

## Drinking Water, Sanitation, and Clean Living Conditions

### INTRODUCTION

5.1 Provision of clean drinking water, sanitation, and a clean environment are vital to improve the health of our people and to reduce incidence of diseases and deaths. Women and girls spend hours fetching water and that drudgery should be unnecessary. Drudgery is undesirable in itself and it also takes away other opportunities for self-development. Drinking water is less than 1% of the total water demand and should have the first priority among all uses of water.

5.2 Lack of covered toilets nearby imposes a severe hardship on women and girls. Also provision of clean drinking water without at the same time of provision for sanitation and clean environment would be less effective in improving health. The two should be treated together as complementary needs.

5.3 The status of provision of water and sanitation has improved slowly. According to Census 1991, 55.54% of the rural population had access to an improved water source. As on 1 April 2007, the Department of Drinking Water Supply's figures show that out of a total of 1507349 rural habitations in the country, 74.39% (1121366 habitations) are fully covered and 14.64% (220165 habitations) are partially covered. Further, present estimates shows that out of the 2.17 lakh water quality affected habitation as on 1.4.05, about 70000 habitations have since been addressed for providing safe

drinking water. Also, from the reported coverage, there are slippages in the prescribed supply level, reducing the per capita availability due to a variety of reasons.

5.4 Water supply in urban areas is also far from satisfactory. As on 31 March 2004, about 91% of the urban population has got access to water supply facilities. However, this access does not ensure adequacy and equitable distribution, and the per capita availability is not as per norms in many areas. Average access to drinking water is highest in class I towns (73%), followed by class II towns (63%), class III towns (61%), and other towns (58%). Poor people in slums and squatter settlements are generally deprived of these basic amenities. The population coverage in the past decades and as of March 2004 is as shown in Table 5.1 below:

5.5 The quantity of urban water supply is also poor. Water is supplied only for few hours of the day that

**TABLE 5.1**  
Percentage of Population Covered with Water Supply Facilities

Year	Urban Population (million)	Percentage of Population Covered with Water Supply
1981	152	78
1991	217	84
2001	285	89
2004	308 (projected)	91

leads to a lot of waste as taps are kept open and water is stored not all of which is used. This is so, despite the fact that per capita availability of water in cities like New Delhi exceeds that in Paris, where water is supplied round the clock.

5.6 The access to toilets is even poorer. As per the latest Census data (2001), only 36.4% of the total population has latrines within or attached to their houses. However in rural areas, only 21.9% of population has latrines within or attached to their houses. An estimate based on the number of individual household toilets constructed under the TSC programme (a demand-driven programme implemented since 1999) puts the sanitation coverage in the country at about 49% (as on November 2007). An evaluation study on the programme conducted in 2002 shows 80% of toilets constructed were put to use. This use is expected to be much higher as awareness has improved much since 2002.

5.7 63% of the urban population has got access to sewerage and sanitation facilities (47% from sewer and 53% from low cost sanitation) as on 31.3.2004. As a consequence, open defecation is prevalent widely in rural areas but also significantly in urban areas too.

5.8 We look at the Eleventh Plan approach to deal with the problems of rural water supply, urban supply, rural sanitation, and urban sanitation.

## RURAL WATER SUPPLY

### PAST PROGRAMMES AND OUTLAYS

5.9 The GoI's major intervention in water sector started in 1972–73 through Accelerated Rural Water Supply Programme (ARWSP) for assisting States/UTs to accelerate the coverage of drinking water supply. In 1986, the entire programme was given a mission approach with the launch of the Technology Mission on Drinking Water and Related Water Management. This Technology Mission was later renamed as Rajiv Gandhi National Drinking Water Mission (RGNDWM) in 1991–92. In 1999, Department of Drinking Water Supply (DDWS) was formed under the MoRD to give emphasis to rural water supply as well as on sanitation. In the same year, new initiatives in water sector had been

initiated through Sector Reform Project, later it was scaled up as *Swajaldhara* in 2002. With sustained interventions, DDWS remains an important institution to support the States/UTs in serving the rural population with water and sanitation related services all across India.

5.10 An investment of about Rs 72600 crore has been made (under both State and Central Plans) from the beginning of the planned era of development in rural water supply sector. As per available information, this investment has helped to create assets of over 41.55 lakh hand pumps, around 15.77 lakh public stand posts, around 1.60 lakh mini-piped water supply schemes, and 45000 multi village schemes in the country under the Rural Water Supply Programme. Of these systems, 88.21% hand pumps, 93.49% stand posts, 91.95% mini schemes, and 96.26% multi village schemes are reported functional by the States. During the Tenth Plan, the approved outlay for the programme was Rs 13245 crore. The programme was well funded during the Tenth Plan (being a part of Bharat Nirman Programme) and by the end of March 2007, an amount of Rs 16,103 crore was released to the States under the scheme. On the physical achievement side, 352992 habitations have been reported covered by the States during Tenth Plan.

