Accessing Water Resources: A Case Study of Ways to Improve Access of Marginalized Communities to Underutilized Lakes for Fish Farming in Rukum and Kapilbastu Districts, Nepal

Manoj Kaphle[*] and Keshab Kumar Dahal[*]
[*]United Mission to Nepal
Corresponding author: manoj.kafle@umn.org.np

Abstract: This paper aims to examine the possibility of reducing poverty among marginalized communities by improving their access to hitherto underutilized natural lakes. Towards this aim, this paper first analyses the extent and root causes of poverty and food insecurity among the marginalized communities living by the Buddi and Syarpu Lakes in Kapilbastu and Rukum districts respectively. Second, it explores the ways these marginalized communities benefit from the lakes by discussing the practical experiment done to achieve this objective. The paper then demonstrates that fish farming in natural lakes not only introduced an alternative means of livelihood in the study area but also access of marginalized communities to water bodies can significantly reduce poverty and replace the practise of subsistence farming. The findings presented in this paper can be strong evidence of new possibility to increase income, improve food sufficiency level and generate employment opportunities in marginalized communities through an activity which was not perceived before. It recommends that the government should facilitate, with strong policy measures, marginalized communities to operate economic activities using underutilized water resources.

Key words: Lake, water resources, marginalized communities, fish farming, level of income

INTRODUCTION

Water resources are still inaccessible to a large population in Nepal. There are more than 6,000 rivers and rivulets discharging abundant water in Nepal, but 65 per cent of the population depending on agriculture for their livelihood does not have access to those resources (DoFD 2007). On the other hand, enterprises based on water resources, like fisheries and aquaculture, can be potential means of economic growth. These enterprises are growing at a rate of 5.11 per cent every year and contribute 2.54 per cent to Agriculture GDP. But they have been limited to inland water and old production practices (DoFD 2007). There is a huge scope for expanding fisheries and aquaculture as more than 5,000 hectares (ha) of water surface exists all over the country, of which 3,500 ha are estimated to be suitable for aquaculture (UMN 2011). Despite the potentiality and availability of water bodies, only a fraction of these water resources are being utilized so far.

There is a good scope for marginalized communities, who constitute nearly half of the country's population (47.3%), to benefit. As of now only 3 per cent of them get benefits from these resources through fisheries and aquaculture (MoFSC 2000). The Agriculture Policy 2004 acknowledges this potential and stresses better utilization of these resources for greater benefit of poor and marginalized communities (MoAC 2004). However, a number of factors—namely political, economic and technical—are limiting the government's ability to utilize these resources for the wellbeing of its citizens (Rana and Rajbanshi 1975).

The traditional division of labour based on the caste system is also constraining efficient

utilization of water resources, especially for fisheries and aquaculture. For example, social/ ethnic groups like *Jalari, Bote* and *Tharu* have traditionally been engaged in fishing and water-related occupations such as boating and weaving of fishing nets. However, with a few exceptions, such occupations undertaken in traditional manner cannot sustain the family all round the year. In general, these traditional fisher communities live in villages close to water resources. The traditional fishing occupation within the caste system can be attributed both to abundant water resources in the country and to the culture of considering fish as a valuable food resource in the past (Gurung 2003). Despite this fact, these caste/ethnic groups have limited access to resources. As a result, they are forced to engage in multiple activities in crop and animal production or to migrate to cities and other areas for wage employment in order to reduce risk of food scarcity and sustain their families' livelihoods. These traditional occupations have also been overlooked by public assistance programmes and services, which are often biased towards the bigger and better organized farmers. This has been so because smallholders and indigenous peoples have very little influence on the policy process as well as poor access to support services and technical inputs. They are generally seen to contribute little to the national food supply, and the cost of servicing them is considered as disproportionately high (Miller 2009).

