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### Integrated infrastructure development

Robert A Boydell and Wendy Quarry

#### INTRODUCTION

This is not a paper about sophisticated urban planning models but about trying to achieve a balance in the planning of water supplies and environmental sanitation in villages and small towns.

#### Background

Over the past decade the emphasis in water and sanitation infrastructure development in villages and small towns in India has been on the provision of public stand post and handpumps to provide a minimum basic service level of 40 litres capita per day (lcpd) in order to provide equitable distribution of scarce resources. The construction of pour flush water seal latrines in order to relieve scavenging (that is, the emptying of bucket latrines) has also been considered as having a high priority, although implementation has been limited. Other environmental improvements have not been stressed.

At the end of the Water Decade where do we stand? The Government of India has made tremendous strides in providing water to the majority of the problem villages identified at the beginning of the Decade and is adopting a policy of decentralization and the handing over of these water systems to local authorities. However, after visiting a number of villages and small towns in various states that have benefitted from Government's accelerated rural water supply program one leaves with mixed impressions.

#### The Existing Situation

Let us look at a hypothetical village or town of about 15,000 in which the state water board has recently constructed a piped water scheme that was subsequently handed over to the local authority for them to operate and maintain it. The scheme was designed on the basis of 40 lcpd and one public standpost per 250 people. Water is taken from a nearby river and treated in a small plant consisting of a rotating bridge clariflocculator and pressure filters.

The village committee or Gram Panchayat which has recently adopted the scheme see it as a source of revenue and have allowed the richer villagers to have private connections. The scheme which originally had 60 standposts now has an additional 120 private connections which has overwhelmed the system's capacity and the poorer villagers in the periphery only have a trickle of water twice a day for about an hour.

The existing traditional wells continue to be used despite their unsanitary arrangements particularly by the villagers in the periphery, during the day when the new systems do not work or when the new scheme has gone out of order or the power supply fails.

Walking through the streets it can clearly be seen that by providing the village with a new water system, a second problem has been created. The problem of drainage. Because the area is flat and the soils impermeable, spillage from standposts and some old handpumps combine with the additional sillage or grey water generated inside the households from increased water use to form streams that flow through the village streets and lanes.

One cannot help but note the contrast between the immaculately clean household courtyards and the streets in which the storm drains are choked by solid wastes which has allowed the sillage to form stagnant ponds in which flies and mosquitoes are breeding.

When we move into the back streets we can see a number of pour flush latrines which were supplied in a donor driven project, the majority of these latrines are abandoned but some are used for storing cycles and cement.

Also in the back streets to the rear of some of the richer households we see small family sized gober gas (biogas) plants that were provided some years ago by Khadi Village Industries. Approximately half of these are still working and provide

energy for lighting and cooking, the other are abandoned because the domes have rusted and because it was perceived that the efforts of operating the plant did not justify the rewards.

A visit to the water treatment plant reveals that the motors for the alum paddle mixer and the flocculator bridge have burned out and the pressure filters only work intermittently because of the electricity cuts.

The visit to this hypothetical village results in a meeting with the village leader the Sarpanch. He explains his perception of the village's priority needs; these are, water first and drainage second. Schools, clinics and roads are also high priorities, however, latrines are at the end of his list.

#### The Need for an Integrated Design Approach

The example given above may well be extreme but it serves to illustrate that when planning the infrastructure in villages and small towns there is a clear need to take a holistic approach and consider the inter-linkages between water supply and environmental sanitation in its broadest sense, and not to only consider standposts and latrines. At this point we should consider in more detail the design criteria, and linkages between some of these components of village and small town infrastructure.

Water supplies; although inspired by concepts of equity the approach of adopting basic norms in public supplies do not work well. If the richer can afford to pay for a better standard of service why should schemes not be designed to accommodate this. If properly priced and regularly collected, revenue becomes available: to cover all or part of the capital costs; to cross-subsidize basic minimum water supply for the poor; supports expansion and operation and maintenance of the system; ensures sustainability of the system and does not break any equity principles.

Rehabilitation of traditional water sources; within water and sanitation projects the incremental costs of improving and protecting existing water sources is small. However, the potential benefits are large in terms of health improvements. It is clear that communities return to their traditional sources when new schemes fail (if they ever abandoned them). Placing an apron and collar around and open well and installing a handpump can dramatically improve the water's quality by eliminating ropes and buckets.

