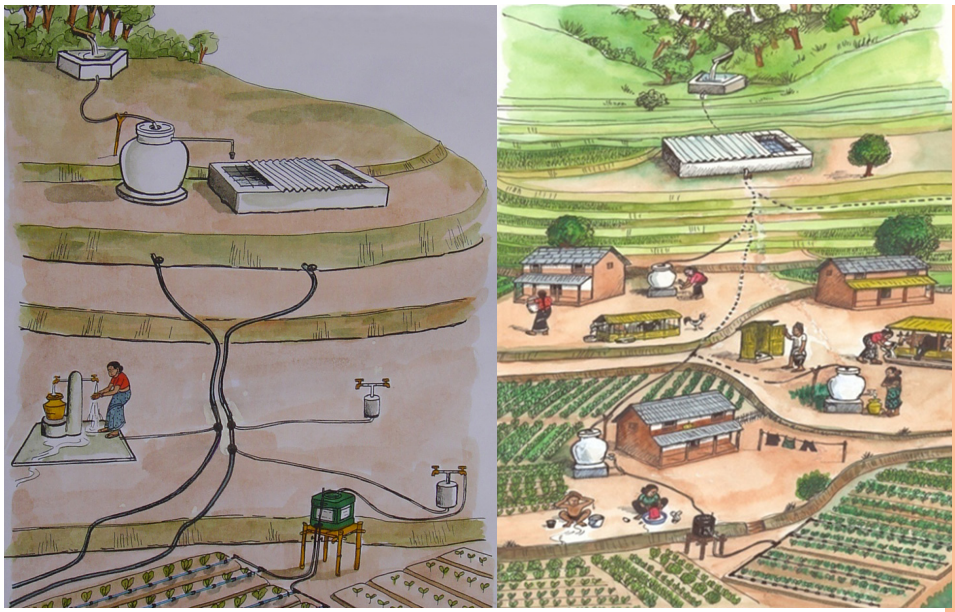


Left: Diagrammatic illustration of a two tank system where the source water is first collected into a tank which is dedicated for domestic use and spillover water is collected into a second tank which is dedicated for agricultural use. (IDE/Nepal)
Right: Diagrammatic illustration of a one tank system where a single tank provides water both to the domestic tap stand and to fill up drip irrigation header tanks. (IDE/Nepal)

A multiple-use water system

Nepal: बहुउद्देश्यीय पानी प्रयोग प्रणाली

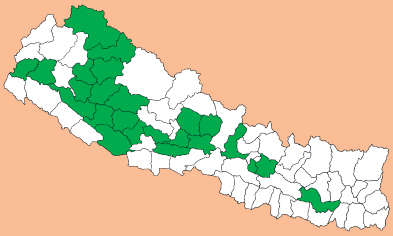
A multiple-use water system gives a community access to water for domestic use and water for crop irrigation.

A multiple-use water system (MUS) is a combined water facility that has proven useful as a means of providing drinking water and water for irrigation for smallholder farmers in the hilly areas of Nepal. Water is collected by gravity from a highland source into a holding tank and is shared by means of distribution lines, domestic tap stands, and irrigation off-take lines. It can also support application of micro-irrigation technologies (MIT) such as drip and micro sprinkler irrigation systems.

MUS is a community-managed system that caters mainly to smallholder landowners and marginal households in rural hilly areas. When properly implemented, it can help to alleviate poverty and increase food security for poor and marginalized groups. The first priority is to provide drinking water and water for domestic use to the community; any excess water is used for agriculture and irrigation.

The following points should be taken into consideration before a community establishes a MUS:

- The source of water should be clear of water-rights issues
- The water should be plentiful and of good quality
- There needs to be a sufficient drop in gradient between the source and the tank if the water is to be collected by gravity. If the drop is not sufficient, users should be prepared to consider lifting the water.
- The distance between the source and the village should be less than 3 km.
- The community should be ready to contribute unskilled labour as part of their contribution to the project.
- The community should be ready to put aside some funds for operational and maintenance costs; these funds can, in part, also be collected in the form of monthly users' fees.
- At least 70% of the water users should be ready to adopt micro-irrigation technologies (MIT) such as drip and sprinkler irrigation.



