Implementation of Water Supply and Sanitation Systems

Nepal – खानेपानी र सरसफाई आयोजनाहरुको कार्यान्वयन

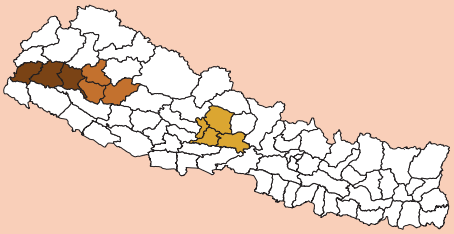
Implementation of water supply and sanitation systems in the rural mid-hills of Nepal.

The approach documented here for implementing water supply and sanitation systems in the rural mid-hills of Nepal balances a blend of hardware and software support. Hardware support comes in the form of standard construction materials and technology, whereas software support focuses mainly on enhancing the capacity of User Committees (UCs) and local service providers to better plan, implement, and take proper care of their schemes. The 20 steps of the implementation process with clearly defined activities synergize hardware and software support with long-term impacts on the functionality of the water and sanitation schemes. The approach enhances feelings of ownership, ensures a sense of entitlement to use the scheme equitably, and instils a feeling of responsibility to effectively operate and maintain it. The following key elements are central to the implementation approach:

- **Participatory Planning and Implementation:** Through a participatory approach, gender and ethnically balanced UCs are formed, which are responsible for leading the scheme's implementation process. The community contributes time, labour, and local construction materials. Public hearings/audits before, during, and after implementation are mandatory.
- **Capacitated Local Service Providers:** Appropriate local people are provided with social and technical training to become skilled service providers (village maintenance workers, tap-stand caretakers, latrine builders, and rainwater harvesting maintenance workers).
- **Capacitated User Committees:** All members of the UCs are provided with two trainings on management issues during pre-construction, construction, and post-construction phases, enabling them to effectively manage implementation, operation, and maintenance of water and sanitation schemes on their own.
- **Operation and Maintenance Funds:** For every scheme, an O&M fund is established and managed by the respective UC. The UC prepares collection and spending regulations in consultation with the community.
- **One Scheme, One Tool Box:** Tools and spare parts are not easily available in remote areas and hardly affordable by economically poor users. The project provides one trunk with tools for minor repair and maintenance works to each supported scheme.
- **Standardized Procurement, Norms, and Practices:** Procurement and construction follow standardized norms and practices. High quality design of schemes is ensured by the application of a standardized design package.
- **Proficient Workmanship:** For each scheme, a social and a technical expert ensure a high level of workmanship by supervising the implementation process and backstopping the UC.
- **Use of Perennial Source, Protection, and Conservation:** Reliability, continuity, and safety of water sources is ensured by chiefly focusing on perennial sources, protecting them from contamination, and supporting their conservation (see QT48).
- **Multiple Use System (MUS) and Waste Water Use:** Productive use of water (e.g., irrigation) may provide economic benefits to the community. MUS are usually developed in schemes with abundant sources and include promotion of measures to reuse waste water.
- **Follow-up Monitoring and Post-Construction Support:** Two follow-up surveys occur within two years after construction to monitor the status of physical structures and institutional mechanisms. Social and technical field staff provide post-construction support and mentoring to UC.

Left: Public hearing for a water supply system in Dailekh (WARM-P)

Right: Community members laying pipelines for a water supply system (WARM-P)



Location: 10 districts in the Western, Mid-Western, and Far-Western Development Regions of Nepal

Approach area: >3,000 km^2

Type of Approach: Project/programme-based

Focus: Usage, conservation, and protection of water sources

WOCAT database reference: QA NEP 40

Related technologies: QT NEP 40

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Comments: The documented implementation approach is part of the Water Use Master Plan (WUMP) approach (QA NEP 36). Key features of the WUMP are its particular focus on "planned and agreed use" of water resources and its holistic approach to managing drinking water schemes. The preparation of a WUMP serves as an entry point for interventions in the water sector and sets priorities in terms of using available water sources and the implementation of related water supply schemes in Village Development Committee areas (VDC), the lowest administrative units in the country. The approach documented here describes the implementation of water projects identified during the WUMP preparation.