5.11 The *Swajaldhara* programme was launched in 2002–03. The programme involves a community contribution of 10% of the project cost to instil a sense of ownership among the people and also to take over the Operation and Maintenance (O&M) of the schemes constructed under the programme. The Centre provides 90% of the project cost as grant. Under the *Swajaldhara* programme, out of the 19385 schemes included under the programme with an estimated cost of Rs 1069 crore, only 11046 schemes could be completed in the Tenth Plan with an expenditure of Rs 610 crore. The monitorable target of covering all habitations in the Tenth Plan, which was aimed to be achieved in 2004, could not be achieved. During the Eleventh Plan, the *Swajaldhara* principles are to be adopted by the State Governments as per local conditions and adequate flexibility has been provided to incorporate such principles under the ongoing ARWSP itself.

**MAJOR ISSUES IN RURAL WATER SUPPLY**

5.12 The main problems are of sustainability of water availability and supply, poor water quality, centralized versus decentralized approaches, and financing of O&M costs.

**Sustainability**

5.13 Habitations that are covered in the earlier years slip back to not covered or partially covered status due to reasons such as sources going dry or lowering of groundwater, sources which are quality affected, systems working below their capacity due to poor O&M, and normal depreciation. Increasing population leading to emergence of new habitations also increase the number of unserved habitation.

5.14 Sustainability of the Rural Water Supply Programme has emerged as a major issue and the Eleventh Plan aims at arresting the slip backs. The rate of habitation slippages from fully covered to partially covered and partially covered to not covered is increasing. In addition to this the increase in the number of quality-affected habitations that are dependent on ground water source is adding to these slippages. This can be gauged from the fact that there are about 6.83 lakh partially covered and not covered habitations as per the 2003 survey. The Mid-Term Appraisal of the Tenth Plan observed that over-reliance on groundwater for rural water supply programme has resulted in the twin problem of sustainability and water quality and suggested a shift to surface water sources for tackling

this issue. Restoration of tanks can provide a local solution (see Box 5.1). It is important to apply the principle of subsidiarity to collect water, store water, use water, and manage waste water as close to the source as possible.

**Water Quality**

5.15 There are about 2.17 lakh quality-affected habitations in the country with more than half of the habitations affected with excess iron (118088). This is followed by fluoride (31306), salinity (23495), nitrate (13958), arsenic (5029) in that order. There are about 25000 habitations affected with multiple problems. About 66 million population is at risk due to excess fluoride in 200 districts of 17 States. Arsenic contamination is widespread in West Bengal and it is now seen in Bihar, eastern UP, and Assam. The hand pump attached de-fluoridation and iron removal plants have failed due to inappropriate technology unsuited to community perceptions and their involvement. Desalination plants have also met a similar fate due to lapses at various levels starting with planning to post implementation maintenance.

5.16 The Bharat Nirman Programme aims at addressing water quality problems in all the quality-affected habitations by 2009. It has given a sign of hope for addressing the issue. While higher allocation (20% of ARWSP funds committed for water quality) of funds is addressed, the next important step is to achieve convergence, ensure community participation, and an

**Box 5.1****Success Stories in Sustainability—Ooranis—The Lifelines of Rural Tamil Nadu**

For the people of Tamil Nadu the traditional ooranis or ponds have truly proved to be a blessing. The ooranis were developed as the main supply systems in Tamil Nadu centuries back. These earthen bunded ponds were constructed by the collective efforts of the people over the ages and have been designed hydrologically to have adequate and assured inflow of surface runoffs. Almost all ooranis are well connected with irrigation tanks called Kanmoi.

In recent years however the ooranis were neglected and dilapidated due to implementation of new water supply facilities such as handpumps, deep borewell, and Combined Water Supply Schemes. Initiatives were taken therefore to improve and strengthen them under the Ministry of Rural Development's RGNDWM, *Pradhan Mantri Grameen Yojana*, ARWSP programmes. These included measures like desilting the pond, treatment of catchment areas, clearing of the supply channel, provision of filter media, and providing draw well arrangements and fencing of the oorani. 360 ooranis have been rejuvenated in several districts with the combined efforts of the government, the community, technical expertise from the Anna University, and NGO participation. Water shortages have now become a thing of the past in these areas, and with the harvested rainwater flowing into the ooranis, a sustainable water supply system has thus become a reality.

IEC campaign. Convergence would offer twin benefits, that is, sustain the source (also provide alternative surface source) and dilute the groundwater chemical contamination.

### Decentralization

5.17 Whenever the community has been involved from planning stage, the programme has always become sustainable. While our programmes have elaborate guidelines for community involvement, it is obvious that field-level adoption is far from satisfactory. The 73rd and 74th constitutional amendments have devolved the water supply responsibility to PRIs/local bodies. Due to their inherent weaknesses like funding constraints, low technical ability, etc. the devolution of power is yet to make a desirable impact on the ground. While sporadic success stories are trickling in, this concept has yet to go a long way. States have to play an important role in placing the Twelfth Finance Commission (TFC) grants devolved to Panchayats and placing the implementation agency at the command of local bodies. The second is simply absent in many States.

