Watercade - Community friendly software for designing and estimation of water supply schemes

S. Zachariah, S. Sebastian, India

As community initiatives in managing water resources and addressing water demands is a key concern in developing countries, the role of community in planning, implementing and operation and managing water supply schemes is increasing rapidly. The informed choice of the community in cost-effective and sustainable technologies for implementation, operation and maintenance is very crucial. This paper describes software developed by the Socio Economic Unit Foundation, Kerala, India to support communities in preparing schemes considering wider technological choices, cost-effectiveness and optimal design. In the last two years hundreds of communities have experienced the application of the software and proved its effectiveness in reducing man days required for Detailed Scheme Report (DSR) preparation, consideration of wider technological and service level options, and optimum design. The Watercade software is a community- friendly tool for designing and estimating has supported community in gaining maximum benefits in planning and implementing community managed water supply schemes. Watercade has enabled community management and informed decision-making to become a reality.

Introduction

Worldwide, countries are integrating the Millennium Development Goals into their national development frameworks. India is also committed to the Millennium Development Goal of providing drinking water and sanitation to its population by 2010.

The water sector in India has undergone basic changes in the last two decade from the focus on infrastructure development to improved management, conservation and institutional changes.

The primary responsibility of providing drinking water and sanitation vests with the State Governments. The central government also allocates funds and ensures that funds are provided in state budgets since 1984. In Kerala, the Kerala Water Authority, government agency with well structured engineering wing has been responsible for drinking water supply. However on account of various internal and external reasons, the institutions and investments have become unsustainable. The systems are typically supply driven, at times over designed and cost recovery is often poor.

In line with 73rd Constitutional Amendments and increasing recognition that centralized, government controlled, and supply driven approaches need to be changed to more decentralized, people centric and demand responsive approaches and this has led to the inception of sector reforms.

This major paradigm shift in thinking and policy, launched in 1996, incorporates the principle of a) demand responsive approaches based on empowerment to ensure full participation in decision making control and management by communities b) shifting the role of government from direct service delivery to that of planning, policy formulation, monitoring and evaluation, and partial financial support c) partial capital cost sharing in either cash or kind or both 100% responsibility of O&M by users for both cost recovery and running.

Community initiatives have emerged over the years to address the problem of scarcity of water in Kerala. Jalanidhi, a project costing $ 90 million that the government of Kerala piloted, used the alternate demand-driven delivery model supported by an International Development Association (IDA) line of credit from the World Bank in 4 districts and later on scaled up to all the districts. Sector reforms is another initiative of Government of India, with the local governments being empowered to implement demand responsive community managed water supply schemes in two districts. A second example is Giridhara, a central government supported programme for tribal hamlets that was carved out in one district. Both district programme of water supply and sanitation projects were supported by the Royal Netherlands government and they placed emphasis on community managed programmes. The thrust of these reform projects is capacity building and empowerment of communities to plan, implement and manage the systems in a sustainable manner. The programme assumes informed choices and participation of the communities at all level. About 4000 small community managed schemes have been implemented in the State.

It is in the above mentioned backdrop, the need for informed choices regarding the technology of water supply became a critical factor for the speedy and cost effective implementation of schemes for the community.

Traditionally engineers are preparing the designs and estimates of water supply schemes manually. It takes approximately 3 man-days for preparing estimates and designs of a single scheme. Then these have to be presented by local Panchayaths to the Block level technical committee, which has to be vetted and approved. The local self government institution (Panchayath) may not have engineering staff. An engineer may have to cover two or three Panchayaths. So this process is time consuming and communities are not getting proper support of the engineers due to their workload. In addition, all the reform projects emphasize on time-bound completion. The community has no role in preparing the detailed scheme report (DSR) and it is a big limitation in the new regime of community management.

For the community, there is no chance for wider technological choices, as it is depends on the services of the engineer. There is little scope for discussions on different options and make informed choices. Preparing DSR for various technological options at different service level is cumbersome and nearly impossible.

There is also no provision for choosing the optimal design and cost effective measures under the manually prepared deigns and estimation procedures.

