



Ensuring sustainability through technical monitoring and evaluation

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THE AGA KHAN Planning and Building Service initiated the Water and Sanitation Extension Programme (WASEP) in 1997 in rural Northern Areas and Chitral (Pakistan). The "WASEP approach" (illustrated in the figure) to rural water and sanitation is an integrated programme of piped water supply, water quality assurance, grey water drainage, adequate sanitation, health and hygiene education, and community based operation and management.

WASEP provides technical assistance, external materials such as pipes, health and hygiene education, and community capacity training. Villages provide local materials, unskilled labour, and all land required for the scheme. The community establishes an operation and maintenance fund which is used to purchase a spare parts inventory and invest in an account to generate profits to pay a local Water and Sanitation Operator (plumber) and Implementer (health promoter). Their contribution accounts for over 45% of scheme costs. Intervention sees WASEP providing adequate hardware and software inputs to ensure that communities can sustain the intervention and obtain on going health benefits.

1998 saw partnerships being formed with 15 villages across Gilgit, Baltistan, and Chitral. Schemes were designed and constructed over a period of one year and were commissioned through the winter of 1998 and spring of 1999. Technical monitoring and evaluation exercises carried out in these villages between November 15, 1999

and February 21, 2000 provided WASEP with valuable insight into the sustainability of their interventions with respect to physical operation of water networks and operation and maintenance being performed by communities.

Monitoring and Evaluation

WASEP's targets are ambitious and require that the programme be implemented with optimised results. WASEP's objectives and purposes are embodied in its Logical Framework Analysis (LFA) where quantifiable performance indicators allow for WASEP's success and shortcomings to be measured. Specific LFA benchmarks include:

- Reduction of water borne diseases (a 50% reduction in diarrhoeal morbidity in the area)
- Continuous supply of safe drinking water (at 45 to 70 litres per capita per day [lcpd] for no less than 325 days a year)
- Hygienic disposal of human faeces (60% coverage of programme homes with sanitation facilities)
- Healthy and hygienic behaviours practiced in the programme area (60% of women know the cause, prevention, and treatment for diarrhoea, 70% of homes using latrines, 55% prevalence of handwashing amongst women and children)

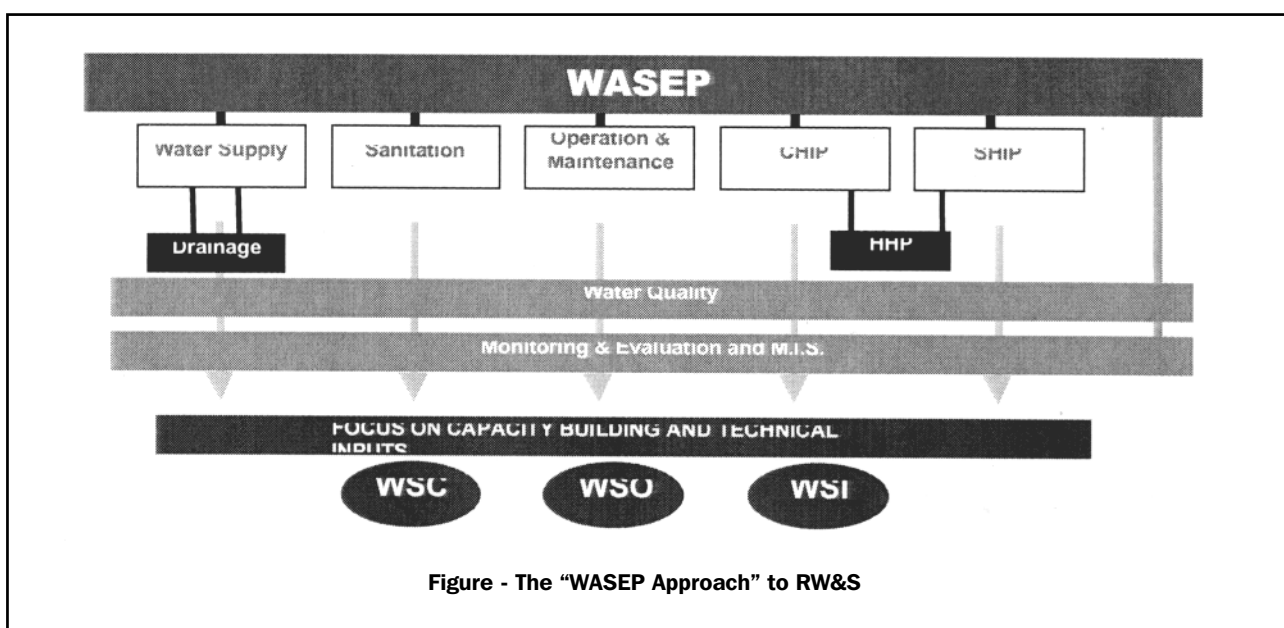


Figure - The "WASEP Approach" to RW&S

- Development of functioning water and sanitation schemes including village based operation, maintenance, and management
- People are aware of the connection between health, water, and sanitation.