### Financing of the Capital Cost and O&M (Rural Water Supply Programme)

5.18 States have been expressing constraints in providing adequate matching share for availing ARWSP funds. The DDWS has suggested that funding pattern of the programme should change from the current 50:50 (Centre:State) to 75:25 for Non Special Category States and 90:10 for Special Category States.

5.19 The Bharat Nirman Programme has nearly doubled the funds available for the sector through the ARWSP. The Centre is also encouraging external assistance for this sector. The average cost of coverage of not covered, slipped back, and quality-affected habitations have gone up considerably.

5.20 The TFC has provided enough funds for the O&M of the water supply systems in rural areas. Also the rural community is not averse to paying charges for a reliable supply. Convergence of various programmes would also bring additional funds. While the funding for the programme would be provided for through various sources, what is more important

for the success of the programme is the change in the approach (community-based local solutions) and mindset (moving away from the pure asset creation towards service delivery approach).

### ELEVENTH FIVE YEAR PLAN TARGETS FOR RURAL WATER SUPPLY

#### The Targets

5.21 To 'provide clean drinking water for all by 2009 and ensure that there are no slip-backs by the end of the Eleventh Plan' is one of the monitorable targets of the Eleventh Five Year Plan. The first part of the goal coincides with the terminal year of Bharat Nirman Programme under which it is proposed to provide safe drinking water to all habitations. Under the Bharat Nirman Programme 55067 not covered habitations, 2.8 lakh slipped back habitations, and 2.17 lakh quality-affected habitations are proposed to be covered. The first two years of the Eleventh Plan forms the second-half period of the Bharat Nirman Programme. While the coverage reported by the States under not covered and slipped back habitations are encouraging, the coverage under water quality-affected habitations is far from satisfactory. This would be one of the major challenges during the Eleventh Plan. The States have done well in covering the slipped back habitations (1.63 lakh habitations covered) and not covered habitations (23000 habitations covered). However, achievement in the quality-affected habitations is way below the target. Against 2.17 lakh habitations, as on 1.4.05, about 70000 habitations have since been addressed. The States find it difficult to establish alternate sources of water supply to the quality-affected habitations, as either the source is very far off or simply not available, nearby.

5.22 The government is also committed to provide 100% coverage of water supply to rural schools. The ARWSP includes school water supply also. The DDWS has estimated that by April 2005, there are 2.31 lakh uncovered rural schools in the country, which needs to be covered with water supply. While the ARWSP has provision of water supply to existing schools, the new schools are covered under other programmes like *Sarva* SSA of the MHRD. The funds required to cover the schools at the rate of Rs 40000

per school works out to Rs 924 crore. The coverage of schools could be best achieved by convergence of various programmes of the Department of the Elementary Education and Literacy and the Department of Women and Child Development.

### The Way Forward

5.23 The problems of sustainability of water availability, maintenance of supply system, and dealing with the issue of water quality are the major challenges in the Eleventh Five Year Plan. The conjunctive use of groundwater, surface water, and rooftop rainwater harvesting systems will be required to be encouraged as the means of improving sustainability and drinking water security. While convergence of various programmes for funds and physical sustenance is most important, States should put in place an effective coordinating mechanism for attaining success. Otherwise the vicious cycle of coverage and slip back would continue in the next plan also. The Eleventh Five Year Plan proposes to deal with the various issues as follows:

5.24 The TFC awards for maintaining the water supply systems by local bodies must be implemented and schemes transferred to Panchayats. State can share a part of the O&M cost of such Panchayat as a hand-holding support for first few years before the local bodies become self-sustainable. To enable local bodies, an effective MIS for knowing the status of water supply in every habitation in the State should be put in place and every State should earmark funds for this purpose. All the States' information systems should be connected to the all-India server at Delhi and this MIS should be web-enabled for moving to the larger objective of public monitoring. Also adequate training at local bodies' level should be undertaken for enhancing their technical capacities for maintaining the water supply systems. The implementing agencies must be made accountable to the local bodies for providing water supply services. However major engineering schemes can continue to be with the State-level agencies.

### Local Participation and Convergence

5.25 In order to universalize access to safe drinking water, it needs to be isolated from agriculture and other uses wherever possible. To prevent lowering of water

tables due to excessive extraction, cooperation with agricultural users becomes necessary. A cooperative mechanism of water users and Panchayat representatives has to regulate use within average annual recharge level. All groundwater-based resources should be provided with a recharge structure that would help keep the source alive. Also rainwater harvesting in schools and community buildings should be made compulsory and individual household rooftop rainwater harvesting system like individual household toilets should be promoted, if necessary, special funds should be earmarked for this purpose.

