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COMMUNITY FISH FARMING IN THE TARAI:

Case Study of Bhawanipur and Hanuman Nagar

Chinta Mani Pokharel

HMG-USAID-GTZ-IDRC-FORD-WINROCK PROJECT

STRENGTHENING INSTITUTIONAL CAPACITY IN THE

FOOD AND AGRICULTURAL SECTOR IN NEPAL

FOREWORD

This Natural Resource Management Paper Series is funded through the project, "Strengthening Institutional Capacity in the Food and Agricultural Sector in Nepal," a cooperative effort by the Ministry of Agriculture (MOA) of His Majesty's Government of Nepal and the Winrock International Institute for Agricultural Development. This project has been made possible by substantial financial support from the U.S. Agency for International Development (USAID), the German Agency for Technical Cooperation (GTZ), the Canadian International Development Research Centre (IDRC), and the Ford Foundation.

One of the most important activities of this project is funding for problem-oriented research by young professional staff of agricultural agencies of the MOA and related institutions, as well as by concerned individuals in the private sector. This research is carried out with the active professional assistance of the Winrock staff.

The purpose of this Natural Resource Management Paper Series is to make the results of the research activities related to natural resources available to a larger audience, and to acquaint younger staff and students with advanced methods of research and statistical analysis. It is also hoped that publication of the Series will stimulate discussion among policymakers and thereby assist in the formulation of policies which are suitable to the development of Nepal's agriculture.

The views expressed in this Research Report Series are those of the authors, and do not necessarily reflect the views of their respective parent institutions.

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CONTENTS

LIST OF TABLES

COMMUNITY FISH FARMING IN THE TARAI
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Chinta Mani Pokharel*

INTRODUCTION

Agriculture is the foundation of the Nepalese economy. It accounts for over 60 percent of GDP (Gross Domestic Production), provides employment for about 90 percent of the labor force, and is the source of 80 percent of Nepal's exports. As the population increases, so does the pressure on the available agricultural land, and this has a direct effect on the country's economy. To minimize the pressure on agricultural land, substitutes need to be found. Community fish farming (CFF) is one way of doing this, especially in the Tarai.

Fish farming is one of the most important sectors of agriculture in the Tarai. Fish is a delicious and nutritious food which is produced (naturally or artificially) in water. Fish flesh contains 13 to 20 percent protein and can be digested more easily than animal meat. Per hectare of land, fish farming is more productive in terms of protein value than the growth of foodgrains such as rice or wheat.

There is ample scope in Nepal, though it is a land locked country, to develop different kinds of agriculture. Of the total area (145,685 sq.km), only 16 percent is presently under cultivation, although 93 percent of the population depend on agriculture for a living. Per capita animal protein consumption in Nepal is only 5 kg per annum partly because of the customs of various ethnic groups and partly because of low animal production and poverty. Fish is an acceptable food for most ethnic groups but until now its contribution to per capita consumption of protein has been only 0.366 kg. However, demand for fish is growing enormously (DOA). Nepal has sufficient water resources to permit fish production at significant levels. Considering the seriousness of the nutritional problems that Nepal now faces, it is essential that all channels to increase the food supply be pursued.

Fish farming will flourish on badly drained land which is little suited to cultivation or which would need great capital expenditure to make it so. It will flourish in saline and brackish water unsuited for agricultural purposes. Drainage water from existing agricultural schemes, which has become too saline for further agricultural use, can be salvaged for use in fish ponds (Hickling, 1962). Fish farming, as a form of resource utilization, should be allowed to compete with existing resource development programs.

Until recently, Nepal has not fully benefited from its valuable water surface. At the same time, there is a waste disposal problem in urban areas that could be partly solved by developing CFF and using the waste products of other sectors of the economy as fish food. This is a good example of how to make the maximum use of waste water resources.

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It is not known exactly when fishing began in Nepal. Archeological evidence of fishing activities (fish hooks) is about 2500 years old, but the earliest written evidence of fish culture practices is only 180 years old. Fish culture activities of that time, continuing through most of Rana period (1845-1950), were primarily to meet the personal demands of the ruling class (Peace Corps, 1983).