The integrated nature of the programme means that the interplay between disciplines and the extent to which each component performs needs to be in keeping with the programme's specific objectives and targets. To keep WASEP in line and focussed on meeting its performance criteria, monitoring and evaluation has been integrated into almost every implementation activity. WASEP's monitoring and evaluation programme incorporates a series of dynamic concepts:

- Tracking of progress vis-a-vis programme objectives (*are we doing what we said we'd do*)
- Quantification and qualification of results with those envisaged (*are the outcomes as we said they would be*)
- Appropriate feedback into the programme (*what do we have to do to get to where we want to be*)
- Implications for the programme (*what can we learn from the M&E to make the intervention optimised*)

WASEP's Health and Hygiene Unit maintains a through monitoring programme which measures the effectiveness of their education programme, health status of partner communities, and effect on community health. (Ahmed and Alibhai at WEDC 2000) The Water Quality Unit implements a full cycle testing programme to ensure that WHO standards are being met vis-à-vis water quality. (Raza et al at WEDC 2000) This paper presents the objectives, activities, and findings of WASEP's Technical Monitoring and Evaluation Programme.

Technical Monitoring and Evaluation

Specific objectives of the technical monitoring and evaluation were:

- To determine the level of service being provided to villagers.
- To quantitatively assess the performance of the water system with respect to design criteria.
- To comprehend the processes and effectiveness of operation and maintenance.
- To understand villagers' relationships with their system.
- To evaluate key aspects of the village Water and Sanitation Committee.

The technical monitoring and evaluation programme entailed both hardware (engineering and design) and software (community awareness and capacity) components to reflect the true nature of any water and sanitation intervention. The programme was developed during a thorough plan-

ning and preparation phase which included the following components:

- Stakeholder Analysis
 - Identifying key stakeholders' (from donors to beneficiaries) interests and information requirements while involving them in M&E
- Process Modeling
 - Outlining the intervention processes and determining where M&E is possible
 - Identifying when M&E should occur and where a feedback loop can be inserted
- Tool Development
 - Determining the types of data that are available and configuring appropriate tools
- Testing Tools
 - Evaluating and adjusting the tools for practicality (Valdez, 1994)

Tech M&E Programme

WASEP criteria states that systems should be designed at 1.8 litres per minute (lpm) with a residual pressure no lower than 5 metres with all taps open. Therefore, with a flow and pressure oriented design criteria to work with, the Tech M&E programme evaluated both level of service and the design criteria through flow and pressure tests. These tests were designed to show the level of service experienced by a user and the change in level if additional users were added. A more qualitative survey was taken of structures and appurtenances including intakes, reservoirs, break pressure tanks, meters, valves, and valve boxes.

WASEP's involvement in latrine construction was limited to providing technical advice, incentive and social marketing without direct implementation. Therefore, sanitation facilities were evaluated on the quality of construction, and the extent to which they facilitated use. The better the quality of construction, and the more they accounted for privacy for women and access by children, the more the potential benefit.

Measuring water consumption required WASEP to use a two fold strategy: 1) village level water consumption was determined using the bulk flow meter at the reservoir - then comparing to 2) actual consumption using a participatory tool in the home.

WASEP's Community Liaison Assistant (CLA) and Health and Hygiene Promoter (HHP) teams administered household surveys in 30% of village households. The impetus for this exercise was the realization that a successful operation and maintenance programme depends on the participation of the community. Questions were asked about the villagers' notions of the Water and Sanitation Committee, tariffs, meeting and the performance of the village's female implementer and male plumber. Surveys utilized direct questioning, semi-structured interviews, and observation methods.

The remainder of the Tech M&E programme assessed two of the instruments of sustainability established in the

communities: the Water and Sanitation Committee (WSC – for daily administration), the Water and Sanitation Operator (WSO – local village plumber), and the Water and Sanitation Implementer (WSI – health promotion). It was WASEP's submission that if these instruments were tuned properly the chances for long-term operation of the intervention were high. The Tech M&E looked at work logs/administrative records and used direct questioning to determine the performance of the WSC, WSO, and WSI.