5.26 Where groundwater quality and availability is unsatisfactory, surface water sources need to be developed. Restoration and building of tanks and other water bodies along with rainwater harvesting structures for recharge and for direct collection at community and household levels constitute an attractive option. The Central Government should support the States for tapping the maximum external assistance for this purpose, a part of the assistance could be shared by the Centre as decided in the case of the external assisted Water Bodies Restoration programme (WBRP) wherein 25% grant of the project cost is passed on to the States. The assistance here could be restricted to covering the quality-affected habitations in various States.

5.27 Another alternative is to bunch the habitations into large numbers and involve the technically sound private service providers to cover the quality-affected habitations on an annuity basis for a certain period. Meanwhile parallel efforts to restore the source through water augmentation programme should continue in these habitations as an alternative arrangement, provided such systems are proposed by and have the consent of the PRIs and local bodies.

5.28 Involvement of the community in the monitoring of the water supply works should be made a primary condition for release of funds for completed work. The DDWS has initiated monitoring of the water quality under the National Rural Drinking Water Quality Monitoring and Surveillance Programme (NRDWQMSP) under which the Gram Panchayat/Village Water and Sanitation Committee provided

with user-friendly field test kits for testing both bacteriological and chemical contaminants followed by testing of the samples at district- and State-level laboratories. Such initiatives need to be extended to the other regular programmes under the ARWSP also. Involving the community in bringing quality and sustainability to the village-level drinking water supply systems should be encouraged, rewarded, and recognized in an appropriate manner along the lines of the *Nirmal Gram Puraskar* that has galvanized communities and local bodies for an enthusiastic and effective response to the TSC of the GoI.

5.29 While our programme guidelines do recognize the role of women in planning and post implementation maintenance with some success stories of women maintaining the hand pumps and tube wells, the success has to spread far and wide. Of late, the country is realizing the potential of women in the form of SHGs. Women SHGs are functioning well in States such as Tamil Nadu and Gujarat. Women SHGs also should be given the responsibility for collection of maintenance funds after the source is handed over to them for maintenance. Women SHGs should be encouraged for taking up the O&M of the existing functional systems. If the source is dysfunctional, the State should incur one-time expenditure to set it right and encourage SHG to take them over.

5.30 The resources required could be easily mobilized if the various programmes can be converged to work in complementary ways.

5.31 The National Rural Employment Guarantee Programme has seven identified work component related to water. The Rural Development Ministry is implementing major watershed schemes through the Department of Land Resources. There are other programmes such as Backward Region Grant Fund, artificial recharge of groundwater schemes and rain water harvesting, restoration of water bodies scheme (both pilot and external assisted) by the Ministry of Water Resources, the National Project for Renovation of Water Bodies and schemes such as the National Afforestation Programme, River Valley Project, Flood Prone River Programme, Integrated

Wasteland Development Programme, Grants under TFC, *Hariyali*, and the States' own schemes. Convergence of these programmes should help to augment funds and bring institutions together for sustainable water supply.

## URBAN WATER SUPPLY

### PAST PROGRAMMES AND OUTLAYS

5.32 The coverage of urban population with water supply facilities in the past had not been very impressive, due to various reasons, including the fact that the investment made in the urban water supply sector had been inadequate. The Tenth Plan projected a requirement of Rs 28240 crore for achieving population coverage of 100% with drinking water supply facilities in the 300 Class I cities by 31.3.2007. The estimated outlay for the Tenth Plan period, however, was only Rs 18749 crore in the State sector, and Rs 900 crore in Central sector making a total outlay of Rs 19649 crore only.

5.33 The Tenth Five Year Plan envisaged augmentation of water supply in urban areas to reach the prescribed norms, higher degree of reliability, assurance of water quality, a high standard of operation and management, accountability to customers, and, in particular, special arrangements to meet the needs of the urban poor, and levy and recovery of user charges to finance the maintenance functions as well as facilitate further investment in the sector. The achievement of these tasks depends to a large extent on the willingness of the State Governments and urban local bodies to restructure water supply organizations, levy reasonable water rates, take up reforms in billing, accounting, and collection, and become creditworthy in order to have access to market funding. Measures were suggested for water conservation, reuse, and recycling of waste water.

5.34 While there were progress in some of the suggestions of Tenth Five Year Plan like adoption of the rain-water harvesting, tariff revision for sustaining O&M, augmenting the water supply, reducing the leakages, etc. This progress is, however, confined to some pockets of the country. Thus, for example, the southern metropolitan water supply and sanitation service

providing institutions of Chennai and Bangalore are meeting their O&M expenditure from the revenue generated from water tariff. The capital city of Delhi's service provider Delhi Jal Board is performing far below the desirable levels both in terms of service provision, persistence of large amount of unpaid and unaccounted for water (UFW) as well as in tariff realization.