WOCAT database reference: QA NEP 29
Location: Kaski, Lamjunj, Tanahun, Dhading, Sangjya, Gulmi, Arghakhanchi, Palpa, Udayapur, Pyuthan, Rolpa, Rukum, Salyan, Dang, Surkhet, Dailekh, Jajarkot, Kalikot, Mugu, Humla, Jumla, Doti, Dadeldhura, Lalitpur, and Kabhrepalinchok Districts, Nepal
Approach area: 45,000–50,000 km^2
Land use: Annual cropping
Type of approach: Project/programme based
Focus: Collect water from a small-scale source and distribute it both for domestic use and for the production of vegetables and high value crops
Related technology: Not described
Compiled by: Parmanand Jha, IDE Nepal
Date: August 2011, updated March 2013

The technology was documented using the WOCAT (www.wocat.org) tool.

ICIMOD iDE नेपाल Nepal WOCAT

Problems, objectives and constraints

Problems

- The community needs to prioritize how it will partition the water for domestic use and for irrigation.

Aims/objectives

- To provide a regular supply of water for domestic and agricultural use
- To supply water for micro-irrigation technologies such as drip and sprinkler irrigation systems
- To improve health and sanitation
- To help smallholder landowners improve their incomes and livelihoods as well as to adapt to climate change by having access to a regular supply of water so that they can grow crops regardless of changes
- To conserve water by using it more wisely

Constraints addressed

Major	Constraint	Treatment
Social-up	The community often cannot agree whether to scale up the domestic or the irrigation water supply.	Concerned stakeholders need to confer and agree
Social	Management and operation of system	Strong social mobilization is needed
Minor	**Constraint**	**Treatment**
Technical	Water supply insufficient to meet the demand	Increase the capacity of the storage tank

Participation and decision making

Stakeholders/target groups

Land users individual/ group | SLM specialists, agricultural advisors | Local leaders and local government | Teachers, students and parents | Women/Men/ Dalit/Janajati/ Brahmin/ Chhetri

Approach costs met by:

International non-governmental organization	30%
Local government (district, village, national)	26%
Local community and land users	44%
TOTAL	**100%**

Annual budget: USD 10,000–100,000

Remark:
All costs and amounts are rough estimates by the technicians and authors. Exchange rate USD 1 = NPR 74 in August 2011

Decisions on choice of the technology: The community discusses and makes a decision on the type of water supply system they would like and specifies how they would like to apportion water for domestic and agricultural use. They submit a proposal to the concerned authorities.
Decisions on method of implementing the technology: Technical support is provided by IDE Nepal in collaboration with different national and international non-governmental organizations, government organizations, and local bodies.
Approach designed by: IDE Nepal. This is a leading organization that has designed its own model for multi-use water systems and has helped to install these throughout the country for the past eight years.
Implementing bodies: IDE provides technical support: it helps communities to conduct feasibility studies, it works with them to come up with a suitable design, it provides cost estimates, and it offers supervision during the construction phase. The actual construction is managed by the communities themselves through their appointed construction committee and subcommittees as decided in the MUS users group. Training and capacity building is provided by IDE.

Land user involvement

Phase	Involvement	Activities
Initiation/motivation	Interactive	The community comes to a consensus on their water needs. They identify a source that it is within the 3 km limit and investigate the water use rights.
Planning	Motivation and mobilization	Technical aspects are dealt with; these include assessing the source to verify whether it has an adequate supply of water, assessing different schemes (for intake, take off, tap stands, and the like), preparing a design and estimating the cost, and discussing funding.
Implementation	Mobilization	A users' committee is formed and the community provides unskilled labour. Technical assistance is provided by INGOs/NGOs.
Monitoring/evaluation	Self-mobilization and INGO/NGO	The work is monitored by the users' committee but monitoring and evaluation of technical aspects are provided by INGOs/NGOs at different times during the project.