In the Jalanidhi projects, usually there will be 20 to 25 beneficiary groups for the water supply schemes in a panchayath of average area of 30 square kilometre and a population of 25000. Within the time limit of 24 months, the community has to mobilize user groups, decide on the schemes, prepare the estimates and designs and implement the programme. In effect the community has to agree with designs prepared by the engineers without any choices due to time constraints and non-availability of alternate choices. This makes informed decision making impossible.

Again at the block and district level, the vetting process is also delayed due to this elaborate process of manual technical verification.

Watercade

Socio economic unit foundation (SEUF) a pioneering NGO working in the watsan sector piloted the decentralized community managed micro water supply schemes as early as 1993 which has enabled them to become support organization and facilitation agency for two panchayaths of Jalanidhi projects in the piloting stage itself. The Technical Support Wing of SEUF begin to investigate on developing a software for the estimates and design aspects and they succeeded in developing a new community friendly software for design and estimates called watercade.

The minimum system requirement for watercade installation is windows 98/2000 OS and Pentium IV or above system with at least 64 MB ram.

Watercade is designed for small, micro, ground water schemes. The sources are mainly springs, rainwater and ground water sources i.e. open wells, bore wells, tube wells. Watercde is suitable for designing of pumping; gravity schemes as well as manual/ hand pump equipped sources.

Design of rehabilitation or extension of existing schemes is not included.

Generally sources without chemical contamination are selected for micro water supply schemes and hence major treatment systems are not required and not included provisions in the software. However provisions are there for simple disinfection methods.

Capacity building programmes are an integral part of community managed water supply schemes, the basic knowledge for technology choices are imparted through the mobilization and training programmes.

Watercade, with its integrated estimation and type drawing facility, delivers a comprehensive environment for even amateur designers to create sophisticated designs, estimates and drawings. Initially the rates of various works and materials applicable to the area to be entered. One has to just enter the field data, number of households, data about distribution network, design parameters etc. into the computer to automatically produce an estimate and design. With the same data various service level can be tried just by changing the figure on the design parameter of the service levels. Options for printing of design, estimate, drawing and reports (data sheet and specifications etc.) with ordinary printers is included in the software.

Watercade simplifies the work by automated designs, estimate and drawing generation. This also eliminates undue delay in vetting of detailed scheme report and hence savings in manpower and time.

Watercade enables community to take informed decisions by comparing different technology options and costs. The only fuel needed for watercade is the basic data collected from field. Social survey and engineering survey using dumpy level instrument is required for data collection. The demographic details, quantity of water (lpcd), design period and projected population of the scheme is needed for designing. The levels and distance between various points like source, reservoir, tap points etc. are needed. Crosschecking of input data can be done using the output records. Operation and maintenance cost and tariff cost can be calculated using the software.

Watercade enables the user to make use of various prelinked scheme components such as source, pump house, reservoirs, pumping and distribution mains, pump set& accessories, electrification etc. under one scheme according to their requirements with multiple selection options in case of source, pump house and reservoirs.

For the selection of source site the community can use combination of traditional wisdom and expert's opinion. Selection of appropriate site for the reservoir can be decided after engineering survey. It is taken care of projected population growth.

The use of software enables personnel in the community with some basic knowledge and computer literacy to generate detailed scheme reports with desired designs.

Main features of watercade

- Easy and user friendly interface
- Suitable for designing pumping schemes
- Minimal data entry
- Automatic fixation of well diameter
- Economic sizing of pumping main
- Longitudinal section graph of pumping main
- Positioning of valves with graphical aids
- Distribution system designs
- Zoning facilities
- Automatic fixation of reservoir level
- Estimates of different components
- Type drawings and schematic diagrams
- Abstracts and detailed scheme reports' compilation of head load conveyance
- Material and labour data extraction
- Work details
- Provision for different sets of schedules of rate

Watercade was launched in 2003. It is now widely used by all support organizations of Jalanidhi project. SEUF is supporting the organizations through training and handbook on use of Watercade.

Watercade has been popularised in community managed water supply projects in Kerala. In Jalanidhi projects itself 1250 schemes have been designed using watercade for last 2 years.

