over the last few decades, which has an indirect bearing on the economic profile of fishers and fish farmers. Information on economic as well as the social profile of fishers and fish farmers is an essential requirement towards successful implementation of developmental programs.

2.2 National

Gupta (1984) has carried out the marketing of fish and fishery Products in India, wherein they had analyzed price variations among species across states and had identified infrastructural bottlenecks in an efficient marketing system.

Shrestha (1991) has studied the key to the growing popularity of the system in Terai is the warmer climatic conditions which are conducive to higher fish growth. There are 182 species of fish in Nepal. It has been reported that a total of 185 fish species are found in various water bodies in Nepal. They inhabit altitudes ranging from a few hundred meters above sea level to as high as 4000 meters. Three indigenous major carps (rohu- Labeo rohita, catla and mrigal – Cirrhinus mrigala) are already included in the country's aquaculture production systems. Studies are also currently being

carried out into the commercial production of three high-value indigenous cold water fish species: asala (Schizothorax spp.), katle (Acrossochielus spp.) and mahseer (Tor spp.) which are popular delicacies. Mahseer is also popular for sports fishing. In addition to these indigenous fish species, exotic species such as rainbow trout (Oncorhynchus mykiss), common carp (Cyprinuscarpio), and three species of Chinese carps (grass carp- Ctenopharyngodon idellus, silver carp – Hypophthalmicthys molitrix and bighead carp - Aristichthysnobilis) of commercial value have over the years been introduced into the country for production. Recently, Nile tilapia (Oreochromisniloticus), Java barb (Barbonymus gonionotus) and giant river prawn (Machrobrachium rosenbergii) have been introduced with the assistance of neighboring countries in order to study the viability of their commercial production in Nepal.

Shrestha (1991) has stated in regard improved production technology for Carp Polyculture that water body keeps a significant role for adopting carp polyculture traditionally, farmers in Nepal culture three to four species of Indian major carps, i.e. Rohu, Catla, Mrigal and Calabash. Recent additions of exotic species - Silver, Common, Big- Head and Grass carps- have proven successful. Recently studies show Nepalese farmers, as well as Indian farmers, utilize the modern technology of different species of fishes that indicate traditional professions.

Shrestha (1994) has observed that abundant water resources available with many rivers, lakes, stream, reservoirs and village ponds. The Koshi, Gandaki, and Karnali are the three major river systems of Nepal. Besides, these major rivers and their tributaries, there is an innumerable number of streams, lakes and water reservoirs available in Nepal. Nearly three percent of the total area of Nepal is occupied by water resources, of which about 500,000 hectares may be available for fish farming. Out of total inland water resources, river, lakes and reservoirs comprise 48.8 percent, paddy fields 49 percent, swamps around irrigated fields 1.4 percent and village ponds 0.8 percent.

Gupta (1995) has conducted a case study of cost-benefit effects of the fisheries schemes, to study the socio-economic conditions of the fish growers, to identify the major problem faced by the fish growers, to provide suggestions to improve the production and productivity. The population of the sample was 16 farmers directly

involved in the fish farming of Hathaway VDC. The major findings of the study were net profit from fish farming could be encouraging as it was Rs.20960 from 19.5 kattha of abbal land whereas net benefit from paddy was only Rs.7052.85. Before 5 years ago there was only two fish grower but up to the study period, the number increased by 16. Being more profit potentiality it is accepted from several caste communities which leads for diversification of the occupation. The attitude of farmers toward fish farming was positive.

Sharm and Shrestha (1998) have researched out that traditional fishing methods are used by most of the subsistence farmers, e.g. nets (cast nets, gill nets and scoop nets), Fishing rods (hook-line), loops, diversion of the river channel and fish spearing. Recently the use of destructive fishing methods has increased including electric fishing, explosives and poisons.

Shrestha (1999) has observed major fish species currently farmed in Nepal several indigenous and exotic fish species are farmed in Nepal for food and recreational purposes. The three major Indian carps commonly farmed in Nepal are Rohu (Labeo rohita), Catla (Catla catla) and Mrigal (Cirrhinus mrigala). In addition, exotic carps namely Common carp (Cyprinus carpio), and Chinese carps: Grass carp (Ctenopharyngodon idellus), Silver carp (Hypophthalmicthys molitrix) and Bighead carp (Aristichthys nobilis) have been cultured since 1955/56. Recently gold fish (Carassius auratus) was introduced as a recreational species in Nepal. Cold water fish species rainbow trout (Oncorhynchus mykiss) was introduced in 1968 and 1971 from India and in 1988 from Japan.

Joshi and Tiwari (1999) have given the appropriate marketing infrastructure and profitability encourages the marketing agents for the efficient flow of goods from the production sites to the market centers. Non- native fish are introduced around the world mainly for improving fisheries, sports, ornamental fish trade and bio-control of the mosquito. The aquarium trade has not come under the scanner of environmentalist, conservationists, ecologists, and policy makers as much as trade in terrestrial endangered species.

Gurung and Basnet (2003) have explained salmonids rearing and farming disease like fin rot, hepatoma, fungal problems in fertilized eggs, presence of watery fluid in

stomach and physical disordered like blunt snout, twisted alevins, abnormal gills, degenerated operculum and blindness were observed by Godawari fisheries Research Centre during introduction of salmonids like rainbow trout.

Sharma (2008) has viewed that the availability of a plethora of water resources gives Nepal an opportunity to exploit its resources for various usages such as electricity production, irrigation, and fish farming. The widespread availability of paddy fields in the southern plains and mid-hills of the country provide additional opportunities for rice cum fish culture. Nepal is rich in fish biodiversity with nearly 200 fish species available, of which around 190 are indigenous species and remaining are exotic species. Among them, 59 indigenous and two exotic fish species are considered cold water species. In total, 10 fish species have been categorized in the endangered and vulnerable categories, while 34 fish species falls under the threatened category. Fish farming has been traditionally practiced by some tribes in Nepal since time immemorial. Generally, Tharu, Kewat, Das, Kahar, Mallaha, Lodh, Gaud, Gaha, Gurung, Kumal, Gupta and Magar tribes were traditionally involved in capture fishery.

Jha and Bhujel (2012) have studied three high-value indigenous cold water fish species popular as delicacies: Asala (Schizothorax sp.), Katle (Acrossochielus sp.) and Mahseer (Tor sp.) are also under consideration for commercial farming. One of the major problems of fish farming in Nepal is the prevalence of fish diseases. Several bacterial, protozoan, parasitic, crustacean, fungal and unknown diseases are prevalent in Nepal. Among the bacterial diseases, the major diseases are Tail and Fin rot, Columniaris, and Gill disease. The common fungal diseases are Saprolegniasis, Epizootic ulcerative syndrome. Trichodiniasis, Costiasis, Ichthyopthirius, Myxosomiasis, Apiosomiasis, and Epistylis are the major protozoan diseases identified in Nepal. Ectoparasitic diseases caused by Dactylogyrus sp. and Gyrodactylus sp. and helminthic diseases caused by Bothriocephalus sp, Procamallnus sp., Zylanema sp, Piscicola sp., and Cariophullaeus sp. have also been reported in Nepal. Among the crustacean diseases, diseases caused by Argulus sp and Learnea sp. are present. In addition to specific diseases, other unknown problems such as sporadic fish kill and falling of scales have been observed by fish farmers in Nepal.

Marketing channel of fish has been not systematic in Nepal. Commonly, fisherman and small scale fish producers sell their fish directly to the consumers. Medium and large scale fish farmers use different channels to sell their fish. They sell some of their fish directly to the consumers in local markets, or through agent or contractors to the middleman or wholesalers. A study conducted by Shrestha (1999) has shown that 28 percent of the fish is consumed or given away by farmers, 30 percent are sold directly to the consumers and 42 percent are purchased by wholesalers from contractors and distributed to retailers in major urban centers. Major problems of fish farming in Nepal. There are several challenges faced by the farmers involved in fish farming.

Shrestha (2012) has explained on the Resource, Biology and Ecology of fresh water of Kathmandu Valley with particular reference to fish production management, Market and Conservation had been done. Some studies on different aspects of fish markets, different types of fishes sold in village markets and Kathmandu markets had been described in "fishes, fishing implements and methods of Nepal". He is working on the breeding project of Guppy, Sword Tail, Platy, Goldfish, and Color Carp.

The continuous flow of water, maintaining oxygen level, avoiding undesirable pollution residues for fish farming might also be challenging task for good and hygienic fish production. Landslide in a hilly region and higher clay and turbid water in some river systems can be a problem for aquaculture based on river water systems. No road and transport facilities, lack of electricity, infrastructure in possible sites for aquaculture and aquatic tourism are very frustrating and challenging issues in Nepal. Many scholars have defined small-scale fisheries on the basis of their scale of operation, level of technology, employment generation, and degree of capital intensity and investment.

Joshi (2014) has reported rainbow trout farming has been done in eleven districts of Nepal namely Mustang, Manang, Rasuwa, Nuwakot, Sindhupalchok, Lalitpur, Kathmandu, Makwanpur, Dhading, Kavre, and Kaski. Recently, Nile tilapia (Oreochromis niloticus), Java barb (Barbonymus gonionotus) and giant river prawn (Machrobrachium rosenbergii) have been introduced to study the potential of their commercial production in Nepal.

Gurung (2014) has conducted on agricultural sector along with fisheries production will increase the production value, this may increase the job opportunities for Nepali people and migration rate will be lowered. It was suggested that there was a three to a five-fold increase of fisherman from 1980 to 2005 in Nepal due to population growth. This study focused on fish business which helps to increase income, employment and as well as control on migration by uplifting village people living standard of life.

Gautam (2015) has reviewed the major problem is the lack of sustainable fingerlings supply system. In addition, lack of marketing infrastructure, lack of cold storage facilities, poor quality fingerlings and fish feed and lack of technical knowledge are other major issues the fish industry is facing. There is also no fish-processing factory available in Nepal. Loss of habitat and their degradation are other major issues for sustainable fish farming in Nepal.