Results and Discussion

Level of Service

Overall, the average levels of service being delivered in partner communities were: a flow of 24 lpm for one tap open or about 17 lpm with two taps open with a static pressure of 84 psi, and delivery pressure of 50 psi with one tap or 33 psi with two taps open. A reduction in level of service with an addition of users resulted due to the branch configuration of the networks. Level of service was compromised vis-à-vis out of service time in colder reaches of the mountains of the Northern Areas and Chitral. Tapstand freezing and fear of freezing at the Yuno water treatment plant meant that some villages did not have access to safe drinking water for days, and sometimes a few weeks.

Although actual monitoring results showed water consumption to be below 25 lcpd during the winter time, when compared to a similar study conducted in the spring, water consumption for drinking, kitchen use, and latrine use were in line. After accounting for the seasonal reduction in bathing and cold water ingestion showed that people were availing themselves to the 45 to 70 lcpd presented in the LFA. (Samji, 1999)

Table- Water Consumption Winter Vs. Summer

(Lcpd)	Kitchen	Bathing	Latrine	Laundry	Total
Spring (Samji)	26	14	3	2	45
Winter (M&E)	9	3	7	4	23

Engineering Design Criteria

The nature of the water supply system design criteria did not allow for its use as a meaningful evaluation criteria. Having been stated as “all taps open” - a practical or feasible test could not be performed on the network. Instead, by using “level of service” as a criteria to assess performance – a better picture was derived of the adequacy of design. This process in itself however does not allow for a direct evaluation of the system from engineering principals.

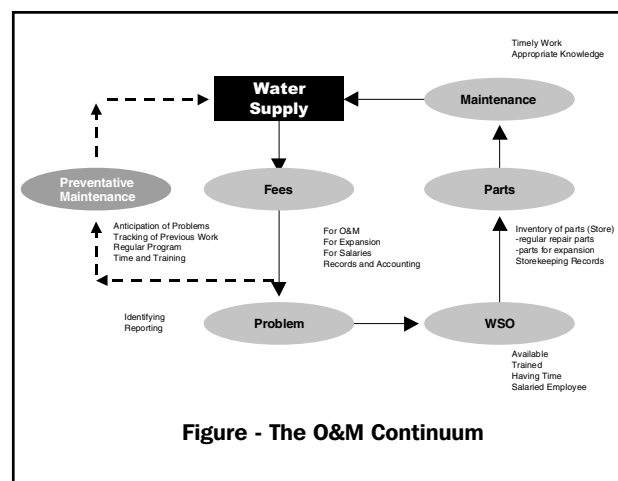
Flows and pressures results were as above, with some areas in the mountainous zones experiencing high pressures. Appurtenances and associated structures were per-

forming as envisaged. Intakes, reservoirs, and tanks were in good. Latrine coverage in the programme area was above 70%. The quality of construction of over 95% of latrines allowed for privacy of women and access by children – a key in achieving health benefit from sanitation.

Operation and Maintenance

The O&M Continuum shows how the provision of clean water and the accrual of health benefits is a result of a cycle of O&M, administration, and capacity. Tech M&E showed that WASEP's schemes have key strengths in this cycle and create an environment for its circulation. The O&M fund collected up-front sets up a store of spare parts which is used on a revolving basis. The funds created for the WSO's salary coupled with the training provided by WASEP ensures that a skilled person is available to carry out the necessary work. Villagers communicate their problems directly to the WSO who is able to fix most problems and continue the flow of clean water.

There are also areas where WASEP can strengthen certain portions of the cycle through its interventions. Clarifying the need for regular fee collection and appropriate record keeping is essential to maintaining a steady flow of funds for long term work that may be required. Tracking of work performed on the system will aid in determining where reserves can be spent and where additional attention needs to be paid. By adding in a preventative measures component, problems in the network can be preempted and a considerable savings can be realized by WSCs.



People and the System

Women have been active in community sessions. Access to villagers and rapport with the community allows WASEP to convey messages of health, hygiene, and operation and maintenance with ease. The WSI has been an effective tool to reinforce WASEP's messages and collect morbidity data.

The most encouraging result of the household surveys was that the women of the village knew that maintenance work should be performed, whom to call when assistance was needed, and that they were using the WSO. The direct

link between user and operator is well established, and fixes are being. Having villagers accept that O&M is important and availing themselves to the local “plumber” will serve to sustain the physical infrastructure in the long term.

Instruments of Sustainability

Water and Sanitation Committees have been active in discussing issues and addressing problems as they arise. As per WASEP’s objectives, formal village management structures have been created and are administering their communities’ schemes. Fees are being collected and salaries are being paid.

