22nd WEDC Conference New Delhi, India, 1996

REACHING THE UNREACHED: CHALLENGES FOR THE 21ST CENTURY

Community water supply in Volta Region

Safuratu Muhammed Andani, Ghana

THE PROVISION OF safe water for the majority of the population living in rural communities is a major challenge to the Government of Ghana. In an effort to address this issue several rural water and sanitation programmes have been initiated by Government and non-government organisations. One of such projects is the Volta Rural Water Supply and Sanitation (VRWSS) Project, which is a joint effort between the Ghana Government and DANIDA.

The Project is being implemented in the Volta Region of Ghana which has a population of about 1.7 million (about ten per cent of the population of Ghana). About 80 per cent of the people of the Region live in rural communities with population less than 5000, which is the target number for the VRWSS Project. The Volta Region is divided into twelve administrative districts and the Project is being implemented in all twelve over a period of ten years (1992 - 2002). The Project aims at reaching the unreached communities in the Project area with potable water and improved sanitation facilities. The Project will also build the capacity of the communities to manage these facilities on their own to secure sustainability.

Choice of technology

In order to achieve the aim of providing water and sanitation facilities for all communities in the Project area, the Project has decided on a range of technology options that will be appropriate for the various communities. The technology provided for a community depends on the least cost option. The various technologies used are:

- Gravity-flow piped system with a spring/stream source without treatment.
- Gravity-flow piped system with a spring/stream source with some treatment.
- Gravity-flow piped system with a borehole source from where the water is pumped into a reservoir for distribution.
- Gravity-flow system with surface water source which is dammed and treated for distribution.
- Borehole with handpump.
- Hand-dug well with handpump.

In deciding on the technology to be used for sustainable rural water supply, the factors that need to be taken into consideration are the source of water; operation and maintenance requirements for the system and the availability of spare parts for the system.

The source of water may be surface water (rainfall, river or lake) or groundwater. This will determine whether the quantity available is sufficient and whether the quality is conducive for the technology chosen. The nature of the maintenance required and the long term sustainability of a water supply system will depend on the technology used. The technology chosen must be appropriate for operation and maintenance at the community level. The users should be able to afford the cost of maintenance and also carry out some basic maintenance on their own.

Lack of spare parts for a water system is one of the major bottlenecks to effective maintenance of rural water supply systems. If users are to maintain the systems on their own, then spare parts, e.g. for pumps need to be locally available and at affordable costs.

Source of water

Both surface water and groundwater are used for water supply on the VRWSS Project. The water supply options are based on those sources with the best water quality and the systems are designed, constructed and operated so as to ensure that the water is not contaminated between the source and the user. Groundwater in the form of springs or exploited with hand dug wells or boreholes is an ideal source for rural water supplies as no water treatment is necessary. Thus, these sources are always given first consideration.

The presence of surface springs in the central part of the Project area makes them appropriate sources of water supply for these areas. The springs occur at the top of hills, above the communities being served and as such the water can be transported to the communities by gravity flow. In most cases, thewater is tapped at the source of the spring which gives water of high quality and therefore needs no treatment. Where this is not possible due to problems of accessibility, and the water flows overland before it is tapped, some form of treatment, mainly filtration, is done.

The lower end of the Project area is virtually covered with saline water in the form of lagoons, and this is a potential problem to water supply development in the area. Limestone and sand aquifers, existing at considerable depths contain large quantities of fresh water which can be harnessed for water supply. This necessitates the use boreholes to explore the water at those depths. There is, however, the problem of groundwater contamination from sea water intrusion and leakage from overlying formations. Surface water is used in cases where the groundwater potential is poor. In the upper east part of the region, underlain by the Voltaian Basin, the groundwater potential is poor and groundwater recharge in these areas is mainly through fractures which are mostly localised and of limited extent. Drilling of boreholes in these areas has been unsuccessful in most cases. Hand dug wells constructed also dry up in the dry season. The availability of surface water from the Volt a lake makes the use of earthdams, with treatmentof the water, a viable option in these areas. In part of the region which is underlain by the Dahomeyan series groundwater resources are limited but many communities in these areas have access to dams of sufficient capacity and in these areas too, a viable option is to treat the surface water for distribution. The treatment process usually consists of roughing filters followed by slow sand filters.

Water treatment is not usually considered appropriate for community managed water supplies due to the high cost of operation and maintenance problems. It is only proposed where no satisfactory groundwater source is available and is normally limited to systems designed to serve more than 2000 people.

Operation and maintenance

The piped systems are designed to operate by gravity so that energy costs are eliminated and repairs greatly reduced. Where pumping is necessary there is only one pumping stage from the clear water well to the service reservoir. The clear water well may be provided with some means by which the community can draw water when the pumps are not operating.

Roughing filters and slow sand filters are used for water treatment which does not involve the use of chemicals or motorized equipment and as such the community can manage the systems on their own. Although the maintenance requirement for the filters is high, the major inputs required (labour, gravel and sand) are locally available.