In order to demonstrate the potentiality of water resources, especially in village lakes and ponds, to improve the livelihoods of marginalized communities living in close proximity of such resources, an demonstration was undertaken to use the Buddi Lake in Kapilbastu (28 ha) and Syarpu Lake (42 ha) in Rukum in 2010 and 2011 respectively for fish farming. The demonstrations, carried out in two different locations for different ethnic groups, had the same aim of creating access of poor and marginalized communities to natural lakes for sustainable livelihoods. The demonstration started with technical study of the two lakes and advocacy to create access of marginalized people to these lakes simultaneously. In the beginning, the project aimed to provide technical assistance to the target populations and to mobilize them towards commercial fish farming, but no dramatic effect on income and food security was noticed. After three years of rigorous efforts by several organizations, and with the support of local government and stakeholders, remarkable changes were observed in the lives of the people involved in fish farming. The positive changes included not only economic growth and increased employment of people, but also increase in people's capacity for advocating for their rights, improvement in health and sanitation and reduction in the incidence of domestic violence. This paper describes the process of implementation of the project, changes it has brought in the lives of the target population, challenges faced while implementing this project and implications for the activities aimed at using water resources for the benefit of marginalized communities.

In order to address the low income and livelihood problems of people of Buddi VDC, ward no. 1 and 2 in Kapilbastu and ward no. 3, 5 and 8 of Bafikot VDC, the Buddi Lake and Syarpu Lake respectively were selected to start fisheries. The poor and marginalized people did not have the capital for initial investment. So, the United Mission to Nepal (UMN) and its local partner organizations, Bhrikuti Community Learning Centre (BCLC) in Kapilbastu and Nepal People's Awakening Forum (NPAF) in Rukum agreed to provide financial and technical support for fish farming in the beginning year. A total of 276 households from the Buddi and 132 households from Bafikot were mobilized. Whereas previously the Buddi Lake was managed and used by a single man from outside the district and the lake in

Bafikot was not properly used, the management and ownership of the lakes were now handed over to the local people. In both districts, the Village Development Committees (VDCs), the government office at village level, which owned the lakes, and the programme supported the poor people to lease the lakes through the BCLC and NPAF for five years. In the first year (2010), five varieties of fish, viz. Common carp, Big head carp, Grass carp, Rohu and Silver carp, were released in the Buddi Lake, whereas fingerlings of the same varieties of fish were released in 2011. A series of awareness sessions on community sanitation, health awareness and income generation through group savings was conducted to enhance the capacity of community groups. These training sessions were delivered by local NGOs through group approach. Besides income from fisheries, the community members benefited through vocational training in various technical areas, which were provided for the sustainability of their business according to their skills and experience. As the income from sale of fish increased, the supporting organizations, viz. UMN and BCLC, strengthened the capacity of the cooperatives, Buddha Janakalyan Cooperative Limited in Buddi VDC and Syarpu Agriculture Cooperative Limited in Bafikot VDC. Through their efforts both cooperatives were able to design strategies and prepare business plans. In addition, these cooperatives built their strength to compete in the bidding to rent the lake opened by the VDCs concerned every five years. All households from target communities became shareholders of the cooperatives and have been benefiting from cooperatives' bonus, credit services and from their own micro enterprises.

MATERIALS AND METHODS

Description of location and communities

The Buddi Lake is situated in Buddi VDC in Kapilbastu District in Western Development Region of Nepal. The lake occupies an area of 28 ha and has average depth of 2 metres (m). *Tharus*, one of the ethnic groups in the Terai, constitute more than 60 per cent of the population around the Buddi Lake.

The Syarpu Lake is situated in Bafikot VDC in Rukum District, a hilly area in Mid Western Nepal. It is one of the biggest and famous lakes of the district. Syarpu is located between 80, 30' east latitude and 28, 40' north latitude at an altitude of 1,307 m from sea level. The lake occupies an area of 40 ha and has maximum depth of 13 m. The communities inhabiting around the lake are Dalits, Chhetris and Brahmins.

Before the project was implemented, subsistence farming used to be the sole means of livelihood in Buddi and Bafikot VDCs, where people operated smallholdings of 0.1 ha and 0.3 ha respectively for farming. This study found that farming was not yielding sufficient food for the communities for the entire year and hence they were food insecure. CBS (2011) also shows that the farmers relying on subsistence farming own only 0.7 ha of land.

