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Impact of Multiple Use Water Services in Tori Danda Community, Nepal

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This paper draws upon research conducted in the Malewa Basne Multiple-Use Services (MUS) system developed in Tori Danda village of Syangja District in Nepal with support from the Smallholder Irrigation and Marketing Initiative (SIMI) project, the Central Department of Rural Development, Tribhuvan University, and International Development Enterprises (IDE) Nepal. The paper describes how the MUS-by-design process and application of related micro irrigation technologies impacted a community in the middle hills of Nepal. Analysis of project impacts was conducted through selection of a random sample of participant households and data collection through a Participatory Rural Appraisal approach. As one of the first gravity-fed double tank, two line distribution systems designed in the middle hills by the SIMI project, this study of Malewa Basne represents typical MUS implementation challenges and community outcomes. The impact analysis includes increase in vegetable production, marketing aspects, and shifts in intra-household roles. Discussion of the process of MUS development also includes the mitigation of community conflict that arose due to caste dynamics and socio-economic disparities.

IDE-Nepal has implemented over 80 multiple-use water services projects in the middle hills of Nepal in the past five years. As one of the first systems built, there are interesting impact lessons that can be drawn from the experience of Tori Danda village. The richness of the experience and outcomes of the Malewa Basne MUS system are due to many factors including caste conflict and linkages with micro irrigation and marketing.

This paper is based on survey research conducted in November, 2006 with smallholders in Tori Danda village. Eleven users (6 women and 5 men) of the multiple-use water system implemented by International Development Enterprises (IDE) through the Smallholder Irrigation and Marketing Initiative (SIMI)1 were interviewed first in a group and then individually. Interviews were also conducted with SIMI staff.

Photograph 1. Tori Danda village (Source: Narayan Singh Khawas)

Background

Tori Danda village is the residence of 29 households in Sworek VDC of Syangja District, Nepal. Sworek VDC lies in the western part of Syangja, about 15 km from the district headquarter. Siddhartha highway passes through the adjoining VDC (Dahathum) and a two-kilometer trail leads from the highway (at the Gairathok trailhead) across the Andhi Khola River up to the village. The villagers are almost completely dependent on agriculture, although some are able to earn additional income from service work or as daily laborers. Landholdings average only half a hectare and prior to the SIMI project, production was largely for subsistence. The major staple crops in the area include rice, maize, wheat and millet, and most households raise some animals including buffaloes, cows, goats, and poultry. Temperatures range from 10-38 degrees Celsius throughout the year. Village literacy is high and all children go to a nearby school.

Due to its location in the middle hills, land in the village is sloped (Photograph 1). The 29 households of Tori Danda are comprised of three different castes at three bands of elevation. The upper band is Giris (8 households), the middle is Brahmins (16 households), and the lower is Thakuris (5 households). Brahmins are a higher level caste whereas Giris and Thakuris are both lower castes than Brahmins, but equivalent to one another. The Malewa Basne multiple-use system supplies the 21 Brahmin and Thakuri households, totaling 121current users.

Development of the MUS system

SIMI staff originally approached Tori Danda villagers in 2003 to encourage the use of micro irrigation for production of high value vegetables to increase income. Despite having little water available, households were already using up to one-third of their domestic water for productive purposes (livestock and irrigation.) Since there was no spring source at an elevation above all three clusters large enough to supply the whole village, the village had two different domestic water systems that had been built by the local government in 1988. The Giri cluster's system used a very small spring source to supply two taps for their eight households. The Brahmin and Thakuri clusters shared a larger spring source (Malewa Basne – "pigeon cry" - spring) that supplied five shared taps. While the Giri domestic supply remained sufficient for their needs, the system shared by the Brahmins and Thakuris was insufficient - only the Brahmin households were actually receiving adequate water.