Differences between participation of men and women: More than 60% of the participants are women who are directly involved with the domestic uses of water for drinking and sanitation as well as in the farming of vegetables and high value crops.

Involvement of disadvantaged groups: More than 40% of the users were members of disadvantaged groups.

Procedural Steps of MUS Design and Implementation

Pre construction phase:	Project Initiation
	Consultative meeting/application call
	Scheme screening
	Feasibility study and tentative costing
	Scheme ranking and selection
	Scheme appraisal
	Formation of water users committee
	Detailed engineering survey
	Design and cost estimation
	Approval/agreement
	Preparation of work plan
	Collection of fund for O & M and MIT kits
	Agreement between WUC and contractor
Construction phase:	Procurement of materials and tools
	Transmission section
	Tanks, taps and distribution section
	Testing
Post-construction phase:	Nomination of scheme operator and caretakers
	Training: Scheme operation
	Micro-irrigation
	Project completion meeting/social audit
Evaluation phase:	Evaluation/feedback

Organogram
(Adapted from
(Mikhail and Yoder 2008)

Technical support

Two main types of MUS are constructed in Nepal.

- One tank system. The source water is collected into a single tank; this tank provides water to the domestic tap stand where householders can collect water for domestic use. The same tank is used to supply water to fill up drip irrigation header tanks.
- Two tank system. The source water is collected into a first tank for domestic use; when this tank is full, overflow is collected into a second tank for agricultural use. The system uses dedicated water distribution lines for domestic and agricultural use.

International Development Enterprises (IDE) has used this approach since 2003 to help supply water to marginalized and poor communities in the hill areas of Nepal. Once these communities have access to a regular water supply, their drudgery decreases, and their health and livelihoods improve. They can take advantage of the irrigation facilities to increase their income opportunities by growing high value crops. MUS has potential beyond what is discussed here since it can be upgraded to accommodate other end-use applications in addition to irrigation.

Training/awareness raising: The approach provided training to the community through the users' committee, field staff, and an agricultural advisor. The local skilled body is trained during site visits. For the most part, information is transferred from farmer to farmer. Much of the training is hands-on.
Advisory service: An advisory service is provided for the land/water users, but what is given is usually insufficient to help farmers learn new techniques such as micro-irrigation.
Research: IDE has researched and implemented this type of MUS concept, system design, and methodology in Nepal since 2003; now other agencies also provide similar systems.

External material support/subsidies

Contribution per area (state/private sector): All MUS systems in Nepal are built by communities or community groups in collaboration with the government and NGOs. The fact that MUS systems provide multiple benefits is seen as a plus point for institutions looking to invest in community projects.
Labour: Unskilled labour is provided by the community; skilled labour is provided by the implementing organization. The implementing organization pays for both the skilled and unskilled labour.
Inputs: Materials that are available locally are contributed by the community. Materials that are not available locally are paid for out of project funds. Equipment, tools, and specialist materials are purchased through collaborative partners. Training programmes aimed at capacity building and upgrading skills are subsidized.
Credit: No credit was provided.
Support of local institutions: The following groups can provide support: village development committees, local governance and community development programmes (LCGDP), community forest user groups, youth clubs, and women's groups. Village development committees can invest in MUS and micro-irrigation technologies as specified in their guidelines.