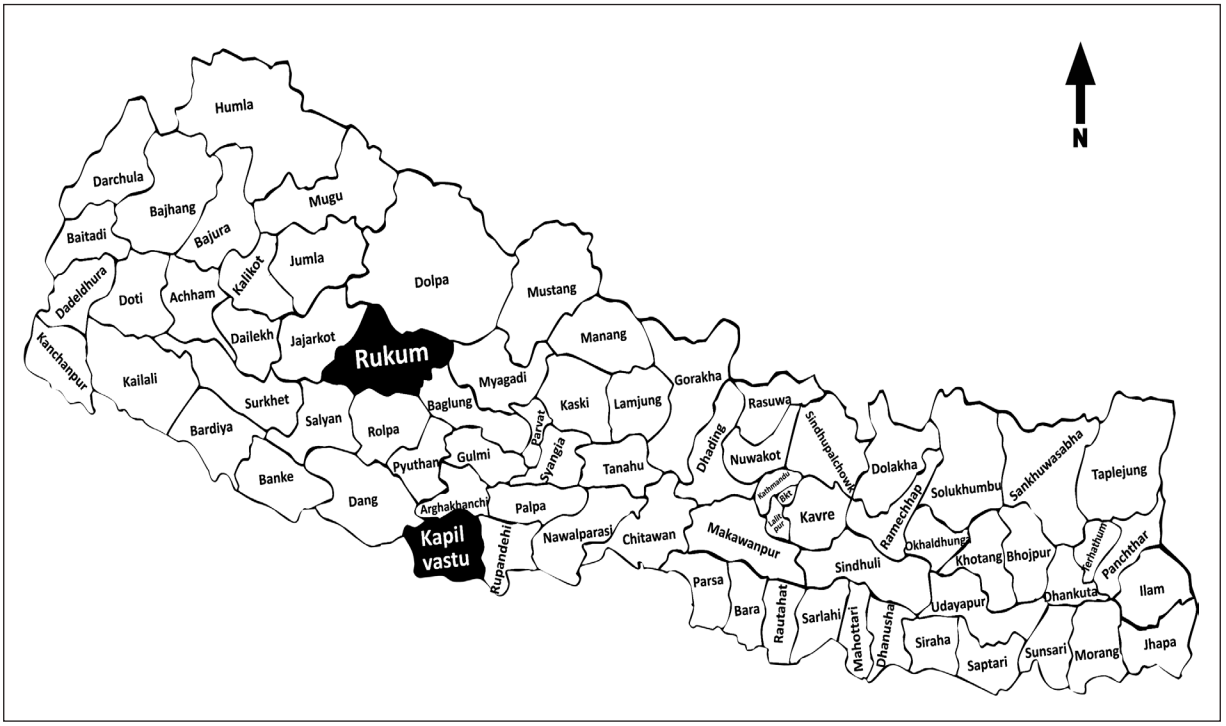

Figure 1 : Map of Nepal showing Kapilbastu and Rukum Districts

Information collection and analysis

Source of data

This study was based on both primary and secondary sources of information. The former consisted of the observations and views of the local people of Kapilbastu and Rukum, government officials, NGO staff and social volunteers, which were collected through interviews. In addition, the views of the targeted beneficiaries and relevant stakeholders were collected by directly visiting them in the field sites. The views of the various people and stakeholders were collected by way of focus group discussions (FGDs), key informant interviews and surveys of respondents from individual households. Interviews were conducted with informants at numerous times throughout the period of four years (March 2010 to February 2014) . The fieldwork for the collection of information from individual households was completed in March 2014. The secondary information comprised research reports produced on the issues of natural resources, especially lakes, access to services provided by the government and private sector agencies, level of income of local people, small enterprises, employment and gender and domestic violence. Different reports produced by the UMN and relevant journal articles and books were also referred.

Selection of study sites and respondents

Field-level data on fish farming and its effects on the livelihoods of marginalized people were gathered in Buddi VDC in Kapilbastu district and Bafikot VDC in Rukum district. Communities for this action research were selected by drawing on the secondary information from UMN and local NGOs of Kapilbastu and Rukum. The surveys carried out by the BCLC in Kapilbastu in mid

2008 and by the NPAF in Rukum in 2009 show that, out of the 408 households, in Kapilbastu and Rukum 64.5 per cent have average monthly income of Rs 500-1,500 (USD 7-20), which is far too little to fulfill their basic needs, and 9 per cent of them do not own land. The survey report says that the extent of poverty could easily be noticed when one visited those villages; small mud houses with thatched roof and poor sanitation around houses were the common scene in villages. Only 10 per cent of the households owning toilets, poor sanitation, open defecation and 58 per cent of the population being illiterate were some evidence of poverty. These may also be considered as the results of low income. *Tharu* ethnic group was selected in Buddi, Kapilbastu, whereas Chhetri, Dalit and Janajati were selected in Bafikot, Rukum. In both districts, altogether 408 beneficiary households were surveyed in the beginning of fish farming in 2010 and each year after fish farming by administering a semi-structured questionnaire. Households were selected on first-come-first-serve basis as the number of households in the villages was not large enough to warrant the use of the random selection process. Both male and female members of the household units were consulted in a single sitting for assessing responses. Questions on fish production, income, employment opportunities and technical skills developed in individuals and access to services was included in the questionnaire. The questionnaire also covered information on domestic violence and awareness of health and sanitation.