Drainage and sullage; clearly when a new or much improved water supply is brought to a village increased water consumption

will take place resulting in sullage and spillage being generated. In flat areas with impermeable soils this creates a major health problem because of insect breeding. Arrangements for dealing with sullage and spillage should be integral components of water supply schemes.

Storm drainage; clearly there is a link between sullage and storm drainage. Our look at the hypothetical village revealed that the sullage and spillage water eventually found its way into the storm drains that line the main road in the village. These drains which were constructed by the roads department who channelled them to the village pond which is now becoming polluted and foul. The design of storm and sullage drains has to be considered together.

Excreta disposal; supply and target driven latrine building projects do not work. The only effective projects are those in which a demand has been created through social marketing or promotion and education campaigns and where the delivery mechanisms and markets have been established to serve the demand once it becomes effective.

Solid wastes; solid wastes are clearly a problem. Vegetation and other wastes which are disposed of indiscriminately, finds its way into the drainage channels where it causes blockages and adds to the pollution. The disposal of solid wastes could be linked with the emptying of pit latrines and the wastes composted outside the village to provide valuable humus. However, composting and marketing the products is a complex process and few long sustained successful examples are seen. Biogas like composting has its faithful proponents, however the long term technical and financial viability of these plants has not been fully demonstrated.

However, the need for appropriate technology should not be forgotten. The water treatment plant would have been much more robust with a flume mixer, hopper bottom sedimentation tank, and slow sand filters rather than the electricity dependent "high tech" equipment that was used.

#### Integrated Projects-bringing it all together

It has become more clear in recent years that for projects to be successful there is a need to involve the beneficiaries in this planning and implementation. However, strategies for doing this are not well understood nor is it an easy task. One method of involving people in the planning and decision-making process is to stimulate

awareness of the environmental situation in which they live and the needs for improvement. One technique has been for the community to develop village maps which indicate where people live, the position of wells and standposts, polluted and flooded areas and to draw up an inventory of required improvements.

A second important consideration is developing an understanding of the communities' ability and willingness to pay for services, both capital and operations and maintenance costs. Recent studies have shown that communities are willing and able to pay a great deal for a high level of service, but conversely people are not willing to pay for poor services. This implies that by providing better services Government can reduce its financial burden. In order to recover costs, schemes should be designed to provide good service and be extendable as and when required. (Ref 1).

A further consideration is the packaging of project components so that the higher priority components provide leverage with which to introduce other interventions. Also the packaging and phasing of communications and implementation of physical works is critical. Donors and Government should resist pushing target driven "supply" projects and should concentrate on creating demand and creating market mechanisms to serve this demand; low cost sanitation is a good example of this.

Projects should also fully deal with the community's perceived needs and not create secondary problems. For example standposts and handpumps should not be provided without adequate drainage.

All of this hinges upon the project authorities establishing a good rapport with an understanding of the communities of the project area. That is developing communications with people - this is discussed in the paper "Communications in Infrastructure Developments" to be presented by Ms. Quarry.

#### Institutions - bring them all together

Bringing it all together at the community or project level is one issue, however, a second problem to be faced is coordinating the numerous responsible institutions. In the typical village situation we examined it may well be that the state water board is responsible for water supplies; the department of rural development for sanitation; the department of health for extension and hygiene education and the public works department for roads and drainage.

A number of NGOs could be active in the area plus the town or village has a council which represents the interests of the residents. Each of these agencies have their own budgets and work programs which may be conflicting, overlapping.

An important concept in integrated infrastructure planning that is embodied in decentralized government is the identification of local nodal agencies which are responsible for coordinating development. Furthermore, an important tool for coordination is the preparation of detailed development plans at the lowest practical level. District, block or town/village plans that are contributed to by the different responsible bodies and agencies are a sound basis for developing coordinated approaches to integrated infrastructure development.

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1. RAMASUBBAN Radhika and SINGH Bhanwar. The Efficacy of Improved Supply Systems in Meeting Rural Water Demand for Domestic Needs. Centre for Social and Technological Change, Bombay, India, 1989 (a report).