CBS (2015) has reported agriculture contributes only about one-third portion of total GDP of the nation and nearly two-thirds of the population depends upon agriculture for daily livelihood which makes it a backbone of the national economy. Out of various sub-sectors of agriculture, aquaculture has established itself as an emerging, progressive and dynamic sub-sector. In Nepal, aquaculture was started in the early 1950s despite having a long history in fisheries practice. Its development, over this period of more than half a century, has not been quite encouraging as it should be as compared to neighbouring countries. Currently, aquaculture contributes to about 1.32 percent of total gross domestic product (GDP) and about 4.22 percent of agriculture gross domestic product (AGDP). According to the statistics provided by MoAD, the economic growth of agriculture sector is 1.3 and 2.22 percent in the fiscal year 2072/073 and 13th fifth-year plan respectively while during this same time period aquaculture achieved the economic growth rate of 10.79 and 18.64 percent respectively. This two-figure economic growth rate of aquaculture in the past 10 years' period has foreseen its potentialities to be established as a vital sub-sector of agriculture.

But despite this growth, our per capita consumption of fish is only 2.75 kg which is far below than the world's average (19 kg) and an average of least developed countries (11 kg). So to address this piteous issue there requires packaged programs and planning leading our aquaculture sub-sector in a more commercial way to

encourage the farmers and possible stakeholders in identifying the possible ways for promoting agri-business sector and exploiting the available resources in a sustainable way.

FAO (2016) has observed that culture fishery is relatively new in Nepal and was initiated on a small scale in the mid-1940s with the introduction of Indian major carp's seed. The introduction of exotic common carp (Cyprinus carpio) in the 1950s and three exotic Chinese carps, namely silver carp (Hypophthalmichthys molitrix), bighead carp (Aristichthys nobilis) and grass carp (Ctenopharyngodon Idella) in the 1970s provided a major impetus in the development of cultured Fishery in Nepal. In addition to this, the successful induced breeding of three major carps rohu (Labeo rohita), catla (Catla catla) and mrigal (Cirrhinus mrigala) provided a new avenue for commercial aquaculture farming practices in Nepal.

DOFD (2016) has reported the pond aquaculture has been developed as the most viable and popular aquaculture production system in Nepal. It has accounted for over 90 percent of the total production of 20000 tons in 2003/2004. The major part of the pond fish production takes place in the southern part of the country, the Terai plain where 94 percent of the fish ponds are located. Carp poly culture in ponds is by far the most common and viable aquaculture production system adopted in Nepal and in 2003/2004 made up about 90 percent of the total production of 18060 tons. The major part of the pond fish production takes place in the southern part of the country-Terai plain, where 94 percent of the fish ponds are located. These ponds cover over 97 percent of the water surface area and account for over 98 percent of the total pond fish production in the country. Data compiled for 2003/2004 showed an average pond fish yield of 3.00 tons/ha in Terai plain, which exceeded the national average of 2.96 tons/ha and is twice the average yield in the hills and mountains.

DoFD (2016) has conducted to the total fish production of our country is 77000 MT in the year of 2072/073 out of which contribution from aquaculture sector is 55500 MT and remaining from capture fisheries according to the statistics provided by the Directorate of Fisheries Development (DoFD) under the Ministry of Agricultural Development. Last fiscal year, out of the 77,000 metric tons of fish produced in the country, around 21,500 metric tons were produced in natural reservoirs and 55,500 metric tons in ponds. Around 57,520 metric tons, 64,900 metric tons and 69,500

metric tons of fish were produced in fiscal years 2069/70, 2070/71 and 20071/072 respectively.

Over the period of last five years, there has been about 37 percent growth in total fish production in the country. This is mainly because of the increase in pond aquaculture practice, which has seen more than 60 percent increment in production. The contribution from capture fisheries is more or less constant over this period. In the fiscal year 2072/073, total aquaculture production is 55500 MT from 9934 hectares of pond area in Nepal with the productivity of 4.89 MT per hectare. There has been constant and predictable growth in pond aquaculture practice in terms of area and production over the years. The rate of increase in the demand for fish is greater than the rate of increase in fish production. People growing health concerns and nutritional awareness is the major reason for this increase in demand. People are consuming more fish in those past years but the level of production is not keeping up as demand rises. But the demand for fisheries products has not increased to the extent necessary for human health. The national demand for fish should be around 131,000 metric tons for a healthy life, he said, however, around 85,000 metric tons were enough to address the current demand. With the increasing demand, the import of fish has also been growing for the last five years because domestic production is unable to meet the growing demand. The import of fish rose by 4 percent in the last five years. The country imported 7,425 metric tons of fish in 2068/069, 9,963 metric tons in 2069/070, 12,869 metric tons in 2070/071 and 11,177 metric tons in 20071/072. The import of fish declined by 29 percent to 7,153 metric tons last fiscal year compared to the previous fiscal year 2072/073 due to the unofficial blockade imposed by India.

The income from fisheries has also been growing with the increase in production and the income from this occupation has soared by 65 percent in the last five years. Fishery generated an income of Rs.28 billion in 2071/072, Rs.24 billion in 2070/71, Rs.21 billion in 2069/70, Rs.15 billion in 2068/069 and Rs.12 billion in 2067/068. Currently, 47218 households are involved in aquaculture practice and annually there is a 5 percent increase in employment opportunities related to aquaculture sub-sector. In the fiscal year, 2072/073 122772 people are directly involved in aquaculture and related sectors whereas more than 400000 people are indirectly benefitted. Fish farming can be successfully done, not only in agriculture land but also in poorly

drained land which is not so suitable for agriculture. Fish can be cultivated successfully in old ponds by managing effectively and by this way production and productivity of fish can be increased.

A survey fishery (2016) has reported fish farming or aquaculture as its commonly known is an intensive animal husbandry business. In this form, the work involves managing and maintaining fish habitats throughout the year, taking care of stock health and welfare way and feeding the fish manually or using automated machinery. People of the current world need to eat with sources of protein necessary ingredients to a healthy diet. One major food having protein is the source of fish as well as other aquatic species in the earth. The food production system of the world is consumed by humans come from farm i.e. fish farm.

Paudel (2016) has conducted another worrying issue for the fish industry in Nepal has been the identification of heavy metal contamination in fish sold at some major urban centers. For example, some fish were found to have been contaminated with Manganese, Lead and Chromium at Kathmandu and Mercury at Pokhara. If not taken seriously, this can be a public health issue anytime and could impact the fishery industry. Fisheries extension and research services in Nepal The extension and research services of the fishery in Nepal fall under the jurisdiction of Ministry of Agricultural Development (MoAD). Under MoAD‘s Department of Agriculture, the Directorate of Fisheries Development (DoFD) is mainly responsible for providing extension services to the farmers. The other institutions under DoFD are Central fish Laboratory, fisheries Development and Training Center, fisheries Development Centers located in different districts, and the District Agriculture Development Offices. The organization responsible for research on fisheries is the Nepal Agricultural Research Council (NARC). NARC has several fisheries research program at several locations, namely Tarahara and Parwanipur for warm water fishery; Pokhara for lake and reservoir fisheries; Trishuli for riverine species; and Godawari for cold-water fisheries.

NPC (2016) has reported the major policies of the government of Nepal are currently at the end of its 13^{th} three-year development plan (2013/14 to 2015/16). For the fishery sector, the target of this plan is to achieve per capita annual production of 2.7 kg Fish. To achieve this target, the major policies put forward by the Nepal

government are to extend the fisheries program in the mid-hills and cooperative based fisheries in the reservoirs, ponds, and wetlands of Terai.

Small, landless and marginalized farmers would be the target of the program. Suitable technologies would be developed and extended based on local feasibility to enhance fish production and productivity. High-value fish production would be prioritized in north-south road corridor and cold-water fish species would be promoted in hills. The policies include mobilization of farmer's group, encouragement of international and private investments, promoting insurance system for commercial fish farming guaranteeing the supply of fingerlings, and providing bank loans for those interested in fish farming. Other major policies include leasing provision of common water bodies such as community ponds, rivers, reservoirs and swamps, an integrated support system for commercial fish production are, expert exchange among academic institutions, promotion of local and indigenous knowledge of fish production, restoration of degraded water bodies and promotion of biodiversity conservation. In addition to the above policies, the Nepal Government had promulgated the Aquatic Life Conservation Act 1961 (Jalchar Sanrakshan Ain 2017) for the protection of aquaculture species. The 1999 (2056 BS) amendment of the act included restrictions on capture methods and killing of some vulnerable and rare fish species. The Act has also provisions for using hydropower reservoirs and dams for the establishment of fish hatcheries.

DADO-RUP (2017) has reported on the nature of the district is plain Terai; fishery is one of the familiar components of agriculture, also the source of income too. Out of total water area of 1002 hectares, aquaculture pond occupies about 877 hectares. Total fish production of the district is about 4500 MT in the previous year 2072/073. A number of fish farmers in this district are about 2140 with pond number of 3910. Various aquaculture methods are practiced like extensive, semi-intensive and intensive aquaculture with pond areas of 206 ha, 221 ha and 450 ha respectively. In the sector of fish hatchery development, at present, 5 private sectors and 1 public sector (Fishery Development Center) are involved in the district. 24 fish nursery farms are present in the district to provide quality fish seed to the farmers as per the demand.

Budhathoki and Sapkota (2018) have presented the Formal types of fish farming begin in Nepal from in 1947 for economic purpose. There are 29,270 fish ponds in the country. The Terai plain alone contains 95 percent of total fish ponds and the area dedicated to fishery amounts to more than 10,718 hectares with the total fish production reaching 65,770 tones in this fiscal year. Nepal has aquatic resources, which are located in different altitude and climatic zones. So due to the different freshwater habitat, there is a potential for different fisheries and aquaculture activities in Nepal.

The corresponding authors of the article concluded that fish consumption per capita is very low this should be increased by raising awareness about fish nutrition. The price of tuna fish was different and depended upon its flavor. Pickle of dry fish of prawn and other dry fish with peanut is also sold in the supermarket, which is consumed by Nepalese customers as snacks. Meat in Nepal is used in order to meet the demand for protein uptake in the human body. There are many fishery policies to extend fishery programs, provide the technical facility, and provide banking loan, insurance and to provide leasing provision of common water bodies. Whose overall aim is to increase production and to make the country self-sufficient but it is recommended to the Nepal government to address the problem faced by the farmers to improved fish farming in Nepal. From the observation of the above mention article, it is seen that fish consumption in the country is low in comparison to other neighboring countries. Therefore the government of Nepal should increase fisheries in accordance with people demand. They suggest that farmers ought to be provided banking loan, insurance and leasing provision of common water bodies.

