

Short Communication

Women in Riverbed Aquaculture for Livelihoods in Foothills of Nepal

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Abstract

Small-scale aquaculture is one of the options for improving household family nutrition and also supplements income for rural poor. Family nutrition depends on women as they prepare, cook and provide food for the family in most of the Nepalese communities. This short communication deals about the use of foot hill riverbed for aquaculture involving women in order to improve family nutrition and supplement income of an ethnic community. 90 household ponds were constructed on both sides of river flood plain in foothills of Nepal. Womens' groups participated in monthly technical training sessions along with fish farming activities. Ponds were stocked with grass carp (*Ctenopharyngodon idella* (Valenciennes 1844)), common carp (*Cyprinus carpio* (Linnaeus 1758)) and Nile tilapia (*Oreochromis niloticus* (Linnaeus 1758)). Local river species were allowed to enter and grow in ponds. Pond dikes were used for vegetable farming, grass cultivation, and pig farming. Though pond fish farming added extra work, ethnic women were able to produce significant amounts of fish, fruits and vegetables that supported family nutrition and was also a source of income.

Introduction

Increasing food and nutrition security, cash income for household family expenses and full utilisation of family labour are the major issues for the rural poor. Communities residing in the foothills of Nepal with limited available agriculture land, use public forest land for livestock grazing to support their livelihoods. Poor access to roads and markets further compound the food and livelihoods security issues. Small-scale pond aquaculture for such rural poor

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communities is one of the options for improving household family nutrition and to supplement income. The role of small-scale aquaculture in household food and nutrition security, income generation and empowerment of women and marginalised communities has been increasingly appreciated in recent years (Shrestha et al. 2012). However, availability of suitable land for pond construction is a major limitation in most of the cases. Gravel bed flood plains, with frequently changing river courses due to monsoon floods, are available resources in many areas of the foothills of Nepal.

This paper aims to present how floodplain gravel-bed riverbeds can be utilized for pond aquaculture by women to improve the livelihoods of poor and marginalised ethnic community of the foothills in Nepal.

Materials and Methods

The program sites were the Bhundrung and Thado khola flood plain river bed of Jhulyan village, which is in the Hadikhola Village Development Committee of Makawanpur district of Nepal (Fig. 1 and 2). About 99 % of the inhabitants of this area belong to the “Tamang” ethnic group, which is a marginalised community. Agriculture and livestock farming are the in major occupations, but these activities support only about 6 to 10 months of the in total household consumption needs. During the remaining months, men from this location temporarily migrate to work as non-skilled labour outside their village. The routine work tasks of women in “Tamang” households are cleaning livestock sheds, fetching drinking water, fodder collection from the forest and farmland for livestock, cooking, livestock grazing and firewood collection along with the other seasonal agriculture work such as rice planting, weeding and harvesting and so on.



Fig. 1. Main river with tributaries and Program site marked



Fig. 2. Ponds at program site marked with arrows

Program activities were carried out from March 2015 to February 2016. An inception workshop with village households was organised, and 2 groups of women were formed from the 53 women. The 2 women's groups were involved with an existing cooperative of the village. An exposure trip for these groups was organised to visit an established and successful women's aquaculture cooperative in Chitwan district. During the project period, 90 fish ponds for 53 households were constructed with an excavating machine. The ponds ranged from 100-500 m² in size with an average area of 170 m². Ponds were constructed on both sides of the river flood plain at the foothills, on land covered by small gravel and boulders. For 8 months, the women's groups received monthly hands on technical training on fish farming in the field. Inputs such as fingerlings, fishing nets, weighing balances, water pumps, fish baskets and vegetable seeds for pond dike farming were supplied. A weekly market in the village was establishment for product sale, and the women's group was linked with the live fish sale market in the nearest city Hetauda.