5.35 However the Tenth Five Year Plan has triggered the realization that institutions have to be self-sustaining and efficient service is the key to realize that. The lesson to be learnt is in today's scenario, in urban areas, people are willing to pay for the services, provided they are reliable both in quantity as well as in quality. The experience of Bangalore is reflected in Box 5.2 below.

**Box 5.2**  
**Urban Slum Water Supply**

The Social Development Unit of Bangalore Water Supply and Sewerage Board (BMWSSB) under the AusAID Master Plan project has helped to cover 10000 households with water supply in 43 Bangalore slums. This was made possible by reducing the connection fee, tariff, and effecting changes in the proof of residency. This way the illegal water connections were connected to revenue earning ones. All these connections were metered and with individual connections, dependence on public stand posts reduced. BMWSSB then cut down the wastages also. The most significant part was the assessing the willingness and capacity to pay by slum dwellers and the tariff made acceptable to the community by ensuring reliable service.

5.36 To extend financial support to the State Government/local bodies and to provide water supply facilities in towns having population less than 20000 (as per 1991 census), the centrally sponsored Accelerated Urban Water Supply Programme (AUWSP) was launched in March 1994. These towns are often neglected during normal times and are worst hit during the period of drought.

5.37 So far, water supply schemes for 1244 towns have been sanctioned at a cost of Rs 1822.38 crore

under AUWSP since its inception from 1993–94 and 639 schemes have been completed/commissioned. Since 2005–06, no schemes are being sanctioned under the programme since scheme has been merged with the Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT). An amount of Rs 828.60 crore (till September 2006) was released to the States and they have reported incurring an expenditure of Rs 805.83 crore and the total expenditure reported is Rs 1412.88 crore.

5.38 An evaluation study carried out in 62 towns in 24 States has shown that the programme has resulted in water supply augmentation and improved health outcomes but indicated the need for some design flexibility and institutional strengthening of local bodies for managing the completed schemes.

## MAJOR ISSUES IN URBAN WATER SUPPLY

### Sustainability and Equity

5.39 Sustainability in the urban water supply is addressed mainly through supply side augmentation. Distant perennial sources are identified and long distance piped water transfer to the cities and towns are common. Augmentation plans are generally gigantic and engineering-oriented and has greater acceptability at all levels. The demand management is the least preferred option. However when it comes to payment of water charges, the decision is invariably with the elected government and not with the executing agency, which has to depend on the grants for O&M, for sustaining the quantity and quality.

5.40 It is not uncommon that pockets of urban areas would get higher service levels both in terms of number of hours of water availability as well as per capita availability. The UFW due to leaking water supply systems and illegal tapping reduces water availability. The average water loss in the leaking water supply systems varies from place to place and it is generally between 20–50%. Dedicated efforts to plug the leakages are required in addition to demand management measures for achieving the sustainability and equity.

5.41 Long distance water transfer has brought in the attendant issues of dependence on other States for urban water supply. For example, Delhi depends on Haryana and UP for its water supply. Chennai gets 15 TMC of Krishna River Water from Andhra Pradesh. Bangalore water supply is fully dependent on Cauvery waters. There are a few instances when even within the State people object to transfer of water from one district to another. Some times, these issues have a serious implication on the sustainability of supplies to the cities.

### Demand and Supply Management

5.42 There is a huge gap between the demand and supply of water in urban areas, which is also growing due to population and urbanization. Norms for various places depending upon the level of development have been established and it is maximum for metropolitan cities. The regular Plan programmes by the States are heavily tilted in favour of supply side management. Recycling and reuse of water, reducing the water demand through rainwater harvesting, using water-efficient household equipment, including flushing cisterns would go a long way in conserving water and reducing demand. Proper metering of water and

rational tariff would reduce water demand and encourage conservation. We need to have a concept of water-efficient homes in urban areas and for this there is a need to have a well-orchestrated information campaign. Long distance piped water transfer and desalination of water in coastal areas as augmentation measures are very capital-intensive. Demand management is necessary to achieve sustainability. An integrated water supply and use strategy such as used in Singapore (see Box 5.3) should be encouraged.

### Financing and Institutional Issues

5.43 Provision of water supply in urban areas is basically a responsibility of urban local bodies. The PPP efforts to attract financing of water supply projects are finding its place, though so far only in few cases (see Box 5.4). PPP is important to leverage government investments and to access private sector management efficiencies. Reforms are a necessary precondition for gaining success through PPP. It is paradoxical that urban utilities receive funds from institutions such as HUDCO, LIC, government, etc. without any reform conditionalities but on the other hand, States are given additional financial support towards implementing reforms through schemes like JNNURM.