2.3 Research Gap

The study purposed to access the cost-benefit effects of the fisheries schemes as socio-economic conditions. It supported to encourage net profit from such farming. The study represented at end of the 20^{th} century. The research of support to the present research for caring and considering conservationists, ecologist's policy to conserve the fisheries farm and designing new ponds or areas.

The different views they recommended networking access to the market of a specific occupation. It's a research gap of 7 years. However, it helped me to understand

traditional and modern occupation related to fish in an international context. To help diagnose disease hampers farms is fin rot, Hepatoma, Fungal problems fertilization problem, blunt snout, twisted alevins and at normal gills, the blindness of fish. When I entered into study field farmers told their due challenges and problems.

The presented a paper in which issues of Governance was raised in the challenges countries facing management fisheries that impacted economic and ecological system consequently, a socio-cultural domain in specific context and place. From the study, I got an idea of the role of the state for facing challenges.

Likewise, the national context of fish farming occupation is found different than international context. The research gap is formal indicated support involved business and stakeholders that can create a virtuous cycle of increased production and consumption.

At the time of preparation research study, different books, journal articles, and Thesis have been studied and found that economic condition improved from fish farming and help to preserve on ecology environment. Modern fish farming promotes Production, migration control if the government focused on training, education and solve the problem of disease to increase their production capacity, employment generates and increases commercial activities.

Hence, this research will be equally beneficial to the policymaker, planners, fish farming researchers, fisherman, students and the persons interested in fish farming in Nepal.

No attaint no work has been done so fast in the skill so study justified the present work in Shuddhodhan rural municipality. No work has been justified on the field of problem, prospect, employment and production the present work. This study has focused about the income status, employment, problem and solution as well as it also helps to fish farmers, others people improved socio-economic life and also helps to contribution on national GDP in Nepal.

CHAPTER III

RESEARCH METHODOLOGY

The research methodology is a systematic process to approach any research problem and explore it objectively for finding the solution.

3.1 Research Design

The descriptive and analytical types of research design have been followed for the study where the issues are related to the research objectives.

3.2 Selection of Study Site

The study were conducted at Rupandehi district of Nepal. The district represents the typical terai characteristics and has the potentiality of fish farming. Data were collected from Suddhodhan rural municipality of Rupandehi district. On the present context of federalism, within 4 VDCs come under 1 Rural Municipalities namely Suddhodhan. These Rural Municipalities are purposively selected because of the majority of fish farmers. This rural municipality has been selected purposively as study site based on the area coverage of fish farming and priority is given to sites in proximity to urban centers, and commercial growers.

3.3 Sample and Sampling Technique

Purposive sampling procedures were used to select Suddhodhan rural municipality based on the fact that there were large water bodies for fish farming and the availability of the technologies. Careful attention were paid to make the list more inclusive (i.e. inclusion of producers from different wealth categories, different ethnic groups and different agro-ecological domains). Total of 80 samples size, 10/10 samples size were selected from each six ward numbers and rest 20 samples size were selected from ward number seven. These 80 samples size represents total population of 136. A well structured questionnaire were used to collect data for the study.

3.4 Nature and Sources of Data

To draw a conclusion and generalization both primary and secondary data were collected to fulfill the objective of the study. This research work is mainly based on primary data were collected from the study area by using different technique and tools like survey, interview, observation, and structured questionnaire. Some secondary data was taken whenever that necessary from different source like economic survey, fishing journal, article, research reports, etc.

3.5 Population, Sample and Sampling Procedure

The research study were conducted on fish farming households in Suddhodhan Rural Municipality, Rupandehi and for this simple random sampling were used by lottery method out of the total population. The total population has been 136 farmers among them 80 farmers are taken as sample size. The sample size were representative of total population. For the requirement of information, research has been done based on different secondary sources of data related study topic.

3.6 Tools and Method of Data Collection

This study is based on the primary as well as secondary sources of data. Primary data were collected by the researcher through questionnaires, informal interviewed with rural municipalities. Secondary data are drawn from fishing development office, district agriculture office, Rupandehi and Thutipipal various published official document.

3.7 Tools and Methods of Data Analysis

The statically tool were used for analyzing at the collected data, percentage, average and ratios were calculated by using the bar diagram.

CHAPTER IV

PRESENTATION AND ANALYSIS DATA

4.1 Background of Rupandehi District

The district lies on the southern and western part of Nepal. On the east, it shares a border with west Nawalparasi District, on West with Kapilvastu District, on North with Palpa District and on South with India. The elevation of the district lies between 100 m to 1229 m from sea level. The total area of the district is 1,360 km² with 16.1 percent in Churia Range and rest in the Terai region.

Rupandehi district is situated in the Western Development Region of Nepal between 270 20'00" to 270 47'25" N latitude and 83012'16" to 83038'7" E longitude with an area of 1360 km2 (CBS, 2002). The average temperature ranges in between 8.750 C to 42.40 C and average annual rainfall is 1391 mm. It is surrounded by Nawalparasi district from the east, Kapilvastu district from the west, hilly districts of Palpa and Arghakhanchi from north and Mahrajganj district of Uttar Pradesh (India) from the south. The total population of this district is 8, 80,196 Brahmin, Magar, Tharu, Muslim, Yadav, Chettry, Kewat, Chamar, Gurung, Newar, Kami, Teli, Kurmi, Koiri, Damai, Sonar, Thakuri are the major communities living in the district. According to the population census 2068 B.S. the population of the district is 880196 in which 432193 are male and 448003 are female. The density of the population is 647 per square kilometer and the literacy rate is 69.78 percent (DPoR, 2018).

The Government is implementing 'fishery zone program' in eight village development committees (VDCs) of Rupandehi. Fish farming in Rupandehi started in 1977.

Rupandehi District Agricultural Development Office is implementing the program in eight VDCs, putting Dayanagar VDC at the center, under the Prime Minister Agriculture Modernization Project. Under the project, Morang and Rupandehi have been selected for the 'fishery zone' program, while Bara has been selected for the 'super zone' program.

Fishery development officer has promoted fish farming in the Rupandehi district. “We are being hopeful to be many farmers are being attracted toward commercial fish farming,” he added. The government has allocated Rs176.8 million to implement the program. Rupandehi has produced around 4,500 tons of fish annually. Fishery industry of the district is worth Rs1 billion annually (Jaisawal, 2017).

In the first phase, we were construct ponds in 500 hectares ponds it constructed in Dayanagar, Manmateria, Amuwa, Kamharia, Suryapura, Harneya and Dhamauli VDCs. “Of the total budget, Rs 162.5 million has been allocated to construct new ponds,” he added. Nursery management, collection center, fish market and refining center are built in the second phase. Though ponds have to be constructed by the end of the current fiscal year, the program office is yet to be built (Ali, 2017).

According to Rupandehi DADO, 2,150 families in the district are conducting fish farming in 1,000 hectares of land. The district has 57 groups of fish farmers. Similarly, there is a natural pond in 125 hectares of land. There are 3,850 artificial ponds, six hatcheries, 16 fish nursery, eight fish firms, and 18 live fish sales center in the district. Fish farming in Rupandehi started in 1977. Rupandehi produces around 4,500 tons of fish annually. Fishery industry of the district is worth Rs1 billion annually, Regarding Ramesh Jaisawal, fish development officer (FZP, 2075).

4.2 A short description of Shuddhodhan Rural Municipality

Shuddhodhan Rural Municipality is of the newly founded municipalities in Rupandehi. The lord Gautam Buddha father’s name is Shuddhodhan. The total area of Suddhodhan Rural Municipality is 57.66 km2 and holds 34638 populations. Shuddhodhan Rural Municipality population density is 325 people per square kilometer as of 2068 census It is based on long-term tourism generation and prosperity with a friendly environment. It lies in Lumbini Zone which is 15 km apart from Lord Gautam Buddha’s birthplace.

It is surrounded by Tilotama Municipality in east, Gaidhawa Rural Municipality in the west, Sainamaina Municipality and Butwal Sub Metropolitan in the north and Siyari Rural Municipality and Mayadevi Rural Municipality in the south. Shuddhodhan Rural Municipality consists of 7 wards which are formed by a combination of Sau-Farsatika, Khadwa Bangai, Man Pakadi and Man Materiya VDCs (RSRM, 2075).

4.3 Income and Expenditure Status of the Fish Farmers

The study of fish farming occupation has been done in Shuoddhodhan Rural Municipality. Nepal is one of the agricultural countries. Where a different agricultural business has done. In which fish farming is one of the important business in Nepal. There are 85 fish species found in various water bodies in Nepal. However, it is seen that there are 11 species of fishes in Rupandehi district. There are 7 species of fish production in Shuddhodhan Rural Municipality. As a researcher, I tried to find the income and expenditure status of the fish farmer where they are attracted towards fish occupation at rigorous practice since the establishment of pond construction. The farmer can have various purposes to conserve and dig up then establish the farmer's income in the given titles. There are factors behind the fish farmer problem to earn and net income as well as the expenditure status of the fish farmers. The following tables have been presented to display the assessment of income and expenditure level of the study area farmers.

Table No. 4.1

List of Respondents in 10 Fiscal Year Rigorous Occupation of Fish Pond to Conserved (2009-2019)

S.N.	Fiscal Year	Male	Female	No. of fish farmers	No. of fish ponds
1.	2009/10	75	5	80	105
2.	2010/11	77	9	86	112
3.	2011/12	83	10	93	117
4.	2012/13	89	13	102	130
5.	2013/14	94	15	109	146
6.	2014/15	100	15	115	154
7.	2015/16	102	16	118	166
8.	2016/17	108	17	125	200
9.	2017/18	110	19	129	220
10.	2018/19	116	20	136	264
Total		**116**	**20**	**136**	**264**

Source: *Fisheries Zone Profile Book*, Rupandehi, 2074/075.

Table No. 4.1 shows that the number of farmers and the number of fish ponds in 2009/10 to 2018/19. According to data of various reports and sources, it has been seen an increasing trend in regard employed farmers and the number of ponds extension. The number of a farmer in the fiscal year 2009/10 was so were 5 of them were female and 75 of them were male. After five the year 2015 the number of farmers were increased i.e. 118 where 16 of them were female and 102 were male to describe the fiscal year 2018/19. It is seen that the number of females is increased ie.20 and 116 were male.