Fish species used for culture were grass carp (*Ctenopharyngodon idella* (Valenciennes 1844)), common carp (*Cyprinus carpio* (Linnaeus 1758)) and Nile tilapia (*Oreochromis niloticus* (Linnaeus 1758)). Local river species such as dedhuwa (*Esomus danrica* (Hamilton 1822)), pothi (*Puntius sophore* (Hamilton 1822)), faketa (*Barilius barna* (Hamilton 1822)) and gaichi (*Macrogathus aculeatus* (Bloch 1786)) were allowed to enter and grow in ponds. Women were trained to harvest regularly for family consumption. Pond dikes were used for vegetable farming, cultivating pulses, banana and grasses. Some households made pig sheds on the dike and raised pigs. The program was launched for one year and the culture period for the fish was about 6 months.

Results

Formation of household women groups and regular monthly gathering for training allowed the women to interact and share on social events of the village, agricultural activities and problems, besides the fish farming activities. It is observed that in the course of training period, individual women developed capacity to present what she saw differences between own pond and others, could interact with trainers. As of the project rule, pond ownership was with household women and that empowered them for income from the pond.

Total income estimated from the aquaculture and pond dike farming from the communities was about NPR 1,350,000 (USD 13500). Outcome of the one-year program is summarized in Table 1.

Table 1. Items, volume and value of production from pond and pond dike farming during of the project implementation period.

S.N.	Production item	Production (kg)	Value (NPR)
1.	Fish production	2,755	716,300
2.	Local fish production	1,590	477,000
3.	Pulses	600	66,000
4.	Vegetables	173	6,920
5.	Banana	150	9,000
6.	Pig	380	76,000
Total			1,351,200

Note: NPR. 100 = USD1

Though pond ownership was with the woman of the household, fish farming was supported by all family members. The Cooperative Society managed to buy fish fry from government hatchery for its members. Feeding and fertilising of pond was by women. The whole family took part in the harvesting activity. Women and grown up children went to village weekly market to sell fish and vegetables, however, the men through the Cooperative Society sold live fish in the city market. As a result of the activities undertaken the Cooperative Society managed to get further support for pond construction.

Discussion

Flood plains of small rivers in foothills are mostly composed of gravel, boulders and loam soils with minimum of top soil. Cereal crop cultivation especially rice, maize, wheat and others are difficult in this terrain. Frequent flash floods during the monsoon are also a problem for the crops. People

residing in such areas are resource poor ethnic communities. Utilisation of river bed/flood plains for aquaculture seems possible as pond dikes can provide flood protection. Water table is quite high and water recharge in pond is good enough even during the dry season. Besides production of cultured species, local indigenous fish species available in the rivers that can be grown in ponds by allowing it to naturally enter into the constructed ponds. It also helps to conserve indigenous fishes, control use of illegal fishing methods in rivers through educating community womens' groups. Raising of livestock (pigs and goats) that the community has been traditionally doing is also possible utilising pond dikes. Goats are also commonly farmed by allowing them to graze in the foothill forests. The amount of stocked fish produced was about 52 kg and indigenous local river fish produced was about 30 kg per household. Approximately 50 % of fish produced was used for family consumption which rose to 8 kg/caput/year for a family of 5, which is about 3 times higher than the national average of fish availability in Nepal i.e., 2.4 kg/caput/year (Mishra 2015). Assuming 50 % fish were sold, their efforts have added an income of NRs 12,000 for each household. Cultivation of grasses on the pond dike helped to raise goats. Banana, pulses and vegetables helped in family nutrition and for supplementing the family income.

Once the ponds are constructed and fish stocked, the culture activities that need to be carried out are everyday feeding, weekly or fortnightly fertilising/manuring and finally harvesting. Fish fry purchase and stocking is mainly done by men and for harvesting the whole family is involved. Feeding and manuring for one pond does not require much time for the woman if it is nearby the house. All the ponds built in the project were close to their residences at 10 minutes' walking distance from house. Moreover, grass cultivation on the dikes can save time for the women who had to go to the forest for fodder for livestock. Grass collection and fish feeding can be done simultaneously. Thus, it can be argued that adding one household pond does not add much extra work for a woman.

Use of available natural resource of foothill river bed or flood plain by constructing fish ponds with strong dikes could benefit many poor communities residing along rivers and streams. Pond ownership and pond income empowers women. Fish produced from pond owned by women supports family nutrition, enhances family income, increases food security, and develops saving behavior

in the women. This model should be scaled up throughout Nepal and also in other countries with similar resource conditions.

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