Challenges for some committees include achieving 100% collection of fees for 1999, and now, collection of fees for 2000. Some of the reason for non-payment has been lack of committee and community awareness of the importance of the fees and lack of information on what happens with collected tariffs. It has also been difficult in convincing villagers to pay for water that they have a natural “right” to. These fees are to be used to plan and save for contingencies, and may be in jeopardy if communities cannot collect. Planning for growth and financing expansion are the other prominent issues associated with fee collection.

Feeding-Back into the Programme

Mitigating technical short-comings in 1998 partner villages and bringing their system performance back on track included reducing delivery pressures with the use of orifice plates, and balancing water flows by readjusting system valves. Water and Sanitation Operators were briefed on preventative maintenance and additional record keeping was added to regular assignments. WASEP’s finance and administration unit conducted audits to follow up on village financial practices, and worked with communities to develop more appropriate financial reporting mechanisms.

1999 and 2000 designs were modified to reflect lessons learned during the Tech M&E. In addition to looped networks, minimum pipe sizes for transmission and distribution lines were adopted to allow for a more even and stable level of service throughout villages. Pressures are now regulated using pressure reducing valves, and prevention of air entrapment is achieved using air release valves. Tapstand freezing is being mitigated with an evolution in design from concrete blocks with galvanized iron pipe to hollow insulated reinforced concrete using UPVC pipes and fittings. These changes will assist in developing networks which allow for a suitable level of service to be maintained.

Formal preventative maintenance procedures were incorporated into the O&M process with WSO’s being trained in line flushing and valve exercising. Record keeping and monthly tracking of systems were instituted and a formal reporting procedure was developed. Strengthening the links of the O&M continuum will assist in ensuring the long term sustainability of the schemes constructed.

At the programme level, Tech M&E highlighted key issues to be addressed through changes in WASEP’s imple-

mentation strategy. One of the key findings was that if the sustainability of physical infrastructure is highly dependant on the communities ability to manage it – then additional inputs have to be invested in community capacity building and a revamping of WSO and WSC training is required. WASEP’s training unit was assigned to refocus training activities and the management unit was brought in to assist in developing appropriate courses for WSCs. Additional financial and human resources have been directed to this programme component.

Assisting communities to achieve financial solvency meant examining the financial partnership entered into with the village. To address tariff collection and long term contingency needs, WASEP’s Terms of Partnership now includes a minimum tariff amount and programme staff work closely with the WSC to formulate a financial vision for their scheme. Financially secure and independent communities have a greater chance of being able to take responsibility for their schemes with limited external inputs.

WASEP’s concept of design criteria and the benchmarks it sets for water system performance needs to be clarified and stated in a manner allowing for meaningful design and evaluation of the design. A more appropriate method of setting a performance benchmark may be to start by establishing a “level of service” and say, “In each branch, two users may have their taps open and each receive enough water to fill a bucket in 5 minutes, with sufficient pressure to sustain flow.” This may translate into a design criteria (target) of 5 l/min at 35 psi. As design guidelines are a series of assumptions made by engineers, a more suitable set of assumptions can be determined which is specific to the Northern Areas. Such standards also allows for WASEP to effectively and practically test for when it has reached an appropriate level of service.

Conclusions

1998 villages provided WASEP with the opportunity to technically assess its interventions. Tech M&E showed WASEP that:

- a satisfactory level of service is being provided to, however the level of service needs to be explained clearly and perhaps can be used as a benchmark to assess system performance in the future
- the design criteria is being met, but needs to be stated in a manner which allows for meaningful design and evaluation of constructed systems
- operation and maintenance is being undertaken successfully by the WSO and can be strengthened by adding preventative maintenance activities
- people are using the and obtain maintenance assistance when required
- WSIs are reinforcing health and hygiene messages
- although the WSCs are functioning, additional efforts need to be made in strengthening managerial and planning capacity.

Tech M&E showed that sustainability of infrastructure (thus health impact) is a result of both hardware and software. Although the deliverable may be physical in nature, health impact is the result of all investments and accompanying measures functioning in an optimised manner. Health and hygiene promotion, community capacity building, and water and sanitation scheme construction are complimentary activities which work in unison – not as silos.

The monitoring and evaluation programme collected and analyzed information that provided WASEP's senior management with technical and social data to make necessary changes in programme strategy. Regular Tech M&E exercises will aid in continually improving schemes to ensure that infrastructure is sustained and that communities are able to avail themselves to health benefit well into the future.

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