Similarly, the number of ponds in the fiscal year 2009/10 was 105, as it was 166 in the fiscal year 2015/16. The number of ponds in the fiscal year 2018/19 is increased up to 264 ponds.

From the above diagram, it is found out that the number of fish farmers either they are male or female is increased in comparison previous and established year. Furthermore, the number of ponds are seen increased where the investment of farmers

whether government help or any organization help dig up or build up the due attraction of the study field farmers.

To compare different ten of year's data related to fish farmers and fish ponds, both male and female involved in this occupation. Thus, the attraction of farmers is positive toward the fish farming occupation. The more the occupation adopted in the study area. It is better to invest in an appropriate circumstance. We can say that if fish farmers had not been built and established fish farms. They would not have invested and increased as well as income enhancement. From the income, farmers can have improved their primitive status i.e. education, health, way of livelihood and modernized as well as a civilized society.

4.2 Pond description of delimited area at Shuddhodhan Rural Municipality, Rupandehi.

The fish pond of the village is controlled as it is artificial pond or lake or a reservoir that is stocked with fish and used in aquaculture for fish the prime purpose of the pond can produce different species of fishes.

The following tabulation indicates many sorts of ponds which are built in the size of available area land and geographical situations. Especially nursery pond and production pond are found nearly study region what I want to display the table chart of the pond.

Table No. 4.2

Pond Detail

S.N.	Nursery pond	Area (Hectare)	Production pond	Area (Hectare)	Total pond	Total area
1.	80	9.14	184	97.53	264	106.67

Source: *Fisheries Zone Profile Book*, Rupandehi, 2074/075.

Table 4.2 shows that details of ponds, their area having different categories of production. There are 80 nursery ponds in the study area and 184 production ponds. The ponds occupy the 9.14-hectare land area where production pond occupies 97.53 land areas. To sum of the total ponds, the area is 106.67 hectare. The production

ponds have covered more land then nursery area land. By the observation of ponds details, the number of ponds has been earning cash amount what the farmers can expect through advantageous perspectives. Fish farming is increasing day by day in this rural municipality. It is also a detail of increase encouragement in regard to fish occupation.

It is found that production ponds are found to be better useful and dig up and built fish farmers whereas nursery ponds are established to supply species of fish to other and newly rebuilt ponds.

Here, the researcher assesses for new and what purpose106.67 hectare land area is used to produce fish. It is a positive attraction toward the fish occupation. Where male and female have invested and worked professionally for the sake of earning a rigorous profession.

4.3 Description population as caste wise in the rural municipality.

Table 4.3 shows caste wise description in Shuddhodhan Rural Municipality of Rupandehi District. The total population of this municipality is 34638 according to the population census 2068. There are 6 castes that live in this rural municipality.

Table No. 4.3

The total population of caste-wise in Shuddhodhan rural municipality

S.N.	Caste	Percentage
1	**Brahman and Chhetri**	22
3	**Madhesi**	36
4	**Janajti**	33
5	**Muslim**	2
6	**Dalit**	6
7	**Other**	1
Total		**100**

Source: Report of Shuddhodhand Rural Municipality, 2074/075

Table 4.3 shows the percentage of the population in the rural municipality. It is seen that 36 percent population respondent from Madhesi community, 33 of Janjati, 22 of

Brahmin Chhetry, 6 of Dalit, 2 of Muslim and 1 of another caste. It shows the highest number of population in this rural municipality represents Madhesi that is 36 percent of the total population and there is 1 percent population of other caste and 2 per cent from the Muslim community.

To analyze the table this place indicates multi-caste inhabitants. It means that no caste has dominated other caste. It's a culturally and social mutual harmony.

4.4 Use and Distribution of the Cash Income from Fish Selling of Fish Farmers in Shuddhodhan Rural Municipality.

The following tabulation displays the use and distribution of the cash income from fish selling. Six titles are mostly implemented for the save of various purposes.

Table No. 4.4

Use and distribution of the cash income from fish selling

S.N.	Title	No. of farmers	Percentage of utilizing cash
1	Raw materials for fish pond	80	50
2	Home expand		15
3	Education		10
4	Saving and credit		15
5	Health care		5
6	Others		5

Source: Field Survey, 2018.

Table 4.4 spectacles the use and distribution of cash income from selling. Eighty farmers involved to response how much do they use and distribute cash income in different titles. According to their responses, 50 percent cash income is used and expanded in raw material for fish pond i.e. the half of total income. Similarly, there is equal distribution i.e.15 percent invests in home expense and saving and credit titles. To see other title and healthcare 5 percent of total cash is used to those titles. Fifteen percent of total cash income is saved for saving and credit.

4.5 Income of fish farmers in Shuddhodhan Rural Municipality.

The annual income of the fish farmers in lakh and the number of farmers in one fiscal year in the regard fisheries sector in Suddhodhan rural municipality of Rupandehi district. It has been shown that their income in different categories of income status.

Table No. 4.5

Annually income of fish farmers in fisheries Sector

S.N	Fish farmer income slabs (in lakh)	No. of Farmers
1	0 – 3	26
2	3 – 6	31
3	6 – 9	12
4	9 – 12	4
5	12 – 15	2
6	15 – 18	2
7	18 – 21	1
8	21 – 24	1
9	More than 24	1

Source: Field Survey, 2018.

Table 4.5 displays that the farmer's annual income is seen into nine categories. The study were researched out 80 farmers of the delimited field of the rural municipality in Rupandehi district. According to the organized and tabulated data of the fiscal year 2075, twenty-six farmers annual income is found 0 – 3 lakh, likewise, 31of them earned 3 – 6 lakh rupees in the same fiscal year. Where 12 of then earned 6 – 9 lakh it their medium size income. Only 4 farmers income is found 9 to 12 lakh annual way. Some farmers income appeared 12 to 15 lakh and 18 to 21 lakh is seen 2 and 2 respectively. Similarly, only one of their income is seen 18 to 21 lakh and 21 to 24 lakh Rs. In one of the same fiscal year. Likewise, 1 of the farmer's income is found more than 24 lakh rupees.

Table 4.5 depicts that the highest number of farmers in the study field have accessed their income 3 to 6 lakh rupees annual ie. 31 farmers income is surveyed up to 3 to 6 lakh rupees whereas 1 farmer in the same fiscal year earned the income up to 15 to 24 lakh respectively. It is found that most of the farmer's income is not above 9 lakh

rupees whereas only a few of them 12 to 24 lakh. Fish farmers in this study field have not earned their income in an equal way. However, their income has found differences in the same fiscal year 2075. Moreover, the income of farmers is seen an increasing trend from beginning level to the highest level.

4.6 Types of Fishes of the Pond at Study Field Area

The census has reported 200 species of fish in the earth's surface. But all the species of fish can be found in built ponds. Fish ponds of Nepal are specially built for income and short term use so the farmer wants to produce and grow the species of fish which have been found in this municipality are as below.

Table No. 4.6

Hybrids types of fishes

S.N.	Types of fishes at the pond	Fish on the basis of Production	Wholesale price Rs./kg
1.	Grass carp	Silver carp	200
2.	Silver carp	Bighead carp	200
3.	Common carp	Rohu carp	270
4.	Naini	Naini carp	200
5.	Bighead	Grass carp	270
6.	Vakur	Vakur	200
7.	Rohu	Common carp	270
8.	Tilapiya		
9.	Bikase mangur		
10.	Baikhi		
11.	Puntius		

Source: Field Survey, 2018.

Table 4.6 spectacles those 11 types of fish are found and grown up for marketing purposes. It has been seen most favorable and adoptable fish such as Silver carp, Grass carp, Common carp, Rohu, Naini, Vakur, Bighead carp, Tilapia, Bikase mangur, Baikhi and Puntius. Among the available fish in study filed farmers responded that the most favourable fish is Silver carp, Common carp and Grass carp. Likewise, the lowest preferable fish include Vakur carp.

The other types of fish are found and sold in an average size and price. The most expensive fish among 11 types of fishes Rohu carp, Common carp and Grass carp. The cheapest one is Silver carp, Bighead carp sold brought. In this region, their species of fish are bought and sold in the market. The price of Rohu, Common carp and Grass carp are sold Rs.270 per kg at wholesales rates. Similarly, Silver carp, Bighead carp, Naini carp and Vakur are sold Rs.200/ kg.

To see production, the Silver carp species are found and grown in the fish ponds. Similarly, Vakur carp species of fish are produced in the least production. From the analysis, we can say that the different species of fish are grown up and sold in wholesales marketing. However, Silver carp is mostly preferable fish among many of them.

4.7 Description of Male and Female Respondents in Fish Farming at Study Area

The following table displays the description of male and female. Who has involved in the fish farming occupatio? It was distributed a set of questionnaires in which they filed up the form of format question. That includes the number of the population adopting such occupation what they replied is tabulated below.

Table No. 4.7

Details respondents male and female

Sex	Number	Percentage
Male	50	62.5
Female	30	37.5
Total	80	100

Source: Field Survey, 2018.

Table 4.7 displays participants of the population in fish farming where 50 male and 30 female were involved. To calculate the data 62.5 percent male have adopted this occupation whereas 37.5 percent female has adopted this occupation. They responded that they want their income as much as they product varieties of fish which are available in the land surface of Rupandehi district.

Although it an ancient profession, man and women nowadays have been attracted and keenly interested in such occupation where 37.5 percent female have been working. On the other hand, we can say female have been improving their life as dependent themselves without the help of a male. Consequently, this trend can help economic development in the grassroots levels.

4.8 Fishes Liked and Preferred by Farmers

The following table spectacles the varieties of fish that the farmers like. They responded that it is tough to identify a favorite fish 11 however they can like according to the taste. But it can be a little bit separate occasion market today are increasing for the perspective of getting benefit from own business. The following responses are necessarily included.

Table No. 4.8

Types of fishes like to farmers

S.N.	Verities of Fishes	No. of farmers	Percentage
1	**Silver carp**	19	23.75
2	**Grass carp**	16	20
3	**Comman carp**	14	17.5
4	**Rohu**	11	13.75
5	**Naini**	9	11.25
6	**Bhskur**	7	8.75
7	**Bighead carp**	4	5
Total	**7**	80	100

Source: Field Survey, 2018.