Modern fishing practices started in the early 1950s with a few indigenous fish species on a limited scale. In 1946 a Fisheries Development Unit was added to the Agriculture Committee. It began by importing about 5000 fingerlings of three Indian carp species (Rohu, Katla and Mrigal). Due to the logistical problems of transporting the fingerlings from India to Kathmandu and the fact that the Indian carp could not be naturally spawned in pond conditions, the search began for a type of fish that could be imported and then easily propogated in Nepal. In 1956, the common carp, and in the late 1960s, Chinese carp, were introduced successfully, and Fisheries Development Centers (FDCs) were set up nationwide.

At present there are twelve FDCs operating under the technical supervision of the Fisheries Development Division. Seven species of fishes are being spawned, producing seed for the private sector as well as for the panchayat fish farms themselves (Peace Corps, 1983).

To encourage the per capita consumption of fish in Nepal, development is being concentrated in the highly productive Tarai region. The Tarai areas of Nepal are dotted with numerous village ponds, some of which have been in existence for centuries. Government estimates put the total existing pond area in Nepal at about 5,000 ha. An intensive Asian Development Bank funded project has recently been launched in 16 districts of the Tarai to further the development of government fish farms, train fisheries workers, develop transport and marketing facilities, and supply technical assistance to interested private fish farmers. The main objectives set forth by the Fisheries Development Division regarding private sector fish farming are: to repair and efficiently exploit existing ponds; to construct new ponds in appropriate areas according to specific guidelines; and to integrate fish farming into the network of other farming systems.

The by-products of fish farming, such as fish oil and fish bones, are also of potential economic value. A network of connected industries should be developed--cold storage, and packing and transportation industries. In this way, the development of CFF on a commercial scale will accelerate the economic development of the country as a whole.

The findings of the study suggest that CFF has already been accepted by the Tarai people as a subsidiary source of income. The government should give special attention to developing CFF further by making capital, technical facilities and training available. Above all, the agencies responsible for the promotion of CFF should attempt to maximize the people's participation by providing incentives.

Objectives of the Study

The study provides a detailed description of present CFF methods in the study area and suggests alternative ways in which fish farming can

be developed to benefit the local and national economy.

An attempt has been made to explore people's ideas and attitudes towards the problems and prospects of CFF in the Bhawanipur and Hanuman Nagar village panchayats. The local pond management system, fish raising practices, conflict and settlement of disputes between shareholders, and the role of the local moneylenders and agencies in promoting fish farming are discussed. These areas, directly associated with human activity, can be more effectively observed and analyzed through anthropology than through any other discipline.

Table 1. Present and Potential Fish Production (Metric tons)

	1980	2000
Capture Fisheries		
(a) Rivers and Lakes	2,200	4,000
(b) Reservoirs	-	2,500
Agriculture		
(a) Ponds	700	18,000
(b) Cages	-	500
(c) Paddy-fishing	1,800	
Total Production	2,900	26,800

Source: Fisheries Development Division, DOA.

Farmers in the Terai practice CFF using their traditional knowledge of the land and the resources available to them. Some follow a method of paddy-fishing which is unique to the region. This study highlights the important features of CFF in both the private sector and the panchayat run enterprises.

Although some studies have been made of fish farming in Nepal, the CFF system in the two village panchayats under consideration has not been included. This study explores the complex processes involved in the CFF system and shows its advantages and disadvantages.

The main objectives of this study are to:

- examine the present status of CFF practices that exist in Bhawanipur and Hanuman Nagar village panchayats;

- study the farmers' attitude towards CFF;

- gather information on the economic benefits to be derived from the system; and

- make suggestions for the development of fish farming.

Limitations of the Study

Detailed information on the present condition of CFF in Bhawanipur and Hanuman Nagar village panchayats has been gathered. Practices and conditions of CFF may vary from one place to another and therefore what is applicable in this study area may not be in other regions. Accurate

information was not easy to find because little is written down by the farmers regarding expenditure, income, and methods used. In these villages, almost all the adults are illiterate which makes it difficult to collect accurate data.

Research Methodology

The study adopts a microcosmic approach and the data was collected through the use of anthropological field work methods. Detailed information is recorded with respect to pond types, pond ownership, pond management, share allocation for pond maintenance, the transfer and sale of ponds, the nature of shareholding, the present status of CFF and the specific problems faced by Bhawanipur and Hanuman Nagar village panchayats. The study area was chosen because CFF has been practiced there for a long time and is well established.