#### Box 5.3 Public Utilities Board (PUB) Singapore

PUB is the National Water Agency in Singapore charged with water, wastewater, and storm water management in the city state. The public agency services about 4.5 million people and a number of major industries with intensive water use. The development and implementation of the complete management system is ongoing but has taken over a period of about 40 years. PUB's holistic approach has resulted in a lower dependence on external water sources by diversification of water sources including water reuse, desalination, storm water storage in new water storages, and supply of very high-quality recycled water to industry with some internal reuse of this supply. Singapore presents a challenging environment for water resources management, as it is a small but densely populated island city state. In its own operations PUB has significantly reduced water losses due to leakage in pipes and inaccurate meters. It has 100% servicing of its population with water and waste water services and strong political and public acceptance of its policies and services. It has been accompanied by a major change in water pricing and access policy, which aims to use the rate structure to encourage the more efficient use of water. PUB has been able to provide lowered costs of delivered water of improved higher quality to industry and the community. Reclaimed water branded *NEWater* in Singapore is recognized for its high quality. Singapore has also been able to maintain low water costs for households on the lowest tariff water supply despite the major capital investments in new equipment and systems. Its household directed campaign of 'Water-efficient homes' helps residents to save water at home and reduce their water bills. Through an extensive partnering programme with the water industry in all aspects of implementation it has been a model of outsourcing skills. From this it has developed an industry capable of transferring this knowledge and skills to the region as well as attracting a broad range of industry skills and capabilities as well as research in Singapore. The PUB story would fit well as a study example in the education of water managers. PUB has won the prestigious 2007 Stockholm Industry Water Award.

PUB website: [www.pub.gov.sg](http://www.pub.gov.sg)



**Box 5.4**  
**PPP in Urban Water Supply**

Tamil Nadu has emerged as forerunner in attracting PPP in urban water supply sector. At 42%, it is a highly urbanized State in the country. The State has already commissioned the 'Tirupur Water Supply and Sewerage project' at a cost of Rs 1023 crore. The cost per kilo litre of water at estimate stage is Rs 30, which is high due to recovery of the sewerage capital cost, operating expenses, and capital cost. The next project on PPP is 100 million litres per day (MLD) desalination project for Chennai Water Supply.

5.44 The large number of institutional issues in water supply sector discussed during the formulation of the Tenth Plan are still valid. The rationale of financing water supply schemes fully or partly as grant, inability of the urban local bodies (ULBs) to raise funds due to low tariff recovery, their weak financial position preventing any augmentation efforts, tossing around the responsibility of water supply from the State level utility to local bodies/Panchayats with large liabilities, etc. are continuing.

5.45 Despite the large grants by TFC for local bodies to maintain the water supply systems, things have yet to improve a lot on the ground. Overlapping of responsibilities between various institutions like ULBs, State-level agencies, and departments dilutes the accountability and responsibility to the customers.

#### Tariff and O&M

5.46 Evolving realistic water tariff so as to discourage excessive use of treated/potable water is one of the important management tools for demand management. Not much has been done on this important aspect in many urban local bodies in the country except a few larger cities that have undertaken some measures by way of installing water meters for consumers. The major reason for slow progress in this regard is that good quality meters are not available on a large scale since the meter manufacturing facility is vested with small-scale industries at present, which do not have the capacity to produce meters on a large scale.

5.47 Poor O&M due to inadequate financial resources is one of the primary reasons for low sustainability

and equity in water supply. The responsibility of operation, maintenance, and revenue collection is generally vested with the elected ULB, while the specialized bodies are not able to raise the water tariff without the approval of the provincial governments. The local bodies generally receive grant assistance ranging from 10% to 60% for capital works on water supply and sanitation from the State Government. Usually, they do not receive any grant assistance for O&M of water supply and sewerage. Municipal bodies in many parts of the country suffer from inadequate resources. Assessment of demand and 'willingness to pay' by the communities would help to arrive at a basis for pricing water management services and to clarify the scope for adopting 'full cost recovery' policies to achieve financial sustainability.

#### ELEVENTH FIVE YEAR PLAN PROGRAMMES FOR URBAN WATER SUPPLY

5.48 With a view to provide 100% water supply accessibility to the entire urban population by the end of the Eleventh Plan in 2012, it has been estimated that Rs 53666 crore is required. With a view to provide reform-linked infrastructure facilities in the urban areas, the GoI has launched the two new programmes namely—

- (i) JNNURM covering 63 cities with population above one million as per 2001 census, including 35 metro cities and other State capitals and culturally important towns.
- (ii) UIDSSMT for the remaining 5098 towns having population less than one million to cover all the towns as per 2001 census, irrespective of the population criteria.

5.49 JNNURM is envisaged for implementation over a seven-year period starting from 2005 to 2012 with a tentative outlay of Rs 100000 crore, which includes contribution of Rs 50000 crore to be made by the States and ULBs. Water supply and sanitation is accorded priority under the programme and is likely to receive 40% of plan funds. It is important to tap the other sources like higher Central and State sector outlays, institutional financing, PPP, and external assistance.