Table 4.8 depicts that seven types of fishes are found in the surface pond of Shuddhodhan Rural Municipality, Rupandehi. Which are liked and preferred by the farmers? The question was asked like which and what fish did they like most. Their replies were not similar however according to their views the most favorable fish is Silver carp in which 23.15 percent of farmers preferred. Likewise, 20 percent of farmers liked Grass carp. Common carp is liked by 17.5 percent, 13 percent of them liked Rohu, 11.25 percent liked Naini 8.75, of them, liked Vakur and Bighead is liked by 5 percent.

To analyze the fact of favorable fish Silver carp is mostly liked by many of them and some of them liked Bighead a less number of farmers.

4.9 Production Cost for Professional Fish.

Table 4.9 displays work detail, unit of land rate and amount in Rs. It is not easy to conduct the profession of fish. There can be a need for much equipment for conducting professional fish farming in the designated region. Likewise for those equipment's many participate can help to grow up as expected norm and plan of farmers.

Table No. 4.9

Production Cost for Professional Fish

S.N	Work details	Unit	Quantity	Rate	Amount Rs.
1	Pond's water area	Hector	1		
2	Pond's deprecations	Amount Rs.	600000	10%	60000
3	Pond sanitation	Time	1	5000	5000
4	Use gysum	Kg	500	20	10000
5	Water expend	Fit	5	40000	40000
6	Fish bhura	Pice	10000	1.5	15000
7	Organic fertilizer	Kg	6000	3	18000
8	Urea fertilizer	Kg	1000	25	25000
9	DAP fertilizer	Kg	700	50	35000
10	Plate dana	Kg	6000	45	270000
11	Process greater	Hours	600	10	6000
12	Security	M/ F	12	10000	120000
13	Medicine and other	Rs.			30200
14	Annual interest	Rs.			31710
Total Expenditure					**665910**
Income details					
15	**Fish production**	Kg	6000	200	**1200000**
16	**Net income**	Rs.			**534090**
17	Fish production expenditure	Per Kg			110.98
18	Expenditure and Income	Ratio			1:1.8

Source: Annual Report Fish Farming, Thuthipipal, Bhairahwa, 2074/75

Table 4.9 shows the cost of the fish farming profession at per hectare. Ponds water area is the first significant work detail that occupies1-hectare land area.

From the table it is studied and carried out Rs.60000 is a need for water pond depreciation whereas a five thousand rupee is paid for pond sanitation. In the same way, Rs.10000 is expensed for gysum. But Rs.40000 has been an expense for water expands, Rs.15000 of urea fertilizer and Rs.35000 of DAP fertilizer. The other expenses are of meaning ponds refer to plate grain where Rs.270000 has been used for buying plate grain for fish of the pond. Similarly, Rs.120000 has been paid for security service. Rs.30200 of medicine and Rs.6000 is of process variation is paid lastly Rs.31710 returned the bank to interest.

It is found that Rs.665910 has been expensed in total in per hectare of land. To compare all the production expenditure Rs.270000 has invested in plate grain i.e. more than other expenditure the least of expenditure is interested in pond sanitation and process greater i.e. Rs.5000 to 1.5 percent.

Similarly from the fish production Rs.1200000 is earned as income in a year from 1 hectare of land occupy however all the income of the fish ponds is not net profit, the net income Rs.534090 i.e. 55.50 percent of the total income.

From the description of and work detail, 17 depicts Rs.110 is needed for per kg fish production expand. To calculate net income and expend the ratio indicates 1:1.8. Total expenditure 50 to 60 percent and 40 to 50 percent is net income in fish farming. Fish farm occupation is the best of more than other agricultural occupation. This is an easily established business in a rural area. This business promotes to other farmers involved in the agriculture sector. Fish farming occupation help to increase farmer’s income. Consequently, increase the economic growth rate of Nepal.

4.10 Employment Opportunities in Fish Farming.

Fish farming is an occupation of farmers fish farming is also known as aquaculture that involves breeding and growing sell fish and fish as salmon trout and halibut for the food industry. Such industry can be breeding fish farms and hatching eggs from those fields. The farmers work as part of a small team, breeding rearing and harvesting fish and sell fish. In regard to opportunities, the some of the farmers rears

other types of fish to stock lakes and rivers for angling purposes and or ornamental ponds.

By adopting the following types of farming employment opportunities can be achieved,

- Fish breeding by hatching eggs from adult stock.
- Buying in young fish and rearing them.
- Feeding fish by hand or by filling hoppers that feed them automatically.
- Monitoring the health of fish.
- Grading fish or shelling by size and moving them to bigger tanks or other holding units.
- Making regular cheeks on whether temperature and oxygen content.
- Cleaning filters and secerns that traps lean and other dirty things.
- Managing fishes of ponds their food as well as hygienic palate grain.
- Harvesting fishes.
- Selling to the public and private market.
- Keeping records of financial details.

The research reached to the study field and tried to collect the data and reports through fish farmers of Shuddhodhan Rural Municipality, Rupandehi.

4.11 Household Population Dependency on Fish Farming.

Table 4.10 shows the household population dependents on fish farming Shuddhodhan rural municipality. It consists of No. of household, male, female and total population and average family.

Table No. 4.10

Household Population Dependents on Fish Farming

S.N.	Description	No. of population	Percentage
1	**No. of household**	136	
2	**Female**	540	48.56
3	**Male**	572	51.44
4	**Total**	1112	100
5	**Average family**	8.18	

Source: *Annual Report Fish Farming*, Thuthipipal, Bhairahwa, 2074/75

Table 4.10 spectacles that household population dependents on fish farming in the studied field. There are 136 household dependents. Forty-eight percent female were involved in the study and 51.44 percent male were involved. There were 1112 total population depending upon the fish farm. Likewise, the average family ration is 8.18.

It is not mentioned other profession of the fish farmers. Fish farm is the best occupation in the agriculture sector. Their income level is increased so dependents upon fish farm enforcedly to the farmers.

4.12 Fish Farming Experience

Experience of professional on fish from can play a vital role to grow invested and conserved area. It is mentioned the year of experience in the fish farm of this place. The year explain from 0 – 5 years' experience, 5 – 10 years' experience, 10 – 20 years' experience and more than 20 years' experience.

Table No. 4.11

Fish Farmers Experience

0 – 5 Years	52	38.24%
5 – 10 Years	51	37.5%
10 – 20 Years	27	19.85%
More than 20 Years	6	4.41%
Total	136	

Source: Fisheries Zone Profile Book, Rupandehi, 2074/075.

Table 4.11 shows that fish farming experience of Shuddhodhan rural municipality farmer's experience. Total fish farmers among them 52 farmers have experienced 0 – 5 years' experience i.e. 38.25 percent. Similarly, 51 farmers have 5 – 10 years' experience i.e. 37.5 percent of the total population, 27 of them experienced 10 – 20 years i.e. 19.85 percent of the total, 6 of them experienced more than 20 years i.e. 4.41 percent of total involvements.

There were 136 populations in the study field. Among the response 38 percent have experienced 0 – 5 years of work experience whereas 4.41 percent have achieved 20 years of work experience.

It is found the experience of farmers is not more than 20 years. Most of them have experience within a short span of time i.e. 0 – 5 years' work experience.

4.13 Identifying Fish Market in the Study Delimitation Area.

Fish farmers purposed to market available fish to the consumers at the right and appropriate time, a place that makes a farmer is an effective marketing system. A farmer from the pond can of business. There is a fix or establish own exclusive trading areas. Where others do not interfere or compete openly. The following table shows the Nepalese fish market especially rural municipality.

Table No. 4.12

Identifying Fish Market in the Study Area

	Farmers	Percentage
Majhi (1)	74	54.41
Merchant (2)	47	34.56
Local market (3)	2	1.47
(1,2)	9	6.62
(1,2,3)	3	2.21
(1,3)	1	0.73
Total	136	

Source: *Fisheries Zone Profile Book*, Rupandehi, 2074/075.

Table 4.12 represents that 74 people from majhi community i.e. 54.41 percent of fish sellers deal in fish in the rural primary market. Thirty-four percent from the merchant sector, 2 percent of them were the local market. Similarly, the local market had been categorized into their areas where 6 percent in majhi and merchant, 3 percent of majhi, merchant and local market, 1 percent of majhi and local market both are involved in the fish market.

Table displays 54 percent farmers are from majhi community the more than other categories merchants have 34 percent fish market. It is seen that 15 percent productive fishes were sold in the local market. However, majhi and merchant both is the main business co-operative pathe rtner of the local fish market.

4.14 Education Profile of Respondents in the Study Area.

Education is the mirror of every part of life. We can assume a general people cannot be educated fish farmers whether he/ she involved in such professional fish farm. The given table below indicates the level of education that fish farmers achieve. It consists of four levels of education basic primary school, high school and college level.

Table No. 4.13

Education profile of respondents

Education Level	Fish farmers	Percentage
Primary School	38	47.5
High School	32	40
Post School / College	10	12.5
Total	**80**	**100**

Source: Field Survey, 2018.

Table 4.13, it is found out that 47.5 percent fish farmer have studied basis or primary education 40 percent of them studied high school level education, and 12.5 percent have studied college-level study.

It is seen most of them have their qualification up to basic and primary level education. Only some of the respondents studied up to college and university level. There is a positive impact on employment and opportunities. Even educated people have adopted fish farming occupation. Moreover, farmers have the qualification of bachelors and master level. We can see the educated male and female both are involved in fish farming in the village area.

4.15 Training Experience of Fish Farmers in the Study Area

Training experience for fish farming many training are organized on fish farming and conducted to teach the farmers for growing more on the ground reality. From the training farmers can adopt organic farmer their freshwater or women water fish farming training including practical knowledge tropical fish farm training they all represent how well the farmers can apply their knowledge and skill in their practical

field. The following table shows the training experience, time for training, time and one or more time participation in training.

Table No. 4.14

Training experience of fish farmers

S.N.		Training	Percentage
1	**Get training**	35	25.74
2	**Once time**	18	51.43
3	**Two time**	5	14.28
4	**More than 2**	12	34.29
5	**No training**	101	74.26
6	**Total**	136	

Source: Fisheries Zone Profile Book, Rupandehi, 2074/075.

Table 4.14 spectacles the number of trained farmers in this village there were 136 total populations in the study 35 people were trained, 18 of them trained once a time, 5 of them took training in twice, 12 of them took training more than two times. Most of the 101 were involved who were not trained i.e. 74.26 percent of total participants. We can say that most of them were untrained for fish farming and some of the farmers are trained that make positive aspect towards such professions.

