Pakistan: Drinking Water Supply and Sanitation Measures in the Northern Uplands/Chitral District

Ex-post evaluation

OECD sector	14030/Water supply and sanitation – small systems	
BMZ Project number	a) 1996 66 587 (investment) b) 1997 70 264 (personnel support)	
Project executing agency	Aga Khan Foundation	
Consultant	Not applicable	
Year of ex-post evaluation	**2006**	
	Project appraisal (planned)	**Ex-post evaluation (actual)**
Start of implementation	Not cited	1st quarter of 1997
Period of implementation	60 months	72 months
Investment costs	a) EUR 4.7 million b) EUR 0.7 million	a) EUR 5.6 million b) EUR 0.7 million
Counterpart contribution	a) EUR 1.5 million b) EUR 0.3 million	a) EUR 2.4 million b) EUR 0.3 million
Finance, of which FC funds	a) EUR 3.2 million b) EUR 0.4 million	a) EUR 3.2 million b) EUR 0.4 million
Other institutions/donors involved	None	None
Performance rating	2	
• Significance/Relevance	1	
• Effectiveness	2	
• Efficiency	2	

Brief Description, Overall Objective and Programme Objectives with Indicators

At programme appraisal water was largely supplied in the programme region via open irrigation channels. These were used for drinking water and irrigation as well as for personal hygiene, washing laundry and as watering places for cattle. Water quality was consequently unhygienic and contributed to widespread water-transmitted diseases in the programme villages. Faeces disposal was also unsanitary: Uncovered pits in the ground or special corners of a plot were used as lavatories, also resulting in health hazards, particularly for children playing in these areas. The project thus aimed at reducing health hazards for the population due to water-induced diseases (overall objective) through the continuous provision of safe drinking water (project objective). The target group was the population of about 100,000 living in the programme locations.

Programme objectives achievement was to be measured with the following indicators:

- Approx. 100,000 people have access to safe drinking water.

- Eighty per cent of the population living in the respective communities have access to safe drinking water.

- Drinking water quality at the offtake points meet WHO standards.

- At least 60% of households at the programme locations have been provided with improved sanitary facilities.

The programme objective indicators were also gauged to be adequate in the ex-post evaluation. They do not, however, correspond fully with the programme objective, which is why indicators were added to the set of objectives on final inspection to measure continuous water supply and the quantity consumed.

Programme Design/Major Deviations from Original Programme Planning and Main Causes

The programme envisaged the rehabilitation, extension and modernization of 65 existing water supply systems (wells, springs, irrigation channels) and the construction of 40 new water supply systems. Moreover, it was planned to carry out measures for water treatment and the improvement of household water storage and disinfection. Household and court connections were to be installed for the most part, public taps only in exceptional cases. Latrines were to be installed to improve household sanitation. Finance was also earmarked for office and laboratory equipment as well as vehicles and training materials. Via personnel support, flanking measures in hygiene education were also planned as well as the supervision of user groups in the first two years after completion of the facilities.

The programme implemented 100 village water supply systems (spring captures, supply pipelines, distribution grids, taps). For the most part, new systems were set up due to the irreparable state of individual components. The programme was subdivided into 2 phases: After the pilot phase (implementation of 15 single projects) an interim technical evaluation was conducted in response to emerging technical difficulties (e.g. frozen pipeline during the winter, 'dead' stretches of pipeline resulting in poorer water quality, pressure problems, etc.), which led to an adjustment of the technical design of the projects for the main phase. Due to the ensuing higher costs, the number of systems was reduced from 105 as originally planned to 100. The installed systems are technically very simple. Gravity-fed systems were introduced in 97 villages. Owing to their geographical location, 3 villages only had to be equipped with power-driven pumps for water delivery, which require higher operating requirements than the other systems. For lack of funds, however, no emergency power generators were obtained for these systems. With frequent power outages due to bad weather, this poses an unacceptable risk to continuous water supply. In systems that draw their untreated water from surface resources (8 systems), simple water treatment facilities (gravel or sand filtration) were set up. Most villagers were supplied via court tap connections and only very few via public taps. Almost all households have built a dry well for the taps, a few conduct the water in adjacent ditches. As a result of these programme measures, about 89,000 inhabitants of the programme region have continuous access to enough drinking water of adequate quality (with the exception of the villagers with pumping systems).

Under the programme, 7,400 latrines were installed (different models: flushing, double vault and composting latrines), providing 77% of the population access to a better sanitary infrastructure.

In the complementary measure, the communities were selected, mobilized and user groups formed in line with set criteria. Selection criteria included the evident need for clean drinking water, community readiness to make its own contribution and of particular relevance as a suc-

cess factor, pre-existing user groups and prior experience with the self-organising capabilities of the villages.

The villagers participated in planning and building the water supply and faeces disposal systems, were trained in their operation and received support by personnel from the Water and Sanitation Extension (WASEP) Programme for two years after commissioning. Moreover, activities were conducted in hygiene and health education at household and community level as well as in schools. Vehicles, office and laboratory equipment as well as training material were obtained for the implementing unit of the Aga Khan Planning and Building Service (AKPBS). Thanks to the complementary measure, functional user groups (100% of the sample) have been established, most of which run the facilities well (80% of the sample) or adequately (20% of the sample). Personal and household hygiene habits have improved visibly.

