

Urgent urban water and waste problems

by John Pickford

In his editorial, John Pickford outlines the problems of water and waste in towns and cities, and introduces the other articles in this issue, covering unconventional solutions, cost recovery and community involvement.

NOT LONG AGO it was repeatedly stated that developing countries were predominantly rural. Something like 90 per cent in the population were said to be rural, contrasting with the developed nations where more people lived inside towns than outside. Recent decades have seen a gradual but steady increase in the proportion of developing country populations living in towns. For example, in sub-Saharan Africa townspeople increased from 14 per cent in 1963 to 22 per cent in

1980 and up to 27 per cent in 1987. There are exceptions like Uganda where the 90 per cent rural figure still applies, but in Zambia more than half the population already lived in towns by 1987.

Like most global statistics, the urban population numbers and ratios are by no means accurate or reliable. Definitions of what constitutes an urban area vary. Is a locality with ten thousand inhabitants a large rural village or a small urban town? Then

some countries define towns by the form of local government irrespective of population, in something like the way that there were 'rotten boroughs' in Britain before 1832, electing members of parliament with few voters. In part the increase in urban population in developing countries is due to rural-urban migration. In part it is due to natural growth.

In most towns and cities in developing countries three types of settlement have special difficulties, affecting the quality of life of the people and the provision (or lack of provision) of water supply and sanitation. These are slums, squatter settlements and sprawling fringe areas.

Urban problem areas

The *Longman Dictionary of Contemporary English* defines a slum as 'a city area of poor living conditions and old unrepaired buildings'. The poor living conditions are the result of lack of repair. Buildings become dilapidated. New towns and cities like Lilongwe, Abuja and Islamabad should have no slums with this meaning of the word. However, new buildings can rapidly become slums as a result of overcrowding and lack of maintenance. Tall blocks of flats are particularly liable to become slums quickly.

In many of the old slums a typical house was occupied by one well-off family in days long ago. With no enforced regulations the plot was fully built up, or additions filled any remaining space. Dilapidation resulted in deterioration of the building fabric. Any services that once existed became unserviceable due to lack of maintenance. Where once each family had many rooms, now each room holds a family. Sometimes two or more families share a room. Buildings become supersaturated with people. Overcrowding and lack of services results in higher incidence of disease. With such congestion the provision of services may be extremely difficult.

Squatter settlements are characteristic of the growth of urban populations in developing countries. In

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In Jakarta these people, desperate for shelter, have settled into a row of abandoned freight cars.

many cities half the people are squatters and have been for generations. Others have recently moved in from rural areas or smaller towns. By definition squatters or their predecessors occupied land to which they had no title. Some squatters squat on tiny plots alongside roads and railway lines, canals, rivers and the seashore. Some move on to city-centre redevelopment sites, knowing that before long their shacks will be replaced by multi-storey banks and office blocks. Others (perhaps the majority) live on large tracts of land beyond the regulated urban development.

Most squatter settlements start with makeshift shelter. Wooden crates and cardboard boxes are a good base. Bamboo stakes, grass matting or odd pieces of sacking and plastic sheeting provide meagre protection from the elements. In some squatter settlements these scanty dwellings are gradually improved. Mud walls and thatched roofs are the first stage of improvement. Thatch is replaced by tiles or corrugated iron sheets. Then bricks or cement blocks take the place of mud walls. There may even be a smattering of two- and three-storey buildings. Yet the people remain squatters unless they obtain some kind of legal entitlement to the land - until they achieve tenure.

Fringe sprawl exists around towns and cities, taking various forms. Some of the peri-urban development is by squatters. Some is provided by central government, municipal councils, housing authorities are similar agencies. This 'official' housing may be intended for low-income people, but often the standards, and therefore the costs, are too high and the properties are soon taken over by the middle-income groups. Many houses in developing countries are built in a gradual process as money becomes available. One room is built first, then others until the house is completed.

Unsuitable systems

Inevitably an increased urban population requires more water. Usually the sources of water currently used are abstracted to their limit. Obtaining more water soon involves seeking and developing sources that are either further away or are at greater depth. This results in new capital costs because of the longer pipelines and deeper boreholes. The greater the rate of the growth of water demand the greater the proportion of new works to old. As old works have either already been paid for, or were built for much



Not far from Abidjan's modern high-rises, some ten thousand people live in the limited area between the road and the lagoon.

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less than present costs, increased rates of urbanization results in higher unit cost - more money per unit volume of water. Operation costs are usually higher too, because of pumping from greater depths or over longer distances. These increases of cost are compounded when urbanization and urban pollution overwhelm catchment areas. Many reservoirs, formerly well away from human habitation and fed by run off from open country, have been enveloped by urban growth and have had to be abandoned.

Water distribution

People in towns generally expect a piped water supply to be available for connection to their houses, offices and factories. This is the conventional level of urban service. So the

distribution network has to be extended in line with the expansion of the urban area. The high ratio of new to old pipes leads to increased costs per unit connection. Existing mains prove insufficient and have to be replaced or supplemented.

Other causes of high costs may be low density in fringe areas, low connection rates and the use of marginal land for housing. These affect both the cost per connection and the cost per unit volume of water supplied. Low housing density in peri-urban areas is in marked contrast to very high population density in the central core of many Third World cities. In part low density is due to the common method of constructing houses in stages. In an area with a hundred plots there may be only two or three houses that have got to the

stage where water connections are required. Where all the spare family money is going into the gradual erection of a house it may be some time before cash can be found for connection to the piped water supply. In the meantime people (usually the women and children) may have to walk to distant public standpipes, use polluted 'natural' sources, or buy water at high prices from water vendors.