FGDs and case studies

As previously stated, FGDs and case studies were two of the important research tools used to gather information for this study. Accordingly, discussions were held with both male and female members of each caste and ethnic group in the settlements in both districts. A total of 13 FGDs were conducted in Kapilbastu. Information was collected on fish market and technical aspect of fish farming. Similarly, two FGDs were conducted in Syarpu, Rukum, with cooperative and farmer groups. Information on fish farming, income and skill development was collected through FGDs. Key informant interviews were also conducted with personnel from DADO, DDC, VDC, cooperatives and leader farmers, traders and service providers.

Collected data were analysed using SPSS (a statistical tool used for analysing social research data) and MS Excel. Information was tabulated and interpreted using triangulation method.

RESULTS AND DISCUSSIONS

Organization and institutionalization of communities

The study found that involvement of people in cooperatives remarkably increased after their involvement in community-based fish farming in both Kapilbastu and Rukum Districts. Tables 1a and 1b presented the effect of fish farming on institutionalization of a local body, ie cooperative. The data shows that only 37.3 per cent of the people were involved in cooperative before fish farming in both districts, which reached 100 per cent after their involvement in fish farming. Table 1b presents district-wise situation. With increased involvement of farmers in cooperatives, members' access to savings and credit increased. This increased access to credit encouraged community members to initiate microenterprises on their own.

Table 1a : Involvement of communities in cooperatives in Kapilbastu and Rukum districts

Situation	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Before Fish farming	152	37.3	37.3	37.3
After Fish farming	408	100.0	100.0	100.0

Source: Field survey 2013

Table 1b : Involvement of community people in cooperatives by VDCs

VDC/District	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Bafikot VDC, Rukum	132	32.4	32.4	32.4
Buddi VDC Kapilbastu	276	67.6	67.6	67.6
Total	408	100.0	100.0	

Source: Field survey 2013

Renting of lakes by cooperatives

Before fish farming, private businessmen used to rent the Buddi Lake at Rs 100,000 per year, whereas the rent increased to Rs 500,000 after the cooperative started leasing the lake for fish farming. In the case of Syarpu Lake, the lake used to be managed by a lake conservation committee before the intervention and the rent was not fixed. The committee earned income by charging local fishermen. After fish farming, the cooperative started paying 10 per cent of its income to the VDC. An agreement was entered into with the VDC that the collected amount would be utilized for the welfare of the VDC.

Table 2 : Status of leasing of lakes before and after intervention

S.N.	District	Before Project Intervention		After Project Intervention	
		Leased by	Rent (Rs)/ Year	Leased by	Rent (Rs)/ Year
1	Buddi, Kapilbastu	Private Business men	100,000	Cooperative	500,000
2	Syarpu, Rukum	Lake Conservation Committee	Not fixed	Cooperative	10% of income

Source: Field survey 2013

Income increased from fish

The community of Buddi received their first harvest of 3,000 kg of fish in the year 2010/11, which fetched Rs 0.5 million. This income increased each succeeding year: Rs 1.9 million from harvesting 15,000 kg of fish in the second year (2011/12) and Rs 2.5 million from harvesting

16,600 kg of fish in the third year (2012/13). The income was used for purchasing fingerlings and feeds, paying guard's salary and for dig boring. The community had saved Rs 1.1 million, excluding all the costs, in their own cooperative, Budda Janakalyan Cooperative, as their share amount till 2013. Figures 3a and 3b show the status of harvested fish and income status of the Buddi Lake in three succeeding years. The data clearly show that production has increased almost by 400 per cent in the second year and 10.66 per cent in the third year, which has direct correlation with the increase in income in each succeeding year (figure 3b).