Altogether, the investment and complementary measures were carried out as planned. Considering the technical improvements made, reducing the number of water supply systems was necessary and reasonable. Due to the continuous supply via taps there was no longer any need to build household water storage and disinfection facilities. Altogether, the measures were appropriate for remedying the problem at the outset.

Key Results of Impact Analysis and Performance Rating

Water supply operations are organized by user groups, consisting as planned of a president, secretary, bookkeeper, technician and at least one hygiene officer. All 10 locations inspected in a sample survey still had operational user groups which discussed and solved current or upcoming problems at regular meetings and also provided for the replacement of members who left.

The technical operation of water supply is adequate, especially in the gravity-fed supply systems without treatment facilities (89%). In two of the inspected water supply systems with sand or gravel filtration there was an obvious need to clean the filter material, which was in part covered with algae deposits. The recommended two-year cleaning intervals had already been exceeded by almost two years here. The pumping water supply systems functioned smoothly at the time of the final inspection. For lack of specialist know-how, however, there are no preventive maintenance routines for the pumps. Instead, they are repaired by trained electricians from the nearest towns when technical problems arise (which happen regularly due to power failures caused by bad weather). Altogether, the project facilities were well maintained except for traces of rust particularly on the valves and a sizable leak in one distribution chamber caused by the earthquake in October 2005. The majority of the user groups/village communities inspected were able to ensure regular operation, carry out larger repairs and in part to connect new households to the water supply system. The latrines were also being used properly.

Water supply is generally available 24 hours a day. Only in the pump systems do frequent supply outages of up to two-months duration occur due to the above-mentioned power failures in the rainy season, because the state power supplier does not always repair damaged electric cables promptly. The population with pump systems (3% of all systems implemented) therefore has to rely on the traditional sources of supply (contaminated irrigation channels, dirty rivers), which then causes a renewed increase in the incidence of water-borne disease, particularly diarrhoea.

Various water resources are used, either spring water, river water or a mixture of both. Water quality in 83% of the systems in the past have met the bacteriological and chemical WHO standards. In the other cases, excessively high coliform bacteria (> 10/100 ml) or arsenic and mercury contents have been found, though the measurement results varied considerably and re-

peated tests should have been carried out to obtain sound data. Since 2003, no water quality analyses have been carried out for reasons of cost, but they should have been, on the one hand to drain the sources in the case of higher heavy metal contents or on the other to prevent health hazards in the case of an unforeseen contamination of river water.

The tariffs are set by the individual user group. Costs are incurred for a maximum of 3 committee members (technicians, hygiene officers) for smaller procurements of material and possibly for electricity. The committee members are paid with monetary income and/or in kind. They are also frequently rewarded through exemption from community work. The collection setup is also adaptable (monthly or seasonal payment of rates, payment in kind or with additional exemption from community work). When extra expenditure needs to be made, special collections are carried out. In 80% of the user groups, the bookkeeping (customer list, cashbook, inventory book, minutes of meetings) was exemplary, with shortcomings only in the user groups that had technical deficits as well.

According to information from the target group, the incidence of diarrhoea has declined to sporadic cases only, as compared with about every second child at project start. Besides the significant reduction of water-borne diseases, injuries due to accidents such as arm and leg fractures have also been reduced because the target group no longer has to fetch water in the rough mountainous terrain (particularly in winter). Fewer miscarriages are also reported thanks to less physical strain on pregnant women. The project thus also effected considerable beneficial impacts for women and saved them up to 6 hours a day for fetching water, which they now use to keep their houses clean, bring up the children and carry out additional fieldwork.

By having the population participate throughout its cycle, the programme aimed at qualifying the target group to strengthen its ability for self-help. The ability for self-organisation is considerable in some communities, as partly attested by NGOs set up for extensive community development. Decades of commitment by the Aga Khan Foundation Pakistan in the programme region has also made a contribution to this.

The average income of the target group falls short of the national poverty line so that poorer sections of the population in particular have been given access to basic social services through the programme.

The programme resulted neither in beneficial nor adverse environmental impacts.

For the most part, the programme objective indicators have been met (target group reached: 89,000 people, 24-hour water supply as a rule, per capita consumption between 35 and 148 litres a day, provision of 63% of households with improved sanitary facilities) and exceeded in water supply coverage (100%). The indicator on water quality is subject to some uncertainty due to the higher heavy metal or coliform bacteria contents. This applies for 10-15 % of the systems, where no considerable health problems have been reported, but these cannot be ruled out, either. In view of this and the good project objectives achievement overall, we assess the **effectiveness** of the project as **satisfactory (Subrating 2)**.