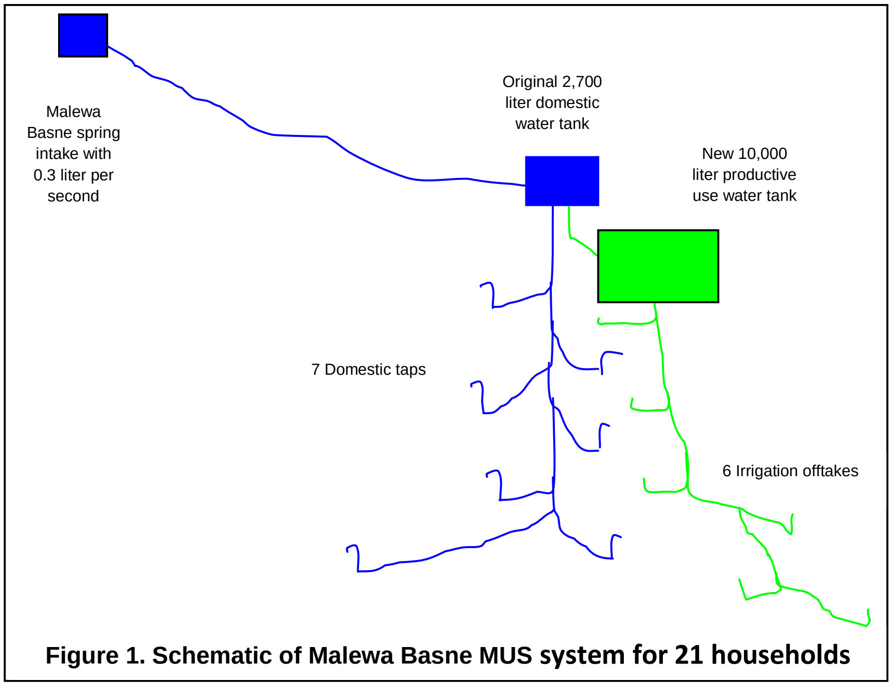

Figure 1. Schematic of Malewa Basne MUS system for 21 households

Since social custom allows Brahmins to take water first from communal taps, and they had the relative advantage of having access to the taps at higher elevations, not enough water was left for the lower level taps. Thus, the Thakuri households were only receiving water one out of every two days. At the original community meeting with all three clusters, the Giri cluster decided that they did not need to be part of a larger multiple-use system because they had their own source and system. Therefore, SIMI began working with just the Brahmin and Thakuri clusters to rehabilitate their old domestic system. SIMI proposed additional taps for Thakuri households and new irrigation offtakes[2] to be shared by field neighbors. However, due to the previous mistrust generated between the two clusters, the Thakuri households originally refused to share the system. At the same time, the land that SIMI suggested be used for construction of the productive use tank belonged to a Brahmin household that refused to give up their land.

These two conflicts persisted through six months of negotiation and system construction sat pending. In order to resolve the conflict between the two clusters, SIMI met with the households in each cluster, had community level meetings, and requested the help of the Water User Committee (WUC) that had been established for system construction and management. SIMI explained that they would ensure equitable distribution of water by installing flow regulators at each tap and offtake to mitigate problems caused by elevation differences. SIMI also had the Brahmin cluster make a public declaration of agreement to equal water allocation. Although SIMI had requested one community member to be elected for training as a plumber/mason, the community elected one Brahmin and one Thakuri to have representation from each cluster. To solve the other conflict, the chair of the WUC held side meetings with the Brahmin landowner, who happened to be his brother, and was able to convince him to agree in writing to give the land free of cost to the community.

Upon resolution of the conflicts, system construction began. SIMI staff estimated the domestic and productive water demand for a 10-year projected population of 137, using 45 liters/capita/day for domestic purpose and 650 liters/household/day[3] for drip irrigation. A new larger pipe was attached to the intake of the spring but still fed the original domestic tank. A new productive use tank was built to capture the overflow from the domestic tank. The five original taps serve 15 households and two new domestic taps were built to serve the remaining six households. Six irrigation offtakes were built to distribute the water from the productive use tank for application using drip irrigation kits (see Figure 1.) The trained plumber/masons provided skilled labor for system construction while the remaining households contributed unskilled labor and local materials. SIMI provided materials needed from outside the village, engineering survey and design, social mobilization, and training. The total cost of the scheme came to NPR 135,890 (US $1,941) including the estimated cost of the existing pipe (NPR 15,741) and existing domestic water tank (NPR 8,500). SIMI provided 48% of the remaining costs; the villagers contributed 34%. Thus, the cost per household not including existing infrastructure was about US $76. Including the cost of SIMI/IDE overhead and agricultural interventions, the average cost of a MUS scheme is US $196-226/household (Mikhail and Yoder, 2009).

Photograph 2. A farmer fills up his micro irrigation header tank from the offtake (Source: Narayan Singh Khawas)

Photograph 3. Villagers weigh vegetables at the cooperative (Source: Narayan Singh Khawas)

Important linkages: micro irrigation and marketing

Each household purchased their own micro irrigation kit (Photograph 2) and were trained on vegetable cultivation, use of micro irrigation, and post harvest processing. The village also elected members to represent them in the Namuna Agriculture Production Marketing Cooperative, a combination of marketing committees from SIMI projects throughout Sworek VDC and two neighboring VDCs. SIMI helped the Cooperative establish a collection center at the Gairathok trailhead on the Siddhartha highway to collect produce from the three VDCs (Photograph 3).

The Cooperative manages the collection center, provides seasonal cropping calendars, and supply of fertilizer and seeds. The Cooperative also bargains with nearby traders for higher prices or takes their produce for sale in the larger markets of Pokhara and Butwal, retaining 3% of the sales and paying the farmers according to the daily rate and amount of produce. Produce is brought to the collection center two market days each week.

Outcomes

Domestic water and sanitation

As shown in Table 1, with an average household size of 6 members, the water available pre-project was less than the standard 45 liters/capita/day.[4] Even so, households chose to use one-third of their water for productive purposes. Since a greater supply was available post-project, water usage for all needs increased, and households used roughly two-thirds of their water for productive purposes. However, households have opted to use less than the 650 liters/day for irrigation. On the other hand, water use for livestock has almost doubled and includes livestock watering and cleaning of sheds. This has resulted in healthier, more productive animals. A few households have even been able to purchase additional livestock.