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

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Problem, Objectives, and Constraints

Problems

- Issues of access to water are often contentious; communities often quarrel over water rights.
- A growing water demand for both domestic and agricultural use and diminishing water sources due to climate change may aggravate water conflicts.
- Dubious sustainability of water supply systems: a significant portion of existing schemes in Nepal are not fully functional, indicating a lack of ownership, proper management, and maintenance

Aims/objectives

- Establish inclusive implementation of water and sanitation schemes to increase sustainable access to water and sanitation
- Ensure an equitable and efficient use of water resources
- Improve functionality and operational life span of implemented water supply schemes by enhancing local ownership and capacitating local service providers and User Committees to operate, repair, and maintain the schemes

Constraints Addressed

Major	Constraint	Treatment
Institutional/Social	Lacking sense of ownership and entitlement by communities to equitably use drinking water facilities and to share the responsibility for effective operation and maintenance	Apply a participatory planning and implementation approach; gender and ethnically balanced UCs are responsible for implementation process as well as operation and maintenance; regular public audits; in-kind contribution by community
Technical	Lack of skills to manage and maintain water supply schemes	Capacity development of UC and local service providers
Financial	Challenge to secure long-term funding for sustainable O&M	Introduce community O&M fund managed by the UC
Minor	**Constraint**	**Treatment**
Environmental	Depletion of water sources may aggravate water scarcity	Apply a holistic planning and implementation approach by considering several technologies (e.g., rainwater harvesting or source conservation)

Participation and Decision Making

Stakeholders/target groups

Users, individual/ group

Local service providers, NGOs, consultants

Village development committees (VDCs)

Contribution to costs:	Construction	Approach
Local Government (Village Development Committee)	5 - 15%	0%
Local Community	15 - 25%	0%
International non-governmental organisation (HELVETAS)	65 - 75%	100%
Total	**100%**	**100%**

For gravity flow schemes (QT NEP 40), approach costs (i.e., training, social mobilisation, and technical support for implementation) make up about 15-20% of the total scheme costs. For a typical scheme of 50 households, total costs amount to USD16,0001, which include approach-related expenses of roughly USD2,500 (corresponding to 2 times 120–150 person days).

Decisions on choice of the Technologies: Made by local community based on proposal of technical and social experts, taking into account the suitability and availability of local water sources.

Decisions on method of implementing the Technologies: Made by local community based on proposal of technical and social experts.

Approach designed by: The Water Resources Management Programme (WARM-P) of HELVETAS Swiss Intercooperation

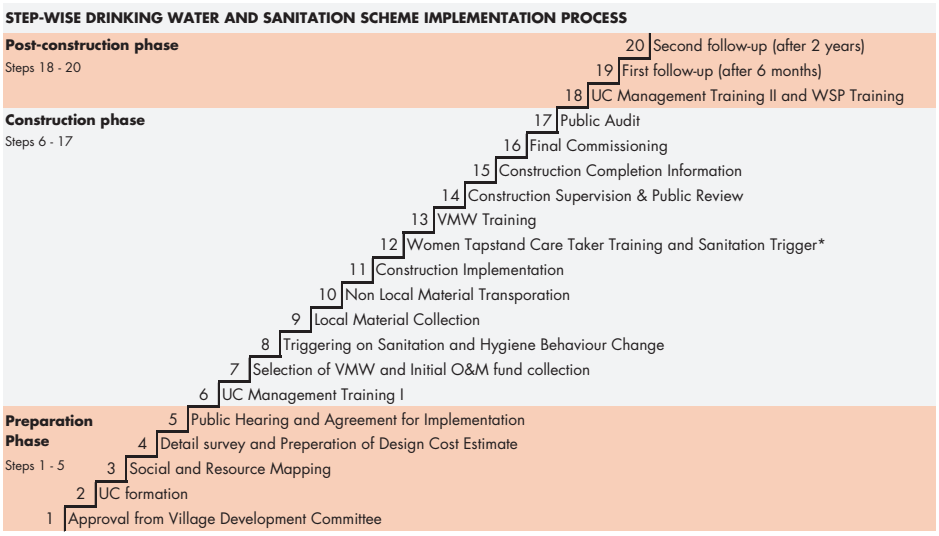
Implementing bodies: The VDCs in partnership with WARM-P/HELVETAS Swiss Intercooperation and local NGO