A representative sample of the fishing population was taken, and questionnaires, interviews, and observation were used to gather the required data. Out of a total of 24 ponds, 16 were randomly selected for study. Samples included all sizes of ponds (big, medium, and small) owned by different communities.

Questionnaires: Both structured and unstructured questionnaires were used. Detailed qualitative information was obtained with the help of structured questionnaires in the areas of personal identification, demography, patterns of shareholding, investment, quantity of fingerlings purchased, and fish sales.

Unstructured questionnaires were used to gather empirical data on problems associated with farming methods, details of local techniques, the market situation, and to record suggestions made by the people to improve the status of CFF in the study area.

Interviews: Interviews were used to obtain qualitative information on the history of CFF. People who were actively involved with CFF were selected. In most cases, the main shareholders/owners of the sample ponds were interviewed. The local junior technical assistant (JTA) provided information on technical conditions and the elderly in the villages were selected for information on the history of CFF.

Observation: Observations were made to supplement the information obtained through the questionnaires.

Use of Secondary Data: Though the results of the study are based mainly on primary data obtained through the field survey, an attempt was also made to obtain information from other sources: various Fishery Development Center, Peace Corps/Nepal, and Agriculture Development Bank reports were studied. The local panchayat secretariats were contacted to obtain data on local population and pond holdings.

COMMUNITY FISH FARMING IN TWO TARAI VILLAGE PANCHAYATS

Features of the Local Economy

Almost all the people in the study area are directly or indirectly engaged in agriculture. The native agricultural system is primitive and

at subsistence level. Traditional agricultural practices are still used; the people plough the fields using oxen and many farmers depend on rainfall during the monsoon to water their crops. In the Tarai, rain at other times of the year is infrequent.

Those who are not directly involved in cropping activities earn a living through agricultural trade, but they are in the minority. They trade in crops, fish, and vegetables, selling in India as well as in local markets. Some people are engaged in animal trade.

History of CFF in the Study Area

The history of systematic fish farming is short. People used to raise and catch fish in natural and artificial ponds. Artificial ponds were dug by the rich people of the village and gave them religious and social status. The ponds were also used to irrigate the land, to supply water for cattle, and for bathing. Fingerlings were not used in these ponds. The fish were caught by the Majhi community but were sold only in the local markets because they were in limited supply and transportation was difficult. The people were not interested in systematic fish farming and artificial ponds were not registered by their owners. Later, the ponds were taken over by the district panchayats and later became their property. The East-West Highway had by now been completed. In 1975, the village panchayats started commercial fish farming in the ponds. Some ponds were given under contract to the local people and the rest were farmed by the village panchayat itself. The pond owners tried to resist the ownership change but without legal support they were helpless.

Later, after seeing the profitability of fish farming, the practice spread from registered to non-registered ponds. Private farming became widespread subject to constraints of money and water supply. Hybrid fingerlings were dropped in the ponds in an effort to breed the fish in greater numbers. Now mainly Brahmins and Chhetris, Tharus, Majhis, Shahus and Yadavs are involved in fish farming. In the Bhawanipur and Hanuman Nagar village panchayats, the Tharu community is more involved in CFF than other groups. The Yadav community participates the least.

The variables selected to study the status of CFF in the study area were: the number of ponds used, water sources available for the ponds, and the basic problems associated with existing fish farming practices.

Table 2. Reasons Given for Fish Farming

Ethnic Community	Generate Income	Supplement Daily Diet	Derive Cash Income
Brahmin/Chhetri	1	1	2
Tharu	6	6	1
Majhi	2	2	-
Yadav	1	-	1
Shahu	3	4	1
Total	13	13	5

Source: Field Survey

The Role of CFF in the Local Economy

The main source of income in the Tarai is agriculture. Now population pressure on the land is forcing the people to find other ways of making a living. Fish farming has become popular as it raises cash income and is another source of food.

The Ponds

The ponds in the area were categorized by their size: small (5-10 kathas, where one katha equals 330.67 sq. meters), medium (11-20 kathas), and large (21-25 kathas). Most of the ponds are medium sized.

Water is the most important requirement for fish farming and there should be a regular supply. In the study area, the supply is not reliable. In April and May most ponds were dry and could not be used because farmers rely on rains which often do not start until mid-June.