The community of Bafikot started to harvest fish from the year 2012, a year after the fingerlings were released in the lake. When the community groups formed their own cooperative, Syarpu Agriculture Cooperative Limited, in the end of 2012, it took the responsibility to manage the fish business through its separate wing "Fish Enterprise". The cooperative received Rs 214,000 from harvesting of 1,070 kg of fish in 2012/13 (2070 BS) which increased by more than two folds in the next year (2013/14) with Rs 444,000 from harvesting of 2,220 kg of fish. Figures 2a and 2b show the status of fish harvested and income received by selling fish in the Syarpu Lake in two succeeding years.

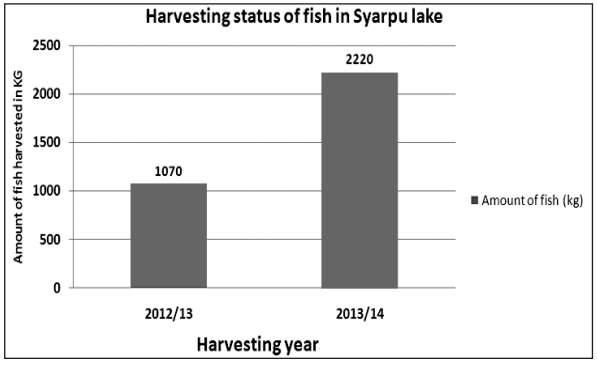

Figure 2a : Status of fish harvest in two succeding years in the Syarpu Lake, Rukum

Source: Field survey 2014

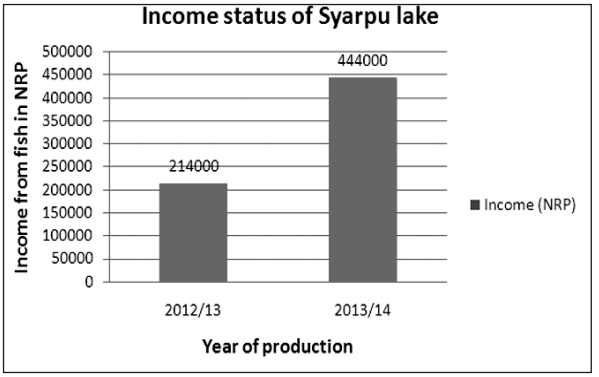

Figure 2b : Status of income by selling the fish in the Syarpu Lake, Rukum

Source: Field survey 2014

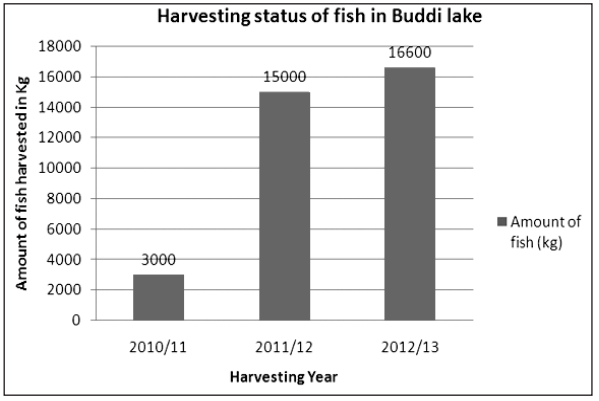

Figure 3a : Status of fish harvest in three succeeding years in the Buddhi Lake, Kapilbastu

Source: Field survey 2013

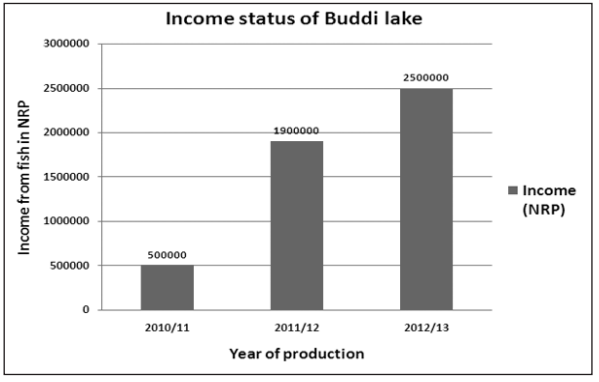

Figure 3b : Income status of the Buddhi Lake in three succeeding years

Source: Field survey 2013

Change in income status of fish farming households

The effects of technical training, exposure visits and demonstration encouraged people to initiate small enterprises by using the credit facility provided by their groups. Income earned from small enterprises and from sale of fish brought significant changes in the annual income of Tharu people of Buddhi, which made livelihood easier. Their children started going to school; they received primary health care such as vaccination; toilets were constructed in each household; and they started to consume fruits and vegetables. Gurung et al. (2009) shows that fish farming has been successful in raising income of the whole community. The increased income has enabled families to send their children to school and significantly improved general livelihoods.