Land User Involvement

Phase	Involvement	Activities
Initiation/motivation	Interactive	During community meetings, a joint decision to go forward with the implementation of a specific scheme is taken. After recommendation by the VDC, the community selects/elects a UC, which is responsible for the whole implementation process.
Planning	Interactive	Members of the Village Water, Sanitation, and Hygiene Coordination Committee (V-WASH-CC) take a lead role in preparing a WUMP for a VDC; similarly, the UC is in charge of the detailed planning and implementation process of particular scheme. Public hearings during the preparation phase disseminate information on the implementation plan and respective roles and responsibilities; they also act as forums to gain approval of the entire community.
Implementation	Interactive/external support	The community contributes to construction with labour and local construction materials. Public reviews during the construction phase assess progress and ongoing works.
Monitoring/evaluation	Interactive/passive	Public audits are conducted after completion: all members of the community assess the quality of the completed work, review expenditures/contributions by the programme and the community, and evaluate whether the scheme meets the set standards and serves the targeted households. Two follow-up reviews are conducted by project staff within two years after construction.

Involvement of women and disadvantaged groups: Quotas are used as one means of ensuring the participation of women (minimum 40%) and disadvantaged groups (proportional to their local population), backed by pro-active measures such as the engaging of local women as social mobilizers, small group discussions to bring out sensitive issues, and training women in non-stereotypical roles such as tap and tank maintenance, and water distribution.

Involvement of disadvantaged groups: Disadvantaged groups (Dalit and Janajati, among others) participate in all activities and committees in numbers proportional to their share of the overall population.



20 steps of implementation process

UC = Users Committee
O&M = Operation and Maintenance
VMW = Village Maintenance Workers
WSP = Water Safety Plan

*Sanitation Trigger: Women tapstand caretakers also act as change agents for open defecation free (ODF) and total sanitation campaigns.

Technical Support

Training/awareness raising: Social mobilization and awareness-raising orientations are key components of the approach: public hearings and audits are held to gain the communities' approval but also to build transparency, shared commitment, and ownership to use and maintain schemes responsibly. Sanitation motivation events are organized to raise awareness on safe household water treatment and sanitation practices.

On-site training sessions are organized for the members of the User Committee (training on management issues during pre-construction/construction/post-construction phases of the scheme), for local village maintenance workers (training on construction, operation, monitoring, and maintenance of the schemes), tap stand caretakers (training on maintenance of community tap stands), and local latrine builders (training on construction of latrines and awareness promotion on sanitation).

Advisory service: Programme staff regularly backstops the UCs in all matters related to scheme implementation. A social and a technical field staff are assigned to each scheme during construction. These field staff members are stationed in the assigned scheme areas until construction is completed and the scheme is finally commissioned.

Research: Research is not a major focus of the approach. However, two follow-up surveys are conducted within two years after construction, focussing on the functional status of physical structures, institutional mechanisms (activity of UC, collection and utilization of O&M Fund, activity of trained service providers, and availability of maintenance tools), and sanitation and hygiene practices. Intermittently, more comprehensive functionality studies are conducted, which cover older schemes as well. Findings of these studies inform general updates of the approach, as well as specific adjustments to different local contexts and needs.

External Material Support/Subsidies

Labour: The majority of unskilled labour works is provided by the community (structural works for tap stands, distribution lines, part of portering of materials from road to village), while all skilled labour and selected unskilled labour works (intake and reservoir tank construction, transmission lines) are provided and paid for by the implementing organization.