4.16 Employment in Fisheries in the Study Area.

Table 4.15 indicates the 10 fiscal year employment descriptions whether they are internal and external sectors. The data table from 2009/10 to 2018/19 is an illustration of the employment rate in the given years.

Table No. 4.15

Employment in the fisheries sector in Shuddhodhan rural municipality

S.N.	Fiscal Year	Internal	External	Total
1	**2009/10**	80	0	80
2	**2010/11**	87	0	87
3	**2011/12**	99	0	99
4	**2012/13**	105	0	105
5	**2013/14**	110	0	110
6	**2014/15**	118	1	119
7	**2015/16**	122	2	124
8	**2016/17**	128	2	130
9	**2017/18**	135	5	140
10	**2018/19**	150	5	155

Source: Fisheries Zone Profile Book, Rupandehi, 2074/075.

Table 4.15 shows the number of fisheries whether they are internal or external employer representing from 10 fiscal years of data description. To analyze the 80 internal fishers were established in 2009/10 whereas 155 fishers are found in the fiscal year 2018/19. Up to the fiscal year 2013/14, there were no external fisheries in the domestic farm. But since 2014/15 the number of fisher including external and internal are grown up gradually.

It shows that the number of fisheries is displayed in the increasing trend rather them decreasing. In the fiscal year 2014/15, there are 118 internal fisheries where only one of then added external fisheries. There were 150 internal fisheries in the fiscal year 2018/19 and five of them from external employed.

4.17 Problems and Prospects of Fish Farming in the Study Area.

Problems of fish farming in Shudhodhan Rural Municipalizes

- **Lack of irrigation**

It is necessary to irrigate fish ponds every few weeks and according to the size and species of fish that are conserved surrounded by a bar of soil or concrete sand.Water level must be maintained in every pond. It means that the tube well for pumping water has to be kept in every pond. The rivers of Rupandehi have not provided irrigation to the fish ponds water resources and the village is not sufficient they are only for drinking water. Channels have not irrigated the pond surface of the delimited region of the village. Whether the available water level access there cannot get recycle management system. If the flood happens accidentally in monsoon season irrigation can get easily but those dells of ponds are destroyed at the time of fishes are overwhelmed and swallowed consequently farmers' investment and hard labor felt to be spoiled.

Farmers grow fishes in the monsoon rainy season in comparison to the month of the year having insufficient water at those months. But in the other periods, they depend upon an expensive way of irrigation. So, the governments of Nepal organization related to NGO, INGO should provide cheap and simple agriculture in irrigation system even the government must reconstruct build canals make permanent irrigation solutions. That would be benefitted to the advantageous farmers.

- **Costly electricity in the fish pond**

It is reported that the charge of electricity is too expensive to pay in the located area. Whenever productive equipment's raw materials for ponds have been already high in price. Fish farming is not included as a subsidy of electricity charges that why the electricity has been provided from industrial sector charge. The subsidy is not given in electricity as fish farming is the agricultural sector so the farmers are in loss decreasing and nuisance at doing the occupation.

Electricity which is used and utilized ought to be given and handed is the agricultural subsidy. Through the use of subsidy farmer pay bill of electricity only 25 percent of

the total used the unit while irrigating the fish ponds. As a result the number of fish ponds can increase and farmers promote their occupation simultaneously. Ultimately, the economic activities by the small and big investment would be more save and produced. fishes can be reached as cheap as they have before previous market selling.

- **Lack of depth in ponds**

The pond of fish farming needs to deep enough. Deep ponds do not freeze solid in the water where species fishes are kept their lives grow on there. The fish must have a space near the bottom of the pond to huddle during the cold month. If the pond is enough water it experiments that the best depths for fishes pond are anywhere from 4 feet to 21 feet deep.

The ponds of fish are 5 to 8 feet deep in this area. The main problem is seen and derived out due to concrete surface at depth more than 8 feet when the ponds are dried off and water layer in diminishing. Furthermore, when the ponds are dug up in the depth expenditure for digging up those fish ponds charges of machine, electricity and water irrigation too expensive to pay as a result, farmers cannot be satisfied. Though they have interested to do this fish occupation, expenditure towards their due investment and complain too. Therefore lack of depth of fish ponds hinder the farmers to produce as an expectation at the outside world.

- **The high bank interest rate in agriculture sector**

All the farmers are cannot equally pay interest from the income of the occupation. Interest rate decision was taken by the Nepal Rasta bank in Nepal. The official interest rate is the bank interest rate. When we analyze the history of the data to the bank interest rate the actual rate are given and allotted. Those rates are only for official's pages banks cannot access to the lower villages. There may be other debit microfinance institution that provides loan to the farmers. However, the bank interest rate in Nepal was recorded at 6.50 percent. The interest rate in Nepal average 6.77 percent from 2003 until 2019 reaching an all-time high of 8 percent in 2012 and a record low of 5.50 percent in 2003. It is the record of the benchmark but local level, the rate becomes high due to this reason. Today commercial bank provides loan 3.33 percent. But various abstract creates a loaning system in the agriculture sector. Bank interest rate 3.33 percent converts into 5.6 to 13 percent. Different bank different

interest rate provides in the village area. Microfinance bank provides high-interest rate i.e.16 to18 percent interest rate. Farmers are unable to take a loan from the bank. So, it is lacking enough capital to manage all around the ponds.

- **Unscientific land distribution as a problem of fish farm professional conducted**

It is found that farmers depend upon fish farming and get opportunities and self-employed. However, their land size has been distributed into a small size it means that the land is disconnected consequently. It makes difficult to conduct such a profession as the happening problems in this rural municipality. Though the land of the village is fragmented into small size and small ponds the government and local bodies should try to reunite plating (chaklabandi) connect properly at the owner's agreement among various factors. If a farmer gets enough land for farming he/she can market and dig up wide construction. Registration of land is evaluated from obstruction to distributed lands. Where big size ponds dug up so on and so forth.

- **Lack of sustainable fingerlings supply system**

Normally, fingerlings are produced by government fish farms and sold to private fish farms. The current fingerling farming doesn't produce an adequate amount of fingerlings and the qualities of the produced fingerlings are not up to par with the industry standard.

- **Inadequate infrastructures**

Cold storage facilities and marketing infrastructure that play a significant role in the fish industries are not abundantly present in Nepal. Nepal also has no fish-processing factory to produce meat from all the fish and lacks essential machinery and infrastructure.

- **Demand-supply gap**

The total production of fish today can only meet about 40 percent of the demand from the consumers and the majority of the fish sold in the local market comes from India. Due to lack of security check near the borders, it has given a passageway for

importing harvested fish from India which has fulfilled most of the demand for fish in Nepal.

- **Diseases in fish farming**

The major disease problem of fish pond and treatment detail by these fish farmers in Shuddhodhan rural municipality.

Table No. 4.16

Various types of fish disease and treatment

S.N.	Types of fish	Disease	Treatment
1	Common carp	Hurting (ghau) to appear	Potassium
2	Common carp, Rohu and Naini	E.U.S.	Use Gysum (Chun) 15 kg /Kattha
3	Silver carp, Naini and Common carp	Argulas	Use Malathiyan PPM
4	Naini and Rohu	Hurting (ghau) to appear	Use Gysum (Chun) 15 kg /Kattha
5	Silver carp and Bighead	Red Fleck, fish die	Use Potassium Magnet 200gm/kattha
6	Silver carp, Naini and Common carp	Red Fleck, fish die	Use salt 5 kg and fitkiri 250 gm/kattha
7	Silver carp and Bighead	Ammonium	Use salt 5 kg and fitkiri 250 gm/kattha
8	Common carp and Silver carp	Lack of oxygen	Use Gysum and water handling

Source: Field Survey, 2018.

- **Lack of training and knowledge**

People involved in fisheries in Nepal don't have proper training and knowledge regarding this sector. According to a survey conducted in 2072 by the National Planning Commission of Nepal under the Department of Agriculture and Forestry, only 34 percent of male and 44 percent of female working in the fishery have taken

proper training. Many workers have poor scientific knowledge of indigenous fish species and their awareness of the industry is limited.

It is recommended that the Nepal government address the basic problems faced by the farmers by prioritizing access to fingerlings supply, fish disease diagnostic facilities, development of fish marketing channel and cold storage facilities. Lack of proper facility at local levels is a huge challenge to meet the current market demand fish.

There are several challenge and problems faced by the farmers involved in fish farming. The major problem is the lack of sustainable fingerlings supply system. In addition, lack of marketing infrastructure, lack of cold storage facilities, poor quality fingerlings production tools is not comfortable available, problems of subsidy policy in the agriculture sector, spam quality is not available in time, problems of fish insurance, lack of new quality nasal fish. High rate import fish in India than farmer get low piece own production fishes, Lack of ice-plant and fish feed and lack of technical knowledge are other major issues the fish industry is facing. There is also no fish-processing factory available in Nepal. Loss of habitat and their degradation are other major issues for sustainable fish farming in Nepal. The extension and research services of the fishery in Nepal fall under the jurisdiction of the Ministry of Agricultural Development (MoAD). Under MoAD‘s Department of Agriculture, the Directorate of Fisheries Development (DoFD) is mainly responsible for providing extension services to the farmers. The other institutions under DoFD are Central Fish Laboratory, Fisheries Development and Training Center, Fisheries Development Centers located in different districts, and the District Agriculture Development Offices. The organization responsible for research on fisheries is the Nepal Agricultural Research Council (NARC).

Prospects of Fish Farming in Shuddhodhan Rural Municipality, Rupandehi

Nepal has abundant unused water resources like rivers, lakes, man-made reservoirs, swamps, ponds, and other water bodies preferable for fisheries and aquaculture development. They provide excellent habitat for fishes. Local people and small farmers utilize this to engage in the fishery. Prospect has been founded on fish farming in the study area.

- Labor available at low wage rate in this study area
- Fish plate grain industry available in the study area
- Thirty-eight place fish market available in Rupandehi district.
- Very fast Infrastructure development in Rupandehi district
- International airport available
- Facilities hat market in the big urban area i.e. Bhairahwa and Butwal
- Good facility for electricity
- Fish zone area established in the study area

There are various species of fish that can be grown faster and harvested. Entrepreneurs can take advantage of this and explore rapid profit-making opportunities. Proper infrastructure and facilities should be developed for increasing the shelf life of fish.