During the survey, 6.2 percent of the sample indicated that flooding during the monsoon was their main source of water and 56.3 percent depended directly on rainfall. Only 37.5 percent had some sort of irrigation technology. Therefore, it is apparent that water scarcity is a major problem among the fish farmers in the Tarai.

Paddy-Fish Farming

In Nepal, 54 percent of cultivated land is paddy, and 85 percent of that is in the Tarai (Augusthy, 1975). Raising fish in paddy fields was first adopted in Kathmandu Valley in 1964, using the common carp. It was so successful that the Bagmati Fish Development Center expanded the idea to the adjoining districts of Kathmandu.

In the study area, many who tried this style of fish farming did not succeed. Reasons given included shortages of water, lack of technical knowhow, shortage of cultivatable land, and the difficulty of raising the necessary capital for investment.

Pond Ownership

The study area is inhabited by Brahmins Chhetris, Maithali, Tharus and Shahus. Most private ponds are owned by Brahmins/Chhetris. Some of the Tharus also farm in private ponds but the majority use village panchayat-owned ponds. Of the others who practice fish farming small but equal numbers farm in either private or village panchayat-owned ponds. There are no district panchayat-owned ponds in the study area.

Those who do not farm in either private or panchayat-owned ponds may take shares in a private pond. There was evidence that members of different communities participate in fish raising from a single pond. The people interviewed argued that to raise fish in a number of separately owned ponds was expensive and time consuming, so pond sharing became popular.

Most of the farmers cannot afford all the items needed for raising fish. Therefore, they enter into joint ventures dividing the input

required and the profit made into shares. Everyone invested either money and/or fingerlings. Some did not volunteer to contribute the money for other items, such as nets, because the price of these items does not stay constant. Share ownership is proportional to the amount invested.

One farmer rarely has sufficient money and labor to invest in fish farming and therefore invites others to invest in joint ownership. Most shareholders in a particular pond are of the same family or community, resulting in maximum participation and allowing the benefits to be kept within the group. Except for the Brahmin/Chhetris, who tend not to practice joint ownership of ponds, most ponds are owned by three or four people, but the number of owners can be as high as nine, especially among the Tharus.

The shareholders are under contract. Both written and oral contracts are used in the study area, but due to illiteracy, the majority are oral. Moreover, the people do not seem to require written contracts as they have faith in each other. Only a few Tharus and Sahus had written contracts.

Causes of Conflict Between Shareholders

Conflicts are common where ponds are under joint ownership and there are various reasons for this. The most usual relate to unequal fish distribution, unequal labor distribution, and the theft of fish. Ten cases were studied (Table 3).

Table 3. Causes of Conflict Between Shareholders

Causes of Conflict	Number of Cases
Fish Distribution	5
Share Distribution	2
Labor Distribution	1
Theft of Fish	2
Total	10

Source: Field Survey

Most shareholding contracts are oral and the conflicts that arise from them are also resolved orally. They are not resolved by legal courts or agencies but by the shareholders themselves. Village elders and panch leaders may be called in to participate in finding a solution.

According to field survey data, 60 percent of the shareholders liked to resolve their disputes themselves. Ten percent of cases were finalized by village elders and the remaining cases were handled and resolved by panch leaders.

Expenditure on Fish Farming in 1984

Most farmers could not give precise information on expenditure because they do not write anything down. Mainly, money is needed to buy the fish species in the beginning, buy the fingerlings, and to catch the

fish, which is usually done by hired labor. No one spends money on medicine. Very few have expenses for transportation and supervision. There was a wide variety in individuals' investment. Most farmers needed to spend between NRs.500 and 1000 in the year.

For good fish production, the farmers need to know the quantity of feed required by the fish and where good quality feed is available. Feed used included husks, corn flour, oil cake, and dung. These were in addition to fingerlings.

It is essential for the development of fish farming in the Tarai that an ample quantity of fingerlings be made available to the farmers, and that a distribution method be organized so that the fingerlings are transported from breeder to farmer efficiently, holding fingerling mortality rate to a minimum.

Sale of Fish

A farmer has several choices as to how to remove the fish from the ponds and get them to market. Very few invested in their own nets and other fishing equipment. In the study area, there were a few well-equipped Majhis who specialized in catching the fish, using nets. Some farmers with small ponds would drain the pond on the day of market but the overwhelming majority hired Majhis to do the job for them. None of them used chemicals which may have a detrimental effect on pond ecology.