At the time of the baseline study in 2010, income of majority (68.8%) of the households involved in fish farming in Buddhi Lake was Rs 5,000 per month and that of 19.9 per cent was Rs 8,000 per month. Only 8.3 per cent of the households earned Rs 10,000 and 2.9 per cent earned up to Rs 15,000 per month--the only amount that was sufficient to feed the family for 12 months.

Table 3 : Change in income status of fish farming households

Income status of individual	Number of people with income of NRP 5000		Number of people with income of NRP 8000		Number of people with income of NRP 10000		Number of people with income of NRP 15000	
	Before fish farming	After fish farming	Before fish farming	After fish farming	Before fish farming	After fish farming	Before fish farming	After fish farming
Frequency	190	80	55	110	23	55	8	31
Valid percentage	68.8	29	19.9	39.9	8.3	19.9	2.9	11.2

Source: Field Survey 2013

Figures 4a and 4b show that 68 per cent of the households had income of Rs 5,000 per month before fish farming, which was not sufficient to feed their family for more than five months. When these people were involved in community-based fish farming, their income increased gradually each year, notably in the third year. At the end of the third year (2013), the percentage of people earning income of Rs 5,000 per month decreased to 28.99 from 68.84, whereas the percentage of people earning Rs 8 thousand per month increased from 19.93 to 39.86. Furthermore, the percentage of people earning Rs 10 thousand per month reached 19.93 from 8.33 before fish farming and those earning Rs 15 thousand reached 11.23 from 2.9. Thus, fish farming brought about tangible increases in income, with 71 per cent of the total 276 persons earning between Rs 8 thousand and Rs 15 thousand per month—an income which is sufficient to feed their family round the year.

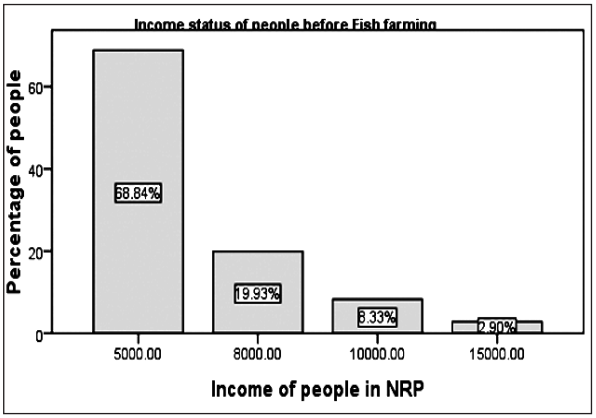

Figure 4a : Income status of Tharu community before involvement in fish farming in Buddhi Lake, Kapilbastu

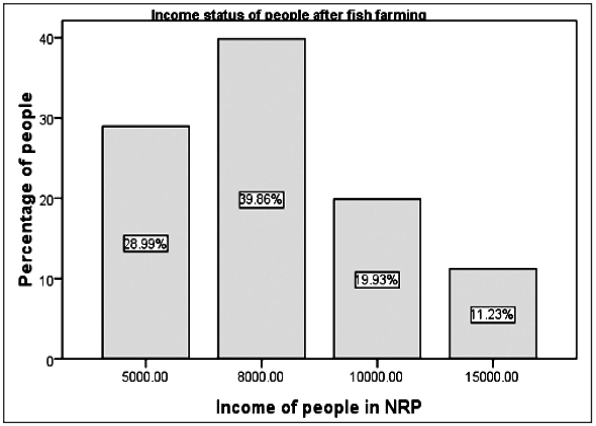

Figure 4b : Income status of Tharu community after involvement in fish farming in Buddhi Lake, Kapilbastu.