Monitoring and evaluation

Monitored aspects	Methods and indicators
Biophysical	Project staff and land users routinely monitor the water source and other biophysical aspects to ensure that the approach remains sustainable.
Technical	Commercial vegetable or high value crop production, micro irrigation, drinking water and sanitation
Socio-cultural	MUS schemes help to improve sanitation and thereby reduce the incidence of waterborne diseases. They also help to improve livelihoods by making more fresh vegetables available both for immediate consumption and for sale.
Economic/production	MUS schemes help to reduce drudgery; the labour saved can be used in the production of vegetables and other high value crops.
No. of land users involved	From 10 to 80; on average 28 land users are involved in one MUS scheme
Management of approach	Participatory approach with collaboration by government organizations, INGOs/NGOs and others to provide routine inspections and technical support

Impacts of the approach

Changes as result of monitoring and evaluation: The approach, as it is now put into practice, is a result of incorporating technological improvements that were originally identified through years of monitoring and evaluation.
Improved sustainable land management: The approach supports sustainable land management because micro-irrigation technologies promote optimal use of water and help to retain nutrients in the soil. Similarly, the production of high value crops and vegetables further increases the fertility of the soil.
Adoption by other land users/projects: Since the reduction in drudgery and the improvements in livelihoods are so great, many communities would like to implement this approach. INGOs/NGOs can help with the financial and technical aspects of implementation.
Improved livelihoods/human wellbeing: This approach helps to reduce drudgery and to improve sanitation; overall, it improves livelihoods and contributes to human wellbeing. It also increases the production of crops, and helps to conserve the soil and improve its fertility.
Improved situation of disadvantaged groups: The wellbeing of marginalized and socio-economically disadvantaged groups improves significantly.
Poverty alleviation: Through increased income from the production of vegetables and high value crops
Training, advisory service, and research: Land users benefit since their livelihoods are improved. A MUS can help a community to develop.
Land/water use rights: Since this approach uses small spring sources of water, there is usually only a minimum risk of conflict for water use. When the water source is registered with the local authorities, it helps to reduce potential conflicts over water rights between communities.
Long-term impact of subsidies: The land users themselves are self motivated to keep the MUS system operational because they depend on it to produce vegetables and high value crops. They can usually recover their initial investment within a year. The monthly maintenance fees insure that the system is operational in the long run.

Concluding statements

Main motivation of land users to implement sustainable land management: The farmers are interested in increasing their vegetable production and in selling their produce. Since the profits earned by selling vegetables and high value crops is quite high they can pay off the debts they have incurred for their initial investment quickly and soon start realizing a profit. As a bonus, this approach also helps to improve sanitation, to reduced waterborne diseases, and generally boost the health of the community.
Sustainability of activities: Since the approach was requested by the community as a whole, they all have a vested interest in seeing that it remains sustainable. When technical support is needed, it can be obtained from the concerned agencies.

Strengths and →how to sustain/improve	Weaknesses and →how to overcome
A reliable water supply for both the domestic and irrigation needs of hill farmers → The continued involvement of the community, the government, and assisting INGOs/NGOs.	Installation costs can be a challenge for very poor communities. It can only irrigate small areas (0.1-0.15ha). → Installation costs can usually be recovered within 1 year when the irrigation water is used to produce high value crops.
The MUS is a simple gravity system that does not require either sophisticated equipment or training. → Continue to investigate how it can be simplified even further.	The intake and reservoirs need to be inspected regularly. → Either devise a means to ensure that inspections are conducted regularly or find a system that requires fewer inspections
A MUS system has a minimum lifespan of ten years and is easy to install even in remote areas. → Continue to investigate how it can be improved even further.	Reservoir tanks and intake pipes can deteriorate over time and pipes and joints can start to leak. → Local skilled labour can be employed to carry out needed repairs. Pipes and fittings should be checked regularly. Routine inspection and maintenance are essential.
MUS is well suited to the dual purpose use of water for both domestic and agricultural use. → Continue research and development to see how it can be improved even further.	Costs can be high when imported materials are needed for repair and maintenance. → At the outset, some money needs to be set aside for operation and maintenance costs; additional funds should be collected by charging monthly users' fees.

Key reference(s): Mikhail, M; Yoder, R (2008) Multiple use water service implementation in Nepal and India: Experience and lessons for scale-up. http://www.ideorg.org/OurStory/IDE_multi_use_water_svcs_in_nepal_india_8mb.pdf (accessed 2 December 2012)
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