There are prospects for entrepreneurs in the areas of harvesting, processing, marketing and distribution of fish. Businesses can invest in these areas and explore the opportunities to reap benefits and help Nepal realize its true potential in the fish industry.

CHAPTER V

CONCLUSION AND RECOMMENDATION

5.1 Conclusions

The research study on 'Fish Farming Study on Shuddhodhan Rural Municipality, Rupandehi District' has been carried out to study employment opportunities in the fish farm and analyze the income level and expenditure in the adopted fish farms from the pond of the rural municipality of Rupandehi.

As a researcher wants to the study field, and then the researcher made rapport building with the farmers (respondent) who were selected for responses. They provided support for studying as the purposes of the study. Moreover, I visited the district agriculture office, Rupandehi. The office provides me with some books and profile related to agriculture program's and project. Some of them were related to prime minister employment program and other profiles were related to fish farming development of fish, structure, and training.

Likewise, from the book and profile resources, the researcher designed my tools which help to collect data of primary as well as the secondary sources. On the basis of designed questionnaires, it was asked to the farmers who have been adopting the occupation for many years. Having this research activity, the researcher collected data that meet the objective of the research on the fish farming on Suddhodhan rural municipality, Rupandehi. The objective of the study were to examine the income status of the fish farmers to analyze the employment opportunities in farmers and identify the problems suggest solutions to overcome them.

In order to meet the objective of the study researcher designed tables that spectacled collected data from primary and secondary sources. Those data were described and analyzed systematically on the basis of analyzed description. The following conclusion represents what has been found from the source of data.

The total population of Shuddhodhan Rural Municipality is 34638 populations. It is seen that 36 percent population respondent from Madhesi community, 33 of Janjati, 22 of Brahmin Chhetry, 6 of Dalit, 2 of Muslim and 1 of another caste. It shows the

highest number of population in this rural municipality represents Madhesi i.e. 36 percent of the total population. It means that no caste has dominated other caste. It's a culturally and social mutual harmony.

The study on the fish farming occupation of Shuoddhodhan Rural Municipality had proposed the objectives to income and expenditure status of the fish farmers. It is seen that there are 11 species of fishes in Rupandehi district. There are 11 types of fishes found and grown up for marketing purposes. It has been seen most favorable and adaptable fish such as Silver carp, Grass carp, Common carp, Rohu, Naini, Vakur, Bighead carp, Tilapia, Bikase mangur, Baikhi and Puntius. But there are 7 species of fish production in Shuddhodhan Rural Municipality. Such as Silver carp, Grass carp, Common carp, Rohu, Naini, Vakur, and Bighead carp fishes.

The results of the present study have demonstrated that the composite culture of carps was followed in the study area. All the carp were cultured in different combinations and proportions. But, the fish production in the study area was not commercialized in general, despite the fact that this was a profitable venture. The important determinants of fish production were expenditure on seed, feed, lime, manure and chemical fertilizer, hired human labour and pond area. The farmers were found to be operating in the second stage of production with respect to inputs namely seed, feed, lime, manure and fertilizers.

The number of farmers and the number of fish ponds in 2009/10 to 2018/19. According to data of various reports and sources, it has been seen an increasing trend in regard employed farmers and the number of ponds extension. The number of a farmer in the fiscal year 2009/10 was so were 5 of them were female and 75 of them were male. The fiscal year 2018/19 it is seen that the number of females is increased i.e. 20 and 116 were male.

Similarly, the number of ponds in the fiscal year 2009/10 was 105, as it was 166 in the fiscal year 2015/16. The number of ponds in the fiscal year 2018/19 is increased up to 264 ponds. There are 80 nursery ponds in the study area and 184 production ponds. The ponds occupy 9.14-hectare land area where production pond occupies 97.53 hector land areas. The total ponds area is 106.67 hector. The most expensive fish among 11 types of fishes Rohu carp, Common carp and Grass carp. The cheapest

one is Silver carp, Bighead carp sold brought. In this region, their species of fish are bought and sold in the market. The price of Rohu, Common carp and Grass carp are sold Rs.270 per kg at whole sales rates. Similarly, Silver carp, Bighead carp, Naini carp and Vakur are sold Rs.200/ kg. One can believe that two hundred rupees are paid for per kg fish whenever Nepalese consumers buy in the general market. Even though it is difficult to produce fishes in the village, fish farmers have grown up different species of fish.

The most favorable fish is Silver carp in which 23.15 percent farmers preferred. Likewise, 20 percent farmers liked Grass carp. Common carp is liked by 17.5 percent, 13 percent of them liked Rohu, 11.25 percent liked Naini 8.75, of them liked Vakur and Bighead is liked by 5 percent. Eighty farmers involved to response how much do they use and distribute cash income in different titles. According to their responses, 50 percent cash income is used and expanded in raw material for the fish pond.

The farmer's participants of the population in fish farming where 50 male and 30 female were involved. To calculate the data 62.5 percent male have adopted this occupation whereas 37.5 percent female has adopted this occupation. We can say female have been improving their life as deepening the dent themselves without help of a male. Consequently, this trend can help economic development in the grassroots levels.

Expenditure used for the fish farming profession at per hectare in Shuddhodhan rural municipality. Ponds water area is the first significant work detail that occupies the 1-hectare land area. Similarly from the fish production Rs.1200000 is earned as income in a year from 1 hectare of land occupy however all the income of the fish ponds is not net profit, the net income Rs.534090 i.e. 55.50 percent of the total income. It is found that Rs.665910 has been expensed in total in per hectare of land. To compare all the production expenditure Rs.270000 has invested in plate grain. More than other expenditure the least of expenditure is interested in pond sanitation and process greater i.e. Rs.5000 to 1.5 percent. The description of and work detail 17 depicts Rs.110 is a need for per kg fish production expend.

The 10 fiscal year employment descriptions whether they are internal and external sectors. To analyze the 80 internal fishers were established in 2009/10 whereas 155

fishers are found in the fiscal year 2018/19. There were 150 internal fisheries in the fiscal year 2018/19 and five of them from external employed. The marginal costs and returns analysis showed that the profitability from fish production, in general, could be increased by increasing expenditure on physical inputs namely seed, feed, lime, manure and fertilizers, and cutting down expenditure on hired human labor.

The fish farmer income and expenditure analysis showed that fish production played a pivotal role in farmer's income and expenditure in the study area. This source of income has shown positive of the fish farmers. The distribution of income earned from fish production among the fish farming households was also relatively better as compared to other sources except for non-farm labor income. But income from fish production was one of the most important sources of family income and employment opportunity in the study area.

5.2 Recommendations

This research study is carried out to meet the objective that the researcher purposed to analyze the economic aspect of the income status of fish farming, analyze employment opportunity from fish farming and identified problems. It has been collected and described. Here, the researcher wants to suggest some appropriate solution to overcome them especially in the context of the study field. It should carry out different research studies related to the fish farming occupation in Nepal that provides appropriate circumvents.

It is carried out to assess and examine the income status of the farmers. How they manage the farm private sectors what aspect behind marketing achievement.

- Cold storage facilities should be expanded to more areas to preserve the standard of the harvested fish and keep it fresh for a longer time.
- Fish processing factories should be established at major hubs like Rupandehi, Kathmandu, Chitwan, and Pokhara from where it can be transported to other places for the fish to be sold.
- Fisheries farm used electricity charge in including an agricultural subsidy. Due to encouraging grown fish farm.

- The political decision used in the subsidy sector, there is no actual farmer getting a subsidy. So there is an investigation in the agriculture sector and identify the actual farmer.
- Development of market infrastructure and management in the village area.
- Government 75 percent and farmers 25 percent invest in the agriculture sector. Due to minimize the cost of the production function.
- The innovation of new nasal baby fish and provide time to time raw material in the village area.
- Established fish research center in the village area and free medicine to farmers. So they can manage their atmosphere.
- Broker/ Mediator is controlling the government market which is not reliable for farmers.

5.2.1 Policy level

Government of Nepal should provide the facilitate and monitor the activities and regulate under a number of acts and programs related to environment management and share and use of aquatic resource now the province and local government administrate the fish firm and make them responsible the activities feed of for fish should be made sustainability which helps to grow and produce quality fish. Pollution around fish earth surface must be reduced.

The policy related to the regulation and transparency by requiring fishing farmers to report the type and quality of the chemical and drugs they used on fish farmers. Thus, we can have hygienic fish from the pond.

- The fish which can affect ecosystem nonnative species ought to be restricted into a water pond.
- Local bodies should manage fish marketing that ensures the investment and interest of fish workers.
- Government subsidy in the agriculture sector.

S.N.	Detail	Facilitation in percentage
1	Agriculture raw material production	50
2	Technical help	100
3	Lab facilities	85
4	Agriculture equipment	50
5	The facility of small irrigation	85
6	Infrastructure service in agriculture occupation	85

Source: *Fisheries Zone Profile, 2075*, Rupandehi.

It has to be felt a positive aspect for the farmer to enhance economic activities. The relationship among government, fish farming and the consumer has to mutually cooperate.

The Government of Nepal has targeted to reduce the poverty level to 17 percent from the 21 percent at the base year by the end of the 14th three-year plan (2016/17 to 2018/19). fish farming is one of the several prominent sub-sectors that can be effectively used for poverty reduction in Nepal. In this context, this paper analyzed the production and yield trends of fish farming, water resources available at the district level, policies of the Nepal government, constraints faced by the fish farmers and opportunities of fish farming in Nepal. In summary, there has been a continuous increase in the production, income and opportunity employment yield of fish in Nepal. However, the increase at the current level is not sufficient to cater the growing demand of fish in Nepal, and also to fulfill the target of making Nepal a self-sufficient country in fish production in the next three years. To achieve this target, the promotion of public-private partnership for improved fish farming is necessary for Nepal. In addition, it is recommended to the Nepal government address the major problems faced by the farmers with priority such as the fingerlings supply, fish disease diagnostic facilities, development of fish marketing channel and cold storage facilities.

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APPENDIX

QUESTIONNAIRE

1. **Introduction details**

Name of farmer's:……..... Age:…....year Sex : male/ female

Address:……..…Municipality Ward No. :… Name of Tole :……

Contact No. :…… Family member:……Male:…… Female:……..