The project made significant improvements in the incidence of water-borne diseases and the prevention of accidents. Only when power failures in the pump-operated supply systems occur must resort still be made to alternative and polluted water resources, which is why the population concerned (0.02% of the target group) still frequently suffers from water-borne diseases. Altogether 600 villages applied to take part in the programme. It still enjoys a good reputation today, with 10-15 people a day requesting the executing agency or the district authority to implement it in their villages. The district authorities have approached the programme executing agency and requested cooperation to improve the dire water supply and sanitary facilities in the

whole programme region. Altogether, the **significance/relevance** is gauged to be **very good (Subrating 1).**

At € 71 per target inhabitant, the investment costs are still adequate (production efficiency). Static operating cost recovery in the classic sense and by way of barter was achieved in 80% of the water user committees surveyed. The very high per capita consumption in some of the gravity-fed systems incurs no additional operating costs and is therefore warranted, although break-even (full cost recovery) has not been achieved (allocative efficiency). We therefore judge the **efficiency** as **satisfactory** altogether **(Subrating 2)**.

Technical and commercial weaknesses were only discernible in 2 of the water user groups surveyed (20%), where sustainable operation is subject to higher risks in the medium term. The other water user groups have so far always been able to find timely remedies for problems, including larger ones (sizable pipe bursts, new household connections, connection of a new spring to ensure a sufficient quantity of water) and raise the necessary funds. In effect, the only costs incurred are for materials as the labour input is generally in the form of unpaid community work. So the short-term to medium-term sustainability risks in this connection are relatively low for most of the implemented supply systems.

Altogether, we rate the project's **developmental efficacy as satisfactory (Rating 2).**

General Conclusions

As experience has repeatedly shown, the prospects for the sustainable operation of rural water supply systems run by user groups are good, if simple technology is provided. This should be addressed in discussions when partners demand modern technologies and higher standards and the point made that these systems are generally less susceptible to operational faults, cheap to run and affordable for the user groups.

When defining selection criteria for including villages in the programme, thought should be given to whether it is better to invest in as many different villages as possible to achieve a broad impact or to select villages where favourable project experience has been gained for the sake of sustainability. Apart from the obvious need for (clean) drinking water, cost efficiency, etc., the selection criteria applied in this case were pre-existing user groups and experience with self-organisation capabilities.

Barter and ad-hoc payments can be adequate payment methods in rural water supply projects to ensure the operation of project facilities in the short and medium term. This way, every community member can make a contribution to maintaining the water supply systems, depending on his/her economic resources and physical abilities. However, such a system can only function if this way of doing things is rooted in the culture or tradition. This should be carefully vetted on project appraisal to ensure that project facilities really can be run in a sustainable way using these kinds of payment systems.

Water projects can have more extensive health impacts than reducing the incidence of water-borne diseases, e.g. reducing the danger of accidents by avoiding transport routes on difficult terrain. The relevance of water supply projects can therefore be significantly higher in upland areas with marked climatic fluctuations and poor pathways.

Health status improvement in water supply and sewage/faeces disposal projects does not only depend on the provision of enough water of adequate quality and functional latrines but also on the hygienic environment of the target group. This also includes hygienic practices in lavatories and personal and household hygiene (preparation and storage of food, use and cleaning of

kitchen utensils, keeping animals in the house, etc.). Under suitable circumstances, projects that address these issues may be able to considerably raise the impacts of water supply and sewage/faeces disposal.

Pump-operated water supply systems should include project components that contribute to securing them against power fluctuations or outages. One option here could be oil-fired emergency power generators, provided the target group can finance their operation.

Key

Developmentally successful: Ratings 1 to 3	
Rating 1	**Very high or high degree of developmental efficacy**
Rating 2	**Satisfactory developmental efficacy**
Rating 3	**Overall sufficient degree of developmental efficacy**
Developmental failures: Ratings 4 to 6	
Rating 4	**Overall slightly insufficient degree of developmental efficacy**
Rating 5	**Clearly insufficient degree of developmental efficacy**
Rating 6	**The project is a total failure**

Criteria for Evaluating Project Success

The evaluation of the developmental efficacy of a project and its classification during the ex-post evaluation into one of the various levels of success described in more detail below concentrate on the following fundamental questions:

- Are the **project objectives** reached to a sufficient degree (aspect of project **effectiveness**)?
- Does the project generate sufficient **significant developmental effects** (project **relevance** and **significance** measured by the achievement of the overall development-policy objective defined beforehand and its effects in political, institutional, socio-economic and socio-cultural as well as ecological terms)?
- Are the **funds/expenses** that were and are being employed/incurred to reach the objectives **appropriate** and how can the project's microeconomic and macroeconomic impact be measured (aspect of **efficiency** of the project conception)?
- To the extent that undesired **(side) effects** occur, are these tolerable?

We do not treat **sustainability**, a key aspect to consider for project evaluation, as a separate category of evaluation but instead as a cross-cutting element of all four fundamental questions on project success. A project is sustainable if the project-executing agency and/or the target group are able to continue to use the project facilities that have been built for a period of time that is, overall, adequate in economic terms, or to carry on with the project activities on their own and generate positive results after the financial, organisational and/or technical support has come to an end.