Source: Field Survey, 2013

Reduction in domestic violence

All 13 groups managed to save up to Rs 300,000. Awareness programmes helped the communities to control alcohol consumption in their households, as a result of which domestic violence decreased. As many as 40 women members of groups reported that awareness raising and frequent interactions among group members had created an environment that protected women from domestic violence at the hands of their husbands and mothers-in law. Altogether 31.2 per cent of the respondents said that domestic violence had reduced in Buddi community (Table 4). Awareness had also led to reduction in the incidence of child marriage and polygamy, which were once so common in their communities (UMN 2012).

Table 4 : Perceptions of reduction in domestic violence

Reduced domestic violence	Frequency	Valid Percentage	Cumulative Percentage
Yes	86	31.2	31.2
No	190	68.8	68.8
Total	276	100.0	

Source: Field Survey 2013

Increased awareness of health and sanitation

Due to increased awareness of health and sanitation, each of the 276 households started visiting health posts for getting their children vaccinated. Therefore, the chances of protecting their children from tetanus (TT vaccine), tuberculosis (BCG vaccine), polio and chicken pox (measles vaccine) diseases increased in Buddi village. (UMN 2012)

Improved access to services

The figures presented in table 5 show the change in access of people to different service providers and service centres before and after fish farming. The proportion of people having access to agriculture service centres (agro-vets, fishery development centre, district agriculture development offices and agriculture training centres) increased from 36.2 per cent before fish farming to 73.2 per cent after fish farming, whereas people having access to human health services also increased from 44.6 per cent before fish farming to 64.9 per cent after fish farming. The study also found that, in Buddi, before fish farming, only 38.8 per cent of the people had access to financial services to get credit

facilities and 43.1 per cent had access to technical services provided by local government offices to get technical support for microenterprises, which increased to 72.5 per cent and 66.3 per cent respectively after three years of fish farming (Field Survey 2013).

Table 5 : Change in access of community to different services in Buddi

	Access to services	Frequency	Valid percentage	Cumulative percentage
Before fish farming	Agriculture services	100	36.2	36.2
	Health services	123	44.6	44.6
	Financial services	107	38.8	38.8
	Service from local government	119	43.1	43.1
After fish farming	Agriculture services	202	73.2	73.2
	Health services	179	64.9	64.9
	Financial services	200	72.5	72.5
	Service from local government	183	66.3	s66.3

Source: Field survey 2013

CONCLUSION AND RECOMMENDATION

The study carried out in two VDCs of Kapilbastu and Rukum Districts in Nepal demonstrated the potentially of natural lakes in improving the livelihoods of marginalized communities if they were given access to manage and use the natural lakes in their communities through cooperatives. Before the project, these marginalized communities did not benefit from the lakes. But following project interventions from external organizations for sensitization for commercial fish farming and right to utilize the lakes by local communities, these communities started to benefit economically and socially. Remarkable changes in the livelihoods of those communities started to appear since the beginning of the second year of intervention.

The study analysed the major effects of community fish farming on economic growth as the fish enterprise helped 71 per cent of the people receive income ranging from Rs 8,000 to Rs 15,000 per month. The income recieved by each household involved in fish farming was sufficient to feed their family (5-6 members) round the year. Besides income and food security, marginalized communities like Tharus and others were bridged with several service providers and were recognized as good fish entrepreneurs. The field survey carried out during the entire period of project intervention also identified the multiplier effects of project intervention based on community-based fish farming. People directly involved in fish farming became aware of domestic violence, community sanitation and health issues like alcohol control, control in domestic violence against daughters-in-law and regular vaccination for pregnant women and their children. Hence, the study has a clear message that the livelihoods of poor and marginalized people living around the water source can be enhanced by improving their access to those resources

for viable businesses, especially those which would not require more financial, technical and legislative investments. For this, government and private sectors, including service providers, need to have sound policy, strategy and commitment to involve marginalized people in agri-business like fish culture and its trade.

At macro level, the Government of Nepal (GoN), with the help of the private sectors, should develop tools for systematic and comprehensive collection of statistics on water resources like lakes in order to develop a sound plan on commercial fish farming, targeting landless and marginalized ethnic groups. The first priority should be given to indigenous peoples by local governments to initiate fish culture rather than hand over lakes to individual entrepreneurs through tender process. Local communities are the right holders according to the policy of the International Labour Organization. Finally, the GoN should develop a marginalized community-centred strategy to utilize natural lakes, which would support to achieve MDG 1, ie 'Eradicate extreme poverty and hunger', as the achievement on this front is behind the target in Nepal.

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