In Jeevadhara projects the programme support group comprising technical and social persons from the community is trained in use of Watercade and they are using the software for designing water supply schemes. 225 schemes have been designed in Jeevadhara, which is in progress now.

The time needed for preparing an estimate and design for a scheme takes only maximum 2hours where as the manual process will take 3 days/ 24 hours minimum. The super check invokes just checking the data and can be done in an hour.

Comparative Financial Implications

No of Beneficiary Groups in a Panchayath 25
No of Panchayath 50
Total No of schemes 25 x 50 = 1250
Engineering support needed 1250 x *24hrs (8hrs/day) = 30,000 hrs
Engineering support using watercade for the same number of schemes 1250 x 2hrs = 2500 hrs
Financial implication for manual estimation and designing ,@ Rs 40/hr ($ 1) 30,000x40 = 12,00,000 ($30000)
Financial implication for estimation and designing using watercade @ Rs. 40/hrs, 2500hrsx40= 100000($ 2500)
The above calculation shows the usage of watercade in Jalanidhi project only.
The cost of developing the software is approximately INR 2,50,000 ($ 5555). It is providing to users at a rate of INR 9,000 ($200).

Limitations

- The data base of Watercade included only 400 families

### Box 1. Maximising the benefits of water supply

By using Watercade software almost 12 times financial benefits are accrued to the user groups.

Other benefits of watercade are that the community is empowered and capacitated to select the best cost effective technology for implementing their own water supply schemes. Informed decision making is possible for the community management groups. There is transparency in material purchase and its use avoids the wastage of money, materials and manpower.

Vetting and approval process is very much simplified and resulted in speeding the process.

Even a basic qualified technical person can handle Watercade with minimum orientation training.

Since the local governments do not have adequate technical staff, Watercade helped to build confidence to plan and implement micro water supply schemes.
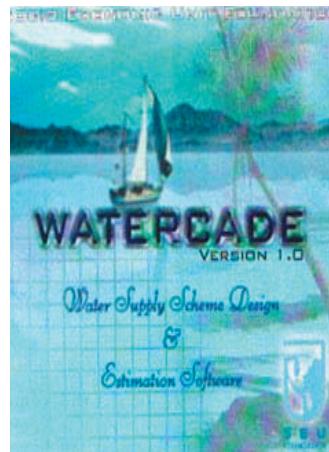
Figure 1. Handbook on Watercade

at a time needs upscale.

- The pumping schemes and gravity schemes are included in the Watercade. But no provisions for infiltration gallery or such complicated treatment arrangements. Needs further improvement.
- Now the schedule of rates used in Watercade is the Public work department's rates in Kerala. But, there is potential for using it in other areas by incorporating the new rates or variables. SEUF is improvising the software based on the feedback from the field experiences.

The government has recognized and approved the software through the government orders. It is expected that other divisions of water supply will also follow in course of time and versioning of watercade depending on the emerging needs.

Watercade is an innovative community friendly initiative in the designing and estimation of micro water supply schemes.

In the changing sector reform scenario, from supply driven, comprehensive schemes to demand driven, micro community managed water supply schemes, there is high potential and relevance for the Watercade software.

References

Hand book on watercade 2003, Socio Economic Unit Foundation, Kerala, India

Annual Report, 2004 Jalanidhi, World Bank Aided Project of Govt. of Kerala

SEUFLET e magazine

Contact address

Suma Zachariah
Programme Officer,
Socio Economic Unit Foundation
TC/16/309,P.B. No. 507
Eswaravilason Road, Thycad.P.O.
Thiruvanthapuram 605014
Tel. + 91 – 471-2325904, Fax. + 91 471- 2325914
E-mail:seufhq@sify.com, seuf@md2.vsnl.net.in

Saji Sebastian,
Programme Officer,
Socio Economic Unit Foundation
TC/16/309,P.B. No. 507
Eswaravilason Road,Thycad.P.O.
Thiruvanthapuram 605014
Tel. + 91 – 471-2325904, Fax. + 91 471- 2325914
E-mail:seufhq@sify.com, seuf@md2.vsnl.net.in
Website: www.seuf.org
www.seuf.org