Inputs: Locally available materials (stone, sand, aggregate, wood, bamboo) are contributed by the community. Procurement and road transportation of other construction materials (HDPE pipes, GI pipes, fittings and valves, cement, wire) and tools are covered by the implementing organization.

Credit: No credit is provided.

Support to local institutions: Support is provided to VDCs, especially to the Village Water, Sanitation, and Hygiene Coordination Committee (V-WASH-CC) during preparation of the WUMP through capacity-building workshops. Training workshops are organized for UCs during the implementation phase.

Monitoring and Evaluation

Monitored aspects	Methods and indicators
Biophysical	Two surveys (after six months and two years) after construction conducted by project staff to follow up on changes in source runoff (measured) and source protection and conservation measures (observed).
Technical	Final commissioning after completion of construction and two follow-up surveys on status of physical structures (observed), hydraulic flow in the scheme (measured), and water availability at point of supply (measured).
Institutional	Two follow-up surveys on institutional mechanisms: activity of UC, collection and utilization of O&M Fund, activity of trained service providers, and availability of maintenance tools.
Sociocultural	Detailed socioeconomic assessment during WUMP preparation. No dedicated follow-up monitoring. Public hearings/audits before, during, and after implementation ensure transparency and community participation. Ad hoc observations of attitude during follow-up visits of project staff.
Economic/production	Detailed socioeconomic assessment during WUMP preparation. No dedicated follow-up monitoring. Ad hoc observations of status/income during follow-up visits of project staff.
No. of land users involved	During public review and final commissioning, community contribution and participation is assessed.
Management of Approach	Final reports of every implemented scheme and annual reports of the programme conclude on allocation of resources.

Changes as result of monitoring and evaluation: Functionality surveys revealed that in some cases users are reluctant to use and properly maintain community taps and that they would rather connect separate pipes from a community tap to bring water directly to their homes. Moreover, users are less inclined to pay O&M fees for community tap stands. Hence, the programme now supports private taps on a case-by-case basis, subject to technical feasibility and a socioeconomic assessment whether users are willing to pay for improved services. On another note, as trained village maintenance workers were often absent due to (seasonal) migration, the programme now organizes training workshops for new maintenance workers in old schemes.

Impacts of the Approach

Improved water resources management: The approach instils feelings of shared responsibility to use water resources in an equitable and sustainable manner. On average, schemes implemented with this approach have a better functional status compared to schemes implemented with other approaches in Nepal (see cited literature below).

Adoption by other users/projects: The approach represents an influential guideline and has been adopted by other organizations for implementation projects. Nepal's Ministry of Local Development, Department of Local Infrastructure and Roads, has expressed an interest to upscale the approach for all the VDCs in Nepal.

Improved livelihoods/human well-being: Improved water access and hygiene practices lead to a significant reduction of reported incidents of water-borne diseases. Additionally, the daily workload for water fetching is reduced on average by two hours per household. The saved time is reported to be spent on livestock raising, vegetable cultivation, and household chores.

Improved situation of disadvantaged groups: Socially and economically disadvantaged groups are the primary target group of the programme. They participate in all parts of the process on equal terms.

Poverty alleviation: If water supply is ample and market access is established, surplus supply can be used for irrigating vegetables and cash crops to raise household income (see QT NEP 41, 42 and 44). Trained local service providers gained an additional source of income, earning on average from USD120 (village maintenance workers) to USD250 (local latrine builders, rainwater harvesting workers) per annum.

Training, advisory service, and research: The offered training and advisory services effectively capacitate UCs and local service providers to manage, monitor, and maintain the water supply schemes. However, this increased capacity does not always result in well-managed and -maintained schemes, as retention of trained service providers, continuing activity and renewal of the UC, and mobilisation and apposite use of the O&M funds are challenging aspects in the post-construction phase.

Land/water use rights: Used water sources are registered with the District Water Resources Committee, which gives users legal ownership of the sources.