Annual income:…….Qualification:…… Cast:……

2. **Have you taken training for fisheries? If you have trained, how many times did you taken part?**

a. ……year b. Never c. Sometimes d. Once a year

3. **When did you start your fish farm? ……year.**

4. **Description of ponds**

S.N.	Types of ponds	Number of ponds	Area region for ponds	remarks
1	Nursery			
2	Production			
3	Maw (mother)			
4	Others			

5. **Who was/ is the ownership of ponds?**
   a. **Self-ownership**
   b. **Lease**
   c. **Public area**
   d. **Other source of pond**

6. **Mention the period of water staying in pond capacity**
   a. **3 – 6 month**
   b. **6 – 9 month**
   c. **9 – 12 month**

7. **Where have you carried small baby fishes mention resources?**
   a. **Government farm**
   b. **Hatchery/ Private farm**
   c. **India**
   d. **Self-production**

8. **From where you were helped provided help of technical service for fish farm?**
   a. **District Agriculture Office**
   b. **Project related to prime minister Modernization on Agriculture**
   c. **Form Nepal Agriculture Research Council**
   d. **Private Fish farm**
   e. **Your self-production**

9. **Have you managed your own hatchery nursery? If you have that hatchery and nursery mention its production.**
   a. **Hatchery**
   b. **Fry babies**
   c. **Fingerling babies**

10. **What sort of poly culture fish or monoculture fish kept in farm? If you keep poly culture fish mention its species.**

S.N	Species of fish	Month of Stocking	Number	Average weight
1	Silver carp			
2	Grass carp			
3	Naini carp			
4	Common carp			
5	Rohu carp			
6	Bighead carp			
7	Vakur			

11. Have you uses fertilizer in fish pond.

Types of fertilizer	Fertilizer in kg	Uses of duration

12. What kind of fish would you like?

S.N	Fish cast	Production (per kattha)	Why do you like

13. Problems of fishes.

Problems	Remedial measures	Suggestion
Problems of production		
a.		
b.		
Problems of stock and processing		
a.		
b.		
Problems of market		
a.		
b.		

14. What kind of diseases and remedial measures in fisheries?

Name of Diseases	Method of remedies

15. What is the way you distribute the fish sales you produce?

S.N.	Description	Percentage	Selling price Rs./kg
1	Fishermen from pond		
2	Merchant		
3	Local market		
4	Capital market		

16. Whether you have any help with any organization for marketing?

a. Yes **b. No**

17. How much does it cost to build a fishing pond?

a. ……(per kattha)

18. How much do you expend and earn income in every kattha of fish farming annually?

a. Expend Rs……. **b. Income Rs……**

19. What do you use and utilize income cash from fish selling?

a. Raw material for fishes **d. Home expend**

b. Education **e. saving and credit invest**

c. Health care **f. others**

20. Have you provided insurance of fish? If you did such insurance, mention the area.

S.N.	Area of insurance /kattha	Premium price	Co-organization
1			
2			
3			

21. How many members of your family are employed from occupation?

a. ……members at home

b. ……external workers

22. What do you think to expand region of fish pond? If you expand the region how much do you occupy the land?

a. ……

23. Please, recommend some of your opinion in regard fish farming occupation.

a. ……

b. …….

c. …….

Name of Researcher: - …… Data:-……

Thank You

Appendix I

Details of dependent farmers in fisheries

S.N.	**Rural Municipality**	**No. of Female farmers**	**No. of Male farmers**	**Total farmers**
1	Siyari Rural Municipality	134	811	945
2	Shuddhodhan Rural Municipality	20	116	136
3	Gaidhawa Rural Municipality	6	210	216
4	Mayadevi Rural Municipality	10	210	220
Total		170	1347	1517

Source: - Fisheries project implementation zone, Rupandehi fiscal year 2074/075

Appendix II

Household population depends on fisheries

S.N.	**Rural Municipality**	**No. of household**	**Female**	**Male**	**Total**	**Family Average**
1	Siyari Rural Municipality	945	3145	3302	6447	6.82
2	Shuddhodhan Rural Municipality	136	450	572	1112	8.18
3	Gaidhawa Rural Municipality	216	948	1099	2047	9.48
4	Mayadevi Rural Municipality	220	962	1027	1989	9.04
	Total	1517	5595	6000	11595	7.64

Source: - Fisheries project implementation zone, Rupandehi fiscal year 2074/075

Appendix III

Description of age wise farmers in fisheries

S.N.	Rural Municipality	< 25	25 - 45	45 - 65	65 >	Total
1	Siyari Rural Municipality	6	232	570	137	945
2	Shuddhodhan Rural Municipality	1	33	84	18	136
3	Gaidhawa Rural Municipality	-	42	153	21	216
4	Mayadevi Rural Municipality	1	54	137	28	220
Total		8	361	944	204	1517

Source: - Fisheries project implementation zone, Rupandehi fiscal year 2074/075

Appendix IV

Details of training in fisheries

S.N.	**Rural Municipality**	**Get training**	**One time**	**Two time**	**< 2**	**Not take training**	**Total**
1	Siyari Rural Municipality	394	252	92	50	551	945
2	Shuddhodhan Rural Municipality	35	18	5	12	101	136
3	Gaidhawa Rural Municipality	30	14	7	9	186	26
4	Mayadevi Rural Municipality	46	27	10	9	147	220
Total		505	311	114	80	1012	1517

Source: - Fisheries project implementation zone, Rupandehi fiscal year 2074/075

Appendix V

Experience of Farmers in the Fisheries Sector

S.N.	Rural Municipality	Less than 5 year	5 – 10 year	10 – 20 year	More than 20 year	Total
1	Siyari Rural Municipality	202	391	350	74	945
2	Shuddhodhan Rural Municipality	52	51	27	6	136
3	Gaidhawa Rural Municipality	102	60	40	14	216
4	Mayadevi Rural Municipality	65	93	42	20	220
Total		421	523	459	114	1517

Source: - Fisheries project implementation zone, Rupandehi fiscal year 2074/075

Appendix VI

Ponds Details

S.N.	Rural Municipality	Nursery ponds	Area (kattha)	Production ponds	Area (kattha)	No. of ponds	Total Area	Remarks (hector)
1	Siyari Rural Municipality	598	1350	1481	9900	2079	11250	375
2	Shuddhodhan Rural Municipality	80	270	184	2880	264	3150	105
3	Gaidhawa Rural Municipality	63	270	292	5130	355	5400	180
4	Mayadevi Rural Municipality	62	150	286	2550	348	2700	90
Total		803	2040	2243	20460	3046	22500	750

Source: - Fisheries project implementation zone, Rupandehi fiscal year 2074/075

Appendix VII

Ponds Ownership Details

S.N.	Rural Municipality	Own	Lease	Public	Own/ lease	Lease/ Public	Total
1	Siyari Rural Municipality	884	33	2	22	4	945
2	Shuddhodhan Rural Municipality	131	4	-	1	-	136
3	Gaidhawa Rural Municipality	187	7	11	6	5	216
4	Mayadevi Rural Municipality	201	5	9	5	-	220
Total		1403	49	22	34	9	1517

Source: - Fisheries project implementation zone, Rupandehi fiscal year 2074/075

Appendix VIII

Duration of water in Fish Ponds Details

S.N.	Rural Municipality	3 – 6 Month	6 – 9 Month	9 – 12 Month	Total
1	Siyari Rural Municipality	3	53	889	945
2	Shuddhodhan Rural Municipality	1	2	133	136
3	Gaidhawa Rural Municipality	1	67	148	216
4	Mayadevi Rural Municipality	7	80	133	220
Total		12	202	1303	1517

Source: - Fisheries project implementation zone, Rupandehi fiscal year 2074/075

Appendix IX

Source of Fish Baby Details

S.N.	Rural Municipality	Public farm	Private farm	Public and Private	Own production
1	Siyari Rural Municipality	2	629	313	1
2	Shuddhodhan Rural Municipality	2	104	29	1
3	Gaidhawa Rural Municipality	26	115	73	2
4	Mayadevi Rural Municipality	39	55	126	-
Total		69	903	541	4

Source: - Fisheries project implementation zone, Rupandehi fiscal year 2074/075

Appendix X

Details of Direct Employment of Fisheries Sector

S.N.	Rural Municipality	Internal	External	Total	No. of Farmers
1	Siyari Rural Municipality	963	41	1004	945
2	Shuddhodhan Rural Municipality	139	3	142	136
3	Gaidhawa Rural Municipality	227	16	243	216
4	Mayadevi Rural Municipality	256	16	272	220
Total		1585	76	1661	1517

Source: - Fisheries project implementation zone, Rupandehi fiscal year 2074/075

Appendix XI

Duration of Water in Fish Ponds

3 – 6 Month	1 (0.79%)
6 – 9 Month	2 (1.47%)
9 – 12 Month	133 (97.79%)
Total	136

Source: - Field survey 2075

Appendix XII

Ward wise fish pond and area in Shuddhodhan Rural Municipality

S.N.	**Ward No.**	**No. of fish ponds**	**Area of ponds (Kattha)**	**Percentage**	
1	1	15	150	4.90	4.34
2	2	14	145	4.57	4.19
3	3	12	210	3.92	6.07
4	4	30	330	9.80	9.55
5	5	25	280	8.16	8.10
6	6	70	640	22.87	18.52
7	7	140	1700	45.75	49.20
Total		**306**	**3455**	**100**	**100**

Source: - Survey 2075 Chaittra 20

Appendix XIII

Cast of the respondent of fish farmers

S.N.	Cast	No. of fish farmers	Percentage
1	**Brahman**	4	5
2	**Chhettry**	8	10
3	**Madhesi**	12	15
4	**Janajti**	30	37.5
5	**Muslim**	3	3.75
6	**Dalit**	17	21.25
7	**Other**	6	7.5
Total		**80**	**100**

Source: - Field survey 2075

Appendix XIV

Age group profile of the respondents

S.N.	Age group (year)	No. of fish farmers	Percentage
1	**Below-20**	5	6.25
2	**20-35**	23	28.75
3	**35-50**	40	50
4	**Above 50**	12	15
Total		**80**	**100**

Source: - Field survey 2075

Appendix XV

Fish Farmers Experience Profile

Years of Fishing Experience	No. of Respondents	Percentage
0 – 5 Years	29	36.25
5 – 10 Years	26	32.50
More than 10 Years	20	25
No experience	5	6.25
Total	**80**	**100**

Source: - Field survey 2075