The Mahjis were contracted to perform the fish harvest and usually kept a percentage of the catch. Wages, or percentage of the catch given, varied among the different communities, and was also based on the number of fish caught.

Table 4. Sale of Fish

Fish Sold (Kgs)	Percentage of Sample	Income (NRs.)	Percentage of Sample
50-100	6.2	1000 - 2000	6.2
101-150	18.3	2001 - 3000	18.8
151-200	-	3001 - 4000	12.5
201-250	18.8	4001 - 5000	37.5
251-300	31.2	5001 - 6000	-
301-350	-	6001 - 7000	-
351-400	-	7001 - 8000	-
Over 401	25.0	8001 - 9000	-
		9001 - 10000	6.2
		Over 10000	18.8

The fish were sold in the local markets and, when production levels were high enough, in Indian markets as well. The quantity of the fish sold was largely determined by production, which in turn depended on the size and number of ponds, the level of investment, and the number of fingerlings dropped in the ponds. The quantity of fish eaten by the individual family also affected sales.

Most respondents sold 251-300 kgs of fish in a year. Though the sale seems high, the income raised was small due to low prices in the market. However, profit derived from the sale of fish is higher than from the sale of other agricultural products because comparatively less labor and capital investment is needed.

Role of Local Agencies in the Development of CFF

Fishery development, management and administration fall under the responsibility of the Department of Agriculture (DOA). The Fisheries Development Division supervises technical activities and research work and has direct administrative control over the activities. Fish hatcheries are located in Kathmandu Valley. Fish farms of Fisheries Development Centers (FDCs) are attached to Agriculture Farms under the DOA, while the rest are under the administrative control of the Regional Directorates of the DOA. The Fisheries Development Division of the DOA provides technical guidance to these farms (Fisheries Development Division, DOA).

In the Eastern Development Region, there are two Fisheries Development Centres, one in Tarahara (Sunsari district) and one in Fattepur (Saptari district). The two panchayats studied are under the Fattepur FDC. The water surface area in the center is 2.01 ha. There is one officer, two junior technical assistants and one ADM staff member. The main purpose of the station is feed and fish distribution (FDC, Fattepur).

The Fattepur FDC has very few technical assistants to provide services to the people. The center is located 60 km from the study area which is a hindrance to the people, who have a long way to travel. The technical assistants visit once or twice a year which is not sufficient.

The Fishery Center is not large and cannot supply enough fingerlings to meet the demands of the fish farmers. The local people expect better technical assistance and a sufficient supply of fingerlings.

Loans

The local farmers' productivity suffers due to difficulties in getting loans and technical support from government agencies.

The farmers take loans in various forms from the agencies responsible for agricultural development. Thirty-nine percent of cash loans are obtained from the Agriculture Development Bank (ADB) and 50 percent of fingerlings come from the FDC. They also get some technical support from the District Agriculture Center. Whatever facilities they get from these agencies, the local people complain that they are inadequate.

In the study area, the agencies that provide loans are: the ADB, Nepal Bank Limited, Sajha Cooperative and the FDC. The ADB has shown more interest in making loans available to the farmers than any of the other agencies. The banks provide loans for farmers only after taking a deposit. The amount of the loan depends on the size of the deposit. It is also determined by the size and number of ponds owned by the farmers in question. Most of the loans obtained from the ADB in 1984 were between NRs.1000 and 2000, but as many as eight percent took loans of between NRs.6000 and 7000.

Besides the agencies, local moneylenders also provide loans to fish farmers. Though the interest rates set by the local money lenders are high, people take loans from them to avoid the complex process that has to be followed when taking a loan from the agencies. People argue that to take loans from the local moneylender is easier and quicker, though their interest rates sometimes reach 60 percent. Those who have no land or money for a deposit take loans from the moneylenders. Such loans are usually small because of the high rates of interest; they were not usually over NRs.3000 and most were under NRs.2000.

However, 58 percent of farmers still take loans from the ADB and the remaining 42 percent use local moneylenders. Seven out of 20 people questioned avoid government agencies due to the complex procedures, and six complained that loans were not forthcoming. Other reasons include delays and corrupt officials. However, eight out of 20 who borrowed from moneylenders agreed that their rate of interest was very high. Moneylenders are also difficult to contact, untrustworthy, and can only lend small amounts of money at a time.