5.50 Sea water desalination has emerged as an alternative option for water supply augmentation in coastal areas. Many research institutes have embarked upon this programme for producing cheap water from the abundant source. While the Chennai Desalination Plan of 100 million litres per day (MLD) is large version being tried with PPP mode by the Government of Tamil Nadu, Central institutes such as Bhabha Atomic Research Centre (BARC) and National Institute of Ocean Technology (NIOT) have already established desalination plants at various places (see Box 5.5). The research needs to be advanced to bring down the cost of water produced from such systems.

#### THE WAY FORWARD

5.51 The Eleventh Five Year Plan will address the issues faced by the sector and strive to achieve the goal of universal water supply coverage and sustainability as follows:

#### Priority for Drinking Water

- While designing and constructing multipurpose dams/reservoirs, adequate care would be taken to reserve/apportion sufficient quantity of water for domestic use in the urban areas. Keeping in view the National Water Policy, topmost priority would be given by the State Governments to the drinking water supply needs of cities and towns from the available water sources. This needs to be operationalized by all States in the form of State Water Policy as desired in National Water Policy, 2002.
- Under JNNURM and UIDSSMT programmes, special attention will be given to towns and cities

affected by surface and groundwater contamination due to the presence of chemicals such as iron, manganese, fluoride, salinity, arsenic, pesticides, etc. in excess of the prescribed limits. Such drought-prone and water shortage areas as well as the cities and towns having water quality problems would be given top priority in the selection process by State Governments/ULBs.

#### Maintenance of Assets

- Adequate thrust may be given to the O&M of the assets created for their optimal and efficient use by evolving suitable strategy and creating adequate infrastructure facilities within State departments/concerned ULBs.
- Computerized MIS is a must for developing a strong data base at local, State, and Central levels on Urban Water Supply and Sanitation sector for decision making, planning, and mid-course corrections from time to time. In most States, elaborate computerized MIS is not in place. It is recommended that MIS cells may be created with central funding at State and Central levels for exchanging information and to develop good data base for the sector.

#### Metering of Water for Volumetric Change

- Telescopic water tariff/user charges should be formulated and levied to discourage excessive use of water while providing a basic quantity of water at a low tariff. Metering of water supplies should be made mandatory in a phased manner with a view to conserve water as well as to generate revenue on a realistic basis.

#### Box 5.5

#### Sea Water Desalination Initiative by National Institute of Ocean Technology (NIOT), Chennai, Pure Water at Six Paise per Litre

The NIOT, Chennai, has succeeded in putting together and operating a desalination system with a capacity of 1 million litres a day. The quality of water is tested and found above international standards. For instance, the total dissolved solids was found to be less than 10 parts per million (PPM) as against international standard of 500 ppm. The system that works on the principle of flash evaporation works on mounted barge off shore, drawing water from sea at different levels to accomplish the task. The technology involved was turning surface sea water into vapour in a vacuum chamber and then condensing the vapour using the cold water drawn from the sea itself from a depth of 600 m. For transporting the one million litre water from offshore barge to the shore, specially designed water bags of special material were made that could hold and carry 2 lakh litres and could be towed to shore using small fishing boats. The NIOT would now focus on desalination plant with 10 MLD with the help of private sector. The water costs 6 paise per litre. The NIOT has already installed one lakh litre desalination plant at Lakshadweep Island during 2006.

- The ULBs need to be given greater autonomy in respect of fixing tax rates, user charges, etc. and also ensure regular revision of such rates. The 74th constitutional amendment needs to be implemented in its entirety. There is a need for regulatory regime in water supply and sanitation sector to enthuse confidence among the private players.

#### Reducing Waste and Promoting Conservation

- Intensive leak detection and rectification programme should receive priority. Severe penalties should be levied on those found responsible for leakage and wastage of water. ULBs may be asked to enact necessary changes in the municipal Acts.
- To reduce wastage of water, adoption of low volume flushing cisterns, waste not taps, etc. should be adopted so as to minimize the need for fresh water. Ministry of Urban Development/Town and Country Planning Organization (TCPO) may take up the matter with the States and ULBs to promote usage of such cisterns so as to conserve fresh water. Central Public Works Department may also widely use such cisterns in the buildings constructed by them.

#### Augmenting Availability

- It must be made mandatory to install rainwater harvesting systems in both public and private buildings including industrial and commercial establishments so as to conserve water. The ULBs should make it a point not to approve building plans having no provision for such systems. It is also equally important to ensure proper implementation of the approved system by the builders.
- The State Governments and ULBs may implement schemes for artificial recharge of ground water as per techniques developed by the Central Ground Water Board.

#### Water Quality

- Water quality surveillance and monitoring should be given top most priority by the State Governments/ULBs so as to ensure prevention and control of water-borne diseases. For this purpose, water quality testing laboratories have to be set up in every city and town backed by qualified personnel to handle such laboratories and where

such labs already exist, they should be strengthened with equipment, chemicals, manpower, etc., if necessary.