Long-term impact of subsidies: No subsidies are part of the approach. UCs are expected to finance maintenance works with the O&M fund established during implementation. The community is asked to ascertain each household's contribution to the O&M fund based on a wealth ranking exercise. While most of the schemes have adequate funds for minor repairs and maintenance, regular collection of O&M funds is not practiced in all communities, which poses a concern for long-term functionality.

Concluding Statements

Main motivation of land users to implement SLM: Sustainable access to water resources to meet domestic and agricultural needs, as well as a reduced workload for water fetching.

Sustainability of activities: Proper functioning of drinking water and sanitation schemes is determined by both the quality of physical structures and the effectiveness of the institutional mechanisms to properly operate, monitor, and maintain the schemes. While the schemes have a robust physical foundation, a key issue toward true sustainability is the establishment of institutional mechanisms related to operation and maintenance (UC, O&M fund, skilled service providers) which remain active throughout the designated lifespan of each scheme.

Strengths and ➔ how to sustain/improve	Weaknesses and ➔ how to overcome
Approach capacitates user committee and local service providers to manage, monitor, and maintain the water supply schemes themselves ➔ secure long-term post-construction support so that UC and service providers remain active for scheme's whole service life. Post-construction support is of particular importance to facilitate repair works, which are beyond the technical and financial capabilities of the communities. As these issues are of long-term nature, the related support should be institutionalized at the governmental level.	Institutional mechanisms related to operation and maintenance (UC, O&M fund, skilled service providers) at the local level are less active during post-construction as during preparation and construction phases(e.g., 40% of the UCs are inactive 5 to 10 years after construction). This can adversely affect the long-term functionality of schemes ➔ UCs control or mobilize other institutional components; therefore, measures to further activate the UCs are crucial to keep the entire mechanism active in the long run. Measures to make UCs more effective include: (i) reform UC every two years and provide training to new members; (ii) build UC capacity by strengthening linkages with local bodies and other resource organizations; (iii) become member of the Federation of Drinking Water and Sanitation Users Nepal (FEDWASUN) and other networks in the sector; and (iv) increase UC income by better mobilizing the Operation and Maintenance fund.
Community owns process by participating in planning and contributing to implementation. Approach enhances feelings of ownership and instils a sense of shared responsibility to utilize the resources in an equitable and sustainable manner. ➔ Investigate how process can be simplified and made more cost-effective to facilitate replication.	Retention (migration) and remuneration of trained service providers is not always satisfactory: about one-third of the trained service providers are absent or inactive after 5 to 10 years ➔ engage and retain trained service providers in scheme area by creating opportunities to offer their skills in other programmes. Additionally, consider training a greater number of service providers per scheme.
Inclusive implementation process managed by the whole community ➔ further capacity-building of disadvantaged groups may enable them to participate more actively.	In some schemes, monitoring activities are carried out rather casually, as opposed to in regular intervals ➔ establish an institutional mechanism at the local level to monitor schemes. Schemes should prepare and implement a water safety plan (as prescribed in Nepal's Drinking Water Quality Ordinance), while local and national governmental bodies can and should assume more responsibility in the monitoring process.
Approach is appreciated by both the government and national and international NGOs. The approach represents an influential guideline and has been adopted by other organizations for implementation projects ➔ increase collaboration to further develop and disseminate approach.	In some cases, users are reluctant to maintain community taps or to pay for repair services ➔ support private taps on a case-by-case basis (subject to technical feasibility and willingness to pay). Make sure that services still serve lower income households adequately.

[1] Exchange rate as per June 2015 US$ 1 = NRs 100

Key references: SWISS Water & Sanitation NGO Consortium (2013) Beneficiary Assessment of WARM-P, Nepal. Lalitpur, Nepal: WARM-P/HELVETAS; HELVETAS (2013) The Effectiveness and Outcomes of Approaches to Functionality of Drinking Water and Sanitation Schemes. Lalitpur, Nepal: WARM-P/HELVETAS

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