Loan money was needed to dig and repair ponds, and purchase fish and fingerlings. Most loans were taken to purchase fingerlings. The survey showed that 8.3 percent needed the money for digging a new pond, 33.3 percent for repair work, and the remaining 58.4 percent for purchasing fish and fingerlings.

Government Cooperation

People's expectations are high. Of the respondents 21.6 percent expected easily available loan facilities from the government, 21.6 percent expected more technical facilities, 25.0 percent wanted improvements in the availability of fingerlings, 5.0 percent expected more easily available fish feed, and the rest expected a cold storage to be set up and managed in the village by the government. So far none of these facilities are provided by the government in the study area.

The expectations of the people are natural and could be fulfilled by the government with effective policies. Facilities should be provided to make fish farming more attractive for the economic benefit of the country. The lack of an electricity supply and the high capital investment required to set up and maintain a cold store implies that this is one facility that may not be available in the near future.

Fish Pond Maintenance

Maintenance of the ponds is carried out by the pond owners themselves. Responsibility for the village panchayat-owned ponds rests with the panchayat and not with the contractor, but the latter must do minor repair work where necessary. In cases where the pond is owned by the local school, they repair and maintain it.

Purchase of Fingerlings

When he needs it, the farmer applies for and receives a written coupon which he later presents at the fish farm where he buys fingerlings. The coupon carries the farmer's name, address, pond size, and the number of fingerlings and what species has been recommended by the local

extension workers. He may be given the fingerlings in one, two or three lots, depending upon their availability at that particular time.

The coupon system creates a lot of problems for the local farmers. They complain about the complexity of the process of obtaining a coupon and the problems of getting the fingerlings when they are needed.

The study area comes under the Fattepur Fisheries Development Center, which is not on a regular transportation route. Bringing the fingerlings from the Center is costly because of the transportation charge. The local farmers sometimes buy fingerlings from the local market although they are more expensive and of poorer quality. Of 16 pond owners interviewed, 56.3 percent obtained fingerlings from local merchants who sell fingerlings in the village; 31.2 percent bring them from the Fisheries Development Center in Fattepur and the remaining 12.5 percent, who want to avoid the coupon system, bring fingerlings from India (which is over 80 km away but they claim that the fingerlings at Fattepur are not always available.

There is a wide variation in the quantity of fingerlings purchased by farmers in the study area. The quantity largely depends upon the individuals' economic status, the size and number of ponds they own, and the number of shareholders participating.

According to available information the Brahmins and Chhetris bought between 2000 and 8000 fingerlings in the year. The majority of the Tharus bought between 2000-5000, and the Majhis sometimes bought as many as 11,000. In total, 69 percent of the respondents bought 2000-5000 fingerlings, 19 percent bought 5001-8000, six percent bought 8001-11000, and the other six bought over 14,000 fingerlings.

The prices set by the government agencies and local merchants are very different. The government price at the time of the survey was NRs.80 per 1000 for common carp fingerlings and NRs.200 per 1000 Chinese and Indian carp. There is an additional packing charge of NRs.3 per plastic bag. The price set by local merchants was NRs.225 per 1000 fingerlings of all kinds. However, due to the cost of transportation, it was still more profitable to buy from local merchants the poorer quality.

Table 5. Major Problems Before the Fish is Produced

	No. of Respondents	Percentage
Economic Problems	3	8.1
Technical Problems	7	18.9
Availability of suitable land	3	8.1
Availability of sufficient water supply	13	35.1
Shortage of fingerlings available when needed	11	29.8
Total	37	100.0

Market Accessibility

The main markets of this area are local hat bazaars located within 5 km of the villages. Otherwise, the nearest market is northern India.

Usually the fish are transported by hand and sold locally. Transport to India is arranged by Indian middlemen. Transport outside of the immediate area is required only when fish production is high.

Fifty percent of the respondents sold their fish in the local market; 42 percent in their own villages, and eight percent went to the Indian market to make a sale. In general, people sell their fish wherever they can get a reasonable price. The main market problems mentioned by farmers were transportation problems, lack of storage facilities, and low and fluctuating prices.

Table 6. Major Problems After the Fish is Produced

	No. of Respondents	Percentage
Unreasonable prices	23	32.5
Transportation	3	7.5
Lack of Suitable Market	8	20.0
Lack of cold storage	16	40.0
Total	40	100.0

Source (Tables 5 & 6): Field Survey (Although only 16 owners were interviewed, the total number of responses are higher. This is because many owners mentioned more than one problem.)

