Chapter 5

Intermittent Water Supply

Intermittent water supply may be defined as a piped water supply service that delivers water to users for less than 24 hours in 1 day. It is a type of service that, although little found in developed countries, is very common in developing countries, especially in South Asia. Changes in water supply can be effected by Asia's growing middle class and its small but very powerful rich group, if they use their influence, but they do not do this because they secure their water supply as individuals through the use of tanks, pumps, and in many cases private wells. This chapter examines the consequences of intermittent water supply and suggests how this problem can be tackled.

A. Prevalence

Many South Asian cities provide less than 10% of the people in their service areas with 24-hour piped supply. In contrast, most Southeast Asian cities provide 80% or more of the people in their service areas with 24-hour piped water supply, but often large proportions of their populations are not served. Neither of these situations is satisfactory. In South Asia, the prevalence of intermittent water supply is so high that most people regard it as normal and are therefore not greatly motivated to do anything about it. In Kathmandu, in the dry season, most people get water for about one hour every other day. In Indian cities, two or three hours of water a day is considered good. See Figure 4.2 in Chapter 4 for the prevalence of 24-hour supply in some Asian cities.

B. Causes

The primary cause of intermittent water supply is extending distribution systems beyond their hydraulic capacities to provide 24-hour service. This is usually done at the behest of elected officials. In Kathmandu, for example, they continue to add 5,000 new connections a year, despite an inadequate distribution system. Other causes of intermittent supply are a failure to meter completely and accurately and a failure to charge and collect on sufficiently high tariffs. It is often said that there is not enough water for 24-hour supply. This is not valid, because much of the water available is wasted. What is needed is demand management. One city where this practice has been successful is Malé, where people get about 34 l/c/d and have a 24-hour piped supply. What determines their consumption is a high tariff ($5/m^3) and strict metering, billing, and collection (see Malé case study in Appendix 2). NRW, in terms of leakage and illegal connections, contributes to intermittent water supply by lowering water pressure in the distribution system. One reason given for designing systems to provide water intermittently is the high cost of pumping for 20–24 hours. What is probably not understood is that pumping times are drastically reduced when balance storage is constructed and metering, billing, and collection controls are set. Very low tariffs add to problems related to excessive pumping, since utilities that lack funds struggle to meet O&M costs if there are long pumping hours.

One hour a day—no tap

Diverting supply to one location

Coping Costs of Intermittent Water Supply

Queuing for water

Underground storage

Rooftop storage

Buying bottled drinking water

Booster pumping

C. Consequences

Households with intermittent water supply must invest extra money in pumping, storing, and treating this resource. In Kathmandu, for example, as much as one half of an average power bill can be attributed to the operation of a pump. Consumers without access to a 24-hour supply tend to use more water than others. Because they are never certain when they will next be served, they throw away the surplus "old" water from yesterday to make way for "fresh" new water today. Intermittent supply causes anxiety, and generally one person from each residence has to devote time to ensuring that water is received when it comes. Valve operators can extract bribes from consumers who wish to ensure that they will receive adequate service. Sometimes females must venture out into the dark at 2:00 a.m. to retrieve water from standpipes, which can make them vulnerable to assault. No water from an intermittent water supply system is safe to drink, because under vacuum conditions foul water can be drawn into the pipes. Certainly hygiene education is important under these conditions, which put at risk people connected to an intermittent supply. Most meters do not register accurately under intermittent supply conditions, raising doubts as to the validity of metering at all. Constant valve manipulation increases the need for more frequent valve maintenance and replacement. Another consequence of intermittent supply is overexploitation of groundwater, particularly by industries (see the Kathmandu case study in Appendix 2). Last, the quantity of water to be made available over 24 hours has to be made available in fewer hours in an intermittent system, which requires distribution pipes with larger diameters. The findings of a conference on intermittent water supply held recently in Mumbai (India) are shown in Box 5.1.

Experience has shown that, once intermittent service becomes the norm, the hours of service continue to decline. The high costs of intermittent supply are paid by the utility, which incurs higher investment and operating costs; the customers, who pay to cope with unsatisfactory service and to protect themselves against unsafe water; and the population as a whole, as the risk of epidemics increases due to the consumption of contaminated water. (Yepes, et al, 2001)

Box 5.1 Intermittent Water Supply
(Mumbai Conference, January 2000)

Advantages *(perceived)*

- *Leakage of water is reduced.*
- *Available water is distributed equally.*
- *There is time for repairs and maintenance.*

Disadvantages

- *Systems do not operate as designed.*
- *Reservoir capacities are underutilized.*
- *There is frequent wear and tear on valves.*
- *More manpower is needed.*
- *Contaminated water requires consumer treatment or the use of bottled water.*
- *Higher doses of chlorine are needed.*
- *Oversizing of networks is needed to supply the necessary quantities in a shorter time.*
- *Inconvenient supply times mostly affect the poor.*
- *Consumers have to pay for storage and pumping.*
- *Water meters malfunction, which can lead to a loss of revenue and customer disputes.*
- *Accountability per subzone is not provided.*
- *In case of fire, immediate supply is unavailable.*

(Indian Water Works Association, 2000)

D. From Intermittent to 24-Hour Supply

To move from an intermittent to a 24-hour supply, it must be accepted that governance and tariffs are at the core of the problem, and those issues must be addressed first. Then it will be necessary to embark on extensive stakeholder awareness programs to convince people that 24-hour access to piped water in the home is possible for all. For this type of service to become standard, moratoriums must be imposed on new connections while distribution systems are

being hydraulically improved. This is best done by starting with 24-hour supply zones and gradually expanding these. Higher tariffs can be imposed on those with 24-hour supply, and the extra funds can be used to improve systems. When tariffs are sufficiently high, there will also be less water used in 24-hour zones, making more water available for use when these zones are extended. Twenty-four-hour zones must be 100% metered, and meters must be accurate (if they are found to be inaccurate, they must be replaced). District metering can be installed to pursue NRW goals, and full computerization of accounts in 24-hour zones should be accomplished. Illegal connections must be pursued in the field—this is a fundamental governance issue.

Intermittent Water Supply (Problems) in a Nutshell

- There is a high prevalence of intermittent supply in South Asia.
- Intermittent supply is caused by extending distribution networks beyond their hydraulic capacities, often at the behest of elected officials.
- Low tariffs and poor collection contribute to intermittent supply.
- Compared with 24-hour supply, intermittent supply uses more water.
- Intermittent supply leads to higher costs and greater inconvenience for consumers and utilities.
- When the supply is intermittent, consumers risk contracting diseases from using water that is not potable.
- Intermittent supply can lead to the exploitation of the poor (who often have to use bribes to get adequate service).
- Expectations of consumers (due to a lack of awareness) are low.

Intermittent Water Supply (Solutions) in a Nutshell

- Promote awareness among stakeholders.
- Address governance issues related to the autonomy of utilities.
- Introduce higher tariffs for 24-hour zones.
- Place moratoriums on new connections.
- Invest in hydraulic modification of distribution systems.
- Start with 24-hour zones, and then expand these.
- Enforce strict metering and collection.
- Reduce NRW.