Table 1. Quantity of water used pre- and post-MUS construction

Use	Prior to MUS construction (liters/household/day)	After MUS construction (liters/household/day)
Drinking	60	105
Cooking	15	35
Bathing & Washing	90	150
Livestock	75	135
Irrigation	15	500
Total	255	925

Source: This table is based on recall data during interviews with 11 of the 21 households using the Malewa Basne MUS system.

Prior to the project, half of all village households had their own toilets. As part of the project a demonstration toilet was constructed and sanitation education given to the community. Due to greater water availability post-project, project awareness activities and demonstration of a low-cost toilet option, and increased income, the remaining households constructed pit latrines on their own.

Increased income

While rice production remained the same[5], eight out of the eleven interviewees shifted some of their land from millet and maize to vegetable production. Cereal production subsequently decreased, but they were able to purchase replacement cereals with their increased income. While most households grew a handful of rainfed vegetables for home consumption prior to the project, none of them had enough vegetables to sell. Production of the traditional vegetables of potatoes, pumpkins, beans, and lady fingers remained roughly the same, but farmers cultivated much more of the high value crops of cauliflower, cucumber, cabbage, and tomato. For the 11 farmers interviewed, vegetable production increased by 72%. Due to micro irrigation, the farmers can now produce vegetables both on- and off-season for a total of three seasons in one year. According to the Cooperative's records, this led to an income increase/household/year of Rs. 15,000 - 150,000 (US $214 - $2,143).

Table 2. Average change in vegetable crop production per household per year (three seasons in one year)

Types of Crops	Before MUS (kg/year)	After MUS (kg/year)

Cauliflower	16	415
Cucumber	5	102
Cabbage	47	83
Tomato	564	591
Potato	144	150
Pumpkins	5	3
Beans	2	1
Lady finger	0.90	0.72
Total	784	1346

Source: This table is based on recall data during interviews with 11 of the 21 households using the Malewa Basne MUS system.

Change in roles

One important outcome was a change in intra-household decision-making. Because women are traditionally the cultivators of vegetables in Nepal, the increased importance of vegetable sales for household income was important for increasing women's decision-making power and financial independence. The eleven interviewees were asked what agricultural decisions men and women within the household were responsible for before and after project implementation. They stated that prior to the project women mostly contributed labor on the farm including fertilizer management, weeding, harvesting, and storing. Nine of the eleven households stated that women were now involved in making decisions about land preparation, variety selection, and hiring of labor. The other two responded that women were now involved in vegetable sales, irrigation, and pest management. All households stated that the men had become more involved in roles previously considered as "female". Eight households said that women had been empowered through their raised income and had started to handle the daily expenses without requiring permission from their husbands.

Conclusions

The outcomes of MUS implementation in Tori Danda village were similar to many other MUS projects in the Nepal middle hills. Most households displayed their need to access water for both domestic and productive purposes and saw an increase in vegetable consumption and income. And, as most MUS projects, there was some change of gender roles due to the increase in water availability and encouragement of kitchen gardens, causing a subsequent decrease in water collection time and increase in time spent in cultivation. Several key factors would help in replicating the Tori Danda MUS experience: inclusion of the community throughout the implementation process, resolution of caste conflicts through negotiation, setting up a viable water user committee for operation and maintenance of the system, training in use of micro irrigation and vegetable cultivation, and setting up a marketing committee to help villagers market their produce.

Acknowledgements

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References

Mikhail, Monique and Robert Yoder (2009) *Multiple-use water service implementation in Nepal* *and India: Experience and lessons for scale-up*. 2009. In print.

Notes

[1] SIMI is a USAID funded project being implemented by Winrock International as the lead organization with International Development Enterprises (IDE) and local partners: the Center for Environmental and Agricultural Policy Research, Extension and Development (CEAPRED), the NGO Support Activities for the Rural Poor (SAPROS) and the Agricultural Enterprise Center (AEC).
[2] Irrigation offtakes are taps that are low to the ground with two spouts so that field neighbors can access water at the same time. A flexible hose is attached to a spout and used to fill up a drip irrigation "header" tanks. Or, a sprinkler can be attached directly to the offtake.
[3] The water demand calculation for drip irrigation in the middle hills varies from 400-800 liters/household/day, depending on the discharge of the spring. For micro sprinkler irrigation the demand is 1120 liters/household/day. The Malewa Basne spring has a discharge of 0.3 liter per second which is large enough to supply 650 litser/household/day for drip irrigation.
[4] In Nepal, the 45 liters per capita per day allotment for domestic purpose includes livestock watering.
[5] In the middle hills of Nepal, farmers usually have terraced land away from the village where they cultivate rice. This land is often fed by farmer managed canal irrigation systems. The rest of their crops they grow on the lower quality land nearer to their homes.

Keywords

multiple-use water systems, micro irrigation, marketing, water user committee, intra-household, vegetable production

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