Future Prospects for the Development of CFF

Community fish farming in Nepal was not well organized until recently. Now it is accepted as a profitable occupation and a useful source of cash income for interested farmers. There are sufficient raw materials and by-products from various agricultural products to feed fish; they only need to be made more easily available. The nature of the soil is suited to the construction of fish ponds. A large number of private commercial fish farms could be set up in the area; as yet there are no such farms. Although rainfall seems to be a prerequisite for fish farming, the climate of the Tarai is otherwise suitable for it. Ten months of the year are comparatively hot. This factor increases the productivity of the water bodies and has a direct, positive effect on fish growth. The water problem could be solved through irrigation.

Of the total cultivated land in this area, 90 percent is paddy. The rice fields can be modified for fish cultivation. This type of paddy-fishing could make a major economic contribution to the area. Farmers could double the benefits of owning a piece of paddy, but due to various constraints such as lack of technical knowledge and water shortages, the opportunities are not being fully realized.

Traditional fish farming practices have existed in the study area for a long time. Successes have further encouraged the local people to expand them as an additional source of income. The challenge now is to provide the facilities needed to improve the existing system.

People are very eager to involve themselves in the CFF system.

They are already motivated and are well aware of the benefits that can be derived from it. It is now time that they are provided with technical and monetary assistance to expand the existing system.

Suggestions Made by the Respondents

The Tharus were the most forthcoming with suggestions and laid particular stress on the first two listed below:

- Cold storage facilities;
- Government support loans;
- Perennial water supply;
- Technical assistance;
- Marketing and market facilities.

SUMMARY

The present study has attempted to analyze the nature and status of community fish farming (CFF) in the Tarai region, with special reference to Bhawanipur and Hanuman Nagar village panchayats. These panchayats are located in the central Tarai. The overall objective of the study was to trace a broad picture of CFF which has been practiced by local farmers for a long time. It has been adopted as a major means of support or subsistence. There are marked varia tions in investment levels and returns from fish farming among the different communities.

In the study area, fish are bred in private ponds, village panchayat-owned ponds, and school-owned ponds. Village panchayat-owned ponds and school-owned ponds are contracted out to farmers for a specified period of time, and for a fixed amount of cash, regardless of productivity. Most fish farmers own only a single pond. The main constraint on owning several ponds was the level of capital and labor investment needed. The ponds were categorized into small, medium and large; most were medium sized, with an area between 10-20 kathas.

It is common practice in the Tarai for fish farmers to jointly own a pond or ponds, where each person holds shares according to the size of their investment. This varied widely from shareholder to shareholder; some invested money and others provided fingerlings. Joint ownership of particular ponds is not restricted to members of a specified caste or community. No written documents are kept and any conflicts that arise between shareholders are resolved by those involved. In a few cases panch leaders or village elders are requested to mediate.

People complained of several problems such as the lack of a regular water supply--most farmers depend on rainfall which is never regular and often scarce--and the absence of technical knowledge when they could not make a success of paddy-fishing despite its obvious potential.

The main reason for raising fish is to generate personal cash income. Fish are traditionally sold both wholesale and retail depending

on what is most convenient for the farmers. Due to transportation and packing difficulties most farmers sell their fish in their own villages and the local markets. The largest amount of fish sold by sample members in 1984 was over 400 kgs. Most sales were between 250-300 kgs. Incomes from fish sales varied greatly; the highest income from sales was over NRs.10,000 and the lowest was less than NRs.2000.

In the study area the main loan giving agency is the local branch of the ADB. Though the interest rate of the local moneylender is higher than that set by the agencies, many people use them because the loans are easier to get and quickly available. People from all communities complained about the complex bureaucratic procedures that have to be followed to get a loan through a government agency.

Although fish farming has been practiced for a long time, it is still in the early stages of development in the study area, where it is characterized by low input and low output. Some people claimed that they drop fishes into a pond and then ignore them until it is time to catch and sell them. They tended to use the cheapest available raw materials and had little idea of what was needed to farm fish efficiently.

The responsibility for the maintenance and supervision of the fish ponds lies with the owners themselves. The responsibility for village panchayat-owned ponds lies with the village panchayat and not with the farmers who use the ponds. It was observed that the condition of the village panchayat-owned ponds was much worse. Most were dirty and usually remained dry during the summer.