Boreholes and hand dug wells are fitted with handpumps for operation. The Indian Mark II pump is used for deep wells whereas the Nira AF85 pump is used for shallow wells. These pumps are appropriate for village level operation and maintenance and community members, including women are trained to carry out preventive maintenance on the pumps. Private individuals are also trained as area mechanics to undertake major repairs on the pumps. For large communities, the water from boreholes is pumped to water reservoirs from where the water flows under gravity to standpipes located closer to the users. This option will also be considered for small communities that are close together so that one borehole can be used to serve a number of communities. Pumping options include electric submersible pumps powered by the national grid, photovoltaic cells or diesel generating units. The electric pump, requiring an energy source other than manual, presents additional recurrent costs which may not be easily affordable for the users. The solar pump has a lower operation cost but the capital cost is much higher than the electric pump. Skilled labour is also required to operate these pumps and this adds to the cost. This option is therefore provided for very large communities in which case the cost per capita is minimal. Operation and maintenance of the water facilities is the responsibility of the community. A committee, whose members are nominated by the community, is established to carry out this responsibility. The community also nominates a caretaker for each facility to carry out routine maintenance, undertake minor repairs, ensure pump site cleanliness and liaise with the area mechanics for prompt repairs of faulty pumps.

Most of the maintenance requirements for the technologies are such that theyc an be done by the community or a caretaker from within the community. These include cleaning reservoir tanks, filters, intake pipes and screens; flushing pipelines; repairing taps, aprons and soakaways; controlling erosion on the dam wall by planting grass; mending erosion gullies by plastering with mud; greasing pump parts and tightening bolts on handpumps. Major maintenance responsibilities are handled by the community and a skilled worker such as an area mechanic with the community reporting any major faults and providing labour during repairs.

Spare parts

A spare parts distribution network involving the private sector is to be establish in the Project area to provide easy access to spare parts for the water systems. Pump suppliers will be encouraged to establish retail outlets in commercial centres within each district. These retail outlets will sell replacement components and spare parts directly to communities. The pump supplier will also give on-the-job training to a number of mechanics within the district to undertake preventive maintenance and repairs on all pumps supplied.

Community participation

Community participation in project activities, from the planning to implementation, is considered very important. Community participation starts with a meeting with the community during which information about the Project is given and necessary data on the community is collected. The Project is demand-driven and as such, communities are expected to apply for assistance. After the application has been processed, a Water and Sanitation (WATSAN) committee, with members from the community, is formed to act as a link between the Project and the community. The WATSAN committee is then trained in aspects of the Project especially the health and hygiene education component. This is done to enable them carry out health and hygiene education in the community.

A feasibility study for the community is carried out to determine the options available for water supply to the community and this information is communicated to the community to enable them make an informed choice on the water system the community wants. The Project also meets with the community for approval of the final design of the system they choose. Before construction of the system starts, the community is expected to pay some money, amounting to a fixed sum per head, into a bank account to be controlled by the community. This payment is the community's contribution towards the capital cost of the system and is supposed to indicate the community's commitment to the Project. The money is paid to the contractor after the system has been constructed. The community's contribution may be in the form of labour provided during construction of the system. The WATSAN committee monitors the construction and ensures adherence to the terms of the contract between the community and the contractor.

The system is formally handed over to the community after completion. Most of the maintenance requirements for the water system is left to the community to handle. Caretakers from the community are trained in carrying out routine maintenance and minor repairs on the water systems and they are provided with the necessary tool kit for their work. Area mechanics are also trained in carrying out major repairs on pumps. Women are encouraged to participate in maintenance of the systems as they are the people who benefit from the continuous operation of the water system. Contributions are collected from community members as user fees and used for maintaining the system.

Problems/constraints

The VRWSS Project, in its efforts to bring water to the unreached communities in the Volta Region, faces some problems / constraints.

The final choice for the water system to be provided is made by the community and because the community is expected to contribute a fixed amount per head towards the capital cost, irrespective of the system chosen, most communities opt for piped systems which may not be the least cost option for the community and therefore puts additional strain on Project funds.

In its efforts to ensure sustainability of the systems provided by involving communities in project activities, the Project encounters a number of problems. These include apathy on the part of community members and a long procedure for implementation of project activities. Provision of water facilities therefore takes a long period and communities become impatient in some cases, thereby loosing confidence in the Project.

The Project is to provide potable water and proper latrines to the communities. However, demand for latrines under the Project has not been very encouraging because of the low perception of the benefits from latrines. Thus, the sanitation component of the Project lags behind the water supply and this means that the health benefits expected from the Project may not be fully realised. An increase in the subsidies given especially, for household facilities may improve the situation. Health and hygiene education also needs to be intensified to create awareness of the health hazards of poor excreta disposal.

Conclusion

The VRWSS Project, in an effort to reach the unreached communities in the Volta Region with potable drinking water, is employing a wide range of technologies. Considering the different conditions existing in various parts of the Project area, this approach of using different technologies which are appropriate for each part of the Project area is in the right direction in facing the challenges of reaching the unreached communities in the VoltaRegion.

References

Volta Rural Water Supply and Sanitation Project - Project Handbook Volume 3.

Community Water and Sanitation Project - Implementation Manual.