Squatters often squat on 'marginal' land. This consists of areas that are not really fit for housing and so are avoided by those who can afford to purchase or lease planned plots. The areas may be marginal because of liability to flooding or landslides, or because of very steep gradients. In any case the provision of water distribution systems presents difficulties.

The paper by Paul Friedlander deals with innovative distribution

methods in urban marginal areas of Tegucigalpa. The problems of cost recovery are outlined by Richard Franceys with reference to Borno State Water Board in Nigeria.

Inappropriate sewerage

Sewerage is the conventional form of urban sanitation. It has been proved time and time again that conventional sewerage and satisfactory sewage treatment/disposal is excessively expensive. It is often quite inappropriate for rapidly expanding urban areas in developing countries with large communities of squatters and other low-income families. Yet politicians, planners and even some engineers still stick to the outworn idea that the whole of every urban area should be seweraged.

The snags with sewerage should be

well known. The cost is high. There is a requirement for ample continuous piped water to every building. Congested and tortuous narrow roads and alleys in central areas present construction difficulties. In flat terrain it is necessary to pump sewage, with all the attendant difficulties. Discharge of inadequately treated sewage to seasonal watercourses creates a high risk of the spread of disease and only a few Third World towns can truthfully claim that their sewage is adequately treated.

In the peri-urban sprawl, sewerage faces the same difficulties as piped water, but connection rates are even slower because costs are higher. Low connection rates mean low sewage flows and low sewage flows result in greater risks of blockage.

In his paper, Kevin Tayler shows from experience in Peshawar and Lahore that sewerage can be appropriate for low-income communities. Marcus Vines and Bob Reed show in their article that community involvement in Brazil and Pakistan provide more affordable solutions with unconventional sewage systems.

Operation and maintenance is generally more of a problem than construction in growing cities. In part this is because of finance. It is worth while for a politician to push forward extensions to a water-supply system; he or she may even gain votes by getting a new sewer installed. Ensuring that enough money is available for unblocking blocked sewers and maintaining the system is a different matter.

Other systems suffer from poor management or insufficient trained manpower or from the difficulty of obtaining spares and supplies even when local funds are available. Bureaucratic hurdles preventing urgently needed spares from being imported may result in several months delay.

Water and sanitation are usually the responsibility of municipal councils and other local government bodies. Strenuous efforts are now being made in some countries to build up or strengthen the quality of their staff. In many developing countries however, they are unable to raise funds, attract good calibre staff or cope with the tasks given them by central government. These difficulties arise from deficiencies in the formal sector and are to some extent avoided if individual families or groups of households are responsible for water and sanitation, as is common in rural areas.

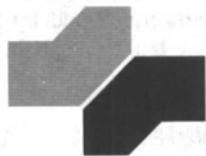
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This squatter settlement at Karjat near Bombay has very limited water supply and sanitation facilities.

The article by May Yacoob has been included in this issue to illustrate the principles of community involvement so necessary for successful projects, not only in rural, but also in peri-urban areas.

Water sources

Many fringe urban areas are as much an extension of the rural situation into the towns as an incursion of urban conditions into the countryside. In the absence of formal municipal services the people use traditional water sources such as wells, rainwater collection, streams, tanks (in the Indian sub-continent), qanats (in the Middle East), and water-holes in the beds of seasonal streams.

The extension of and improvement to such water sources receives plenty of attention in *Waterlines*. For example, where rainfall is fairly continuous throughout the year a satisfactory supply may be obtained by the collection and storage of roofwater using the jars and ferro-cement tanks that have been fully described.

The major disadvantage of extending these systems into urban areas is that pollution is liable to be more severe than in rural areas. To some extent this is inevitable as an increased number of people produce increased waste. Pollution can be controlled by appropriate means,

however, foremost of which is adequate methods of excreta disposal.

Sanitation

Sanitation probably has a greater influence on health and disease than water quality. Apart from anything else, with adequate sanitation there is less pollution and water quality is better.

Septic tanks have a long history of successful operation in low-density suburbs where plots are large enough and the soil is permeable enough for disposal of the liquid effluent into soakaways. Users of WCs connected to these septic tanks enjoy the same benefits as those who have sewers. Generally the cost of good septic tanks and sufficient drainage for high water-use is about the same as sewerage and sewage treatment - much too high for the majority of urban people, who come into the low-income or low-middle-income categories. Disposal of effluent from septic tanks on small plots or on impervious soil is difficult. It often goes into surface drains and ditches, presenting a severe health hazard.

Good low-cost sanitation is available with one of the improved types of pit latrine:

- Ventilated improved pit (VIP) latrines, generally most suitable for those who use paper and other

solid material for anal cleaning. Vent-pipes remove smells and detract flies from escaping into the latrine building, which must be kept fairly dark.

- Pour-flush latrines with a water seal to prevent smells and flies from reaching the latrine from the pit - most suitable for those who clean themselves with water.
- The lowest-cost simple pits with tight-fitting covers to put in the squat hole when the latrine is not in use - often with a cheap screen around it instead of the roofed hut necessary with VIP latrines.

Many people think that pit latrines are only suitable for rural use. But in recent years millions have built in towns and cities and they can be entirely satisfactory. Urban pits are not a new idea. For example, in Dar es Salaam they are the traditional form of sanitation everywhere except in the very limited sewered districts. Some large, lined pits have been in use for more than forty years.

Looking to the future it is reasonable to hope that the prejudice against urban pit latrines will diminish, and that the provision of improved versions of pit latrines will extend better sanitation and improved health to the tens of millions of families without adequate sanitation in the growing urban areas.