The study area comes under the Fattepur Fisheries Development Center. The fingerlings from this center are distributed using a coupon system. Due to the complex process that has to be gone through to obtain a coupon and then to actually use it to get fingerlings when they are needed, the people have negative attitude towards the Center. Most farmers buy the fingerlings from local merchants although they are often of poorer quality. If the process for getting loans or fingerlings was made easier, there might be higher participation in CFF.

RECOMMENDATIONS

Initial Survey of Nepal's Water Surface: There appears to be an abundance of water in public ponds around the country, but no survey has been done to establish the exact amount available for fish farming. Before further development activity is carried out, a thorough survey is necessary.

Research Work: After completing the survey, specific research into CFF and its possibilities should be encouraged. It should focus on which types of fish are suitable for different parts of the country. There are some fish that breed better in cold water and they would therefore be more successfully farmed at higher altitudes. According to the results of the research work, the chosen types of fish should be introduced into different regions by relevant government agencies.

Technical Assisstance and Training: The lack of technical knowledge is the most important constraint on the systematic development of CFF. The government should make available free technical assistance and

economic advice in every village panchayat so that the entrepreneurs can take full advantage of it. Short training courses should focus on new methods of fish farming and marketing that improve yield and income.

Prevention and Cure of Diseases: Different diseases attack fish and can eventually kill all the fish in a pond. The government should provide medicine and technicians before such diseases become widespread, thereby threatening the economic viability of CFF.

Publicity: There should be more publicity on the subject of CFF; different aspects need to be clarified for those who are considering it as an occupation. The government should arrange various demonstration works such as how fish farming can be profitable, and how it can be developed. Related questions should be answered by the government through television, newspapers, exhibitions and cinemas, so that people may begin to take an interest in the subject.

Encouragement for the Private Entrepreneur: Entrepreneurs need to be inspired and encouraged by the provision of facilities to help them acquire land, and provide the initial capital in the form of long-term loans. To meet capital expenditure, loans should be advanced more efficiently through the Agriculture Development Bank and fishery development centers so that more private individuals establish fish farms.

Organization: There is a considerable demand for fish. In order to meet this demand commercial fish farming on a large scale should be established to mass produce fish for a wider market. This could be organized on a corporation basis, with the controlling vote lying in the hands of the government and the remaining shares floated to investors on the open market.

Establishment of Supporting Industries: Fish is a perishable commodity. If fish are kept for a long time without proper care they will rot. Therefore, supporting industries such as cold storage facilities, packing, net manufacturing, and fish preserves must be established so that the maximum benefits from fish farming can be realized. The perishability of fish demands the development of efficient transport and communication networks. In particular, air transport links should be developed, at least between densely populated areas. If this is done, a market outside the country can also be captured, thereby earning much-needed foreign exchange as is done in Bangladesh.

Fish as an Export Item: Nepal imports fish every year in large quantities, which costs a lot of money. Fish exports, on the other hand, are quite insignificant by comparison. Development of CFF in different areas of Nepal may eventually lead to exports, which will help earn foreign exchange.

Full-time or Auxiliary Occupation: Fish farming can be developed both as an auxiliary occupation or as a full-time occupation. In the early stages, it is better as an auxiliary occupation as in Japan, and it will help, to some extent, to reduce unemployment.

Government Policy: Government policy must be development-oriented for CFF, with action that shows results. The government should take the initiative in the development of fisheries by establishing a few small

breeding and distributing centers across the country. If this is not done, Nepal will lag far behind other fish producing countries. The government should be actively in favor of the development of fish farming by making available the necessary facilities. As Nepal is a developing country every new concept must be examined closely. The government should adopt a bold and clear policy in this respect.

REFERENCES

Augusthy T., 1979. Fish Farming in Nepal.

Department of Agriculture, (DOA). "A Glimpse of Fisheries Development in Nepal". Updated brochure.

Hickling C.F., 1962. Fish Culture.

Peace Corps/Nepal, 1983. Fish Culture in Nepal: An Introduction.

Rajbanshi K.G., 1968. Khadya Samasya Ko Samadhan Ma Matsya Palan Ko Mahtwa. Kathmandu, Nepal: Gorkhapatra