#### Finance

- Efforts should be made to step up the quantum of funds through institutional financing, foreign direct investment, assistance from bilateral, multi-lateral agencies, newly launched Pooled Finance Development Scheme, tax-free municipal bonds, Member of Parliament Local Area Development (MPLAD) funds, etc. apart from involving private entrepreneurs.

#### Human Resources

- Trained technical human resources are a must for successful implementation and maintenance of various water supply and sanitation schemes. However, in some States as well on in many ULBs the water utilities do not have adequate trained technical personnel, due to which the sector is affected badly. Under the circumstances, the Public Health Engineering (PHE) training programme of the Ministry of Urban Development has to be toned up further with adequate funds to enable Central Public Health and Environmental Engineering Organization (CPHEEO) to impart training to the various technical personnel of the State Governments/ULBs on a variety of technical subjects and management aspects.

#### RURAL SANITATION

5.52 Sanitation is to be seen as a basic need, as basic as drinking water or food. A sanitary toilet, within or near home, provides privacy and dignity to women. Mahatma Gandhi emphasized the link between sanitation and health as a key goal for our society.

5.53 Sanitation coverage, which ought to be a way of life to safeguard health, is inadequate in our country. In fact, problems like open defecation continue to remain the only form of sanitation for the majority of the population in rural areas. The practice of open defecation in India is due to a combination of factors—the most prominent of them being the traditional behavioural pattern and lack of awareness of the people about the associated health hazards.

5.54 Recognizing the link between healthy environment and sanitation, the MDGs stipulate, inter alia, halving, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation. The TSC programme, the flagship programme of the government, has set an ambitious target beyond the MDGs and aims to achieve universal sanitation coverage in the country by the end of the Eleventh Plan.

#### PERFORMANCE REVIEW OF RURAL SANITATION SECTOR—TSC IN TENTH PLAN

5.55 The TSC is being implemented in 578 districts of 30 States/UTs with support from the Central Government and the respective State/UT governments. Against a target of 10.85 crore individual household toilets, the toilets reported completed is about 2.89 crore up to January 2007. In addition, about 3.12 lakh school toilets, 8900 sanitary complex for women, and 99150 *balwadi* toilets have been constructed. The approved outlay for the programme in the Tenth Plan was Rs 955 crore and the anticipated financial utilization is about Rs 2000 crore. The Eleventh Five Year Plan targets to complete 7.29 crore individual toilets for achieving universal sanitation coverage in rural areas.

#### MAJOR ISSUES IN RURAL SANITATION COVERAGE

5.56 Though the current programme emphasis on construction of household toilets is laudable, it needs to reorient itself to a vigorous Information and Education Campaign mode to bring about a change in mindset. The evaluation study of the programme has shown that 20% of the toilets are not used or used for other purposes like storage. The superstructure for the toilet, the one that guarantees privacy and dignity, was provided funds under the programme starting only in March 2006.

5.57 The issue of convergence of the programme with health awareness received a boost only after the launch of the NRHM. While it was introduced earlier at school level, at the community level it was expanded later. However, the school programme had a cascading effect on the individual household and children helped to change attitudes. The

awareness is now picking up and the programme needs to capitalize on this for increasing the sanitation coverage. Lack of priority for the programme by many States leading to inadequate provision of funds for the State share for the TSC, lack of emphasis on personal communication on sanitation at the village level, and inadequate capacity building at the grassroot level are some of the common issues seen across the States that hinder expansion of sanitation coverage.

#### ELEVENTH PLAN PRIORITIES

5.58 While the hardware part of the programme for assisting the States in providing the various types of sanitation would continue, the focus now should be more on changing behaviour patterns. The Nirmal Gram Puraskar (described later) has brought a sea change in the attitudes of the community and it is promoting a healthy competition among the Panchayats for achieving total sanitation. Low-cost technology options for constructing the toilets should be tried and community should be given freedom to choose the various options. The focus on school sanitation needs to continue. In addition, SWM in villages should be the next focus area. Ten per cent of the TSC funds are earmarked for this purpose already. Adequate funding for the programme would have to be provided so that the momentum generated is not lost.

#### IEC AND NIRMAL GRAM PURASKAR (NGP)—SUCCESS STORIES

5.59 To add vigour to the TSC, in June 2003, the GoI initiated an incentive scheme for fully sanitized and open defecation free Gram Panchayats, blocks, and districts called the NGP. The incentive pattern is based on population criteria. The NGP is given to the following:

- Gram Panchayats, blocks, and districts that achieve 100% sanitation coverage in terms of 100% sanitation coverage of individual households, 100% school sanitation coverage, making the village, block, district free from open defecation and with clean environment.
- Organizations that have been the driving force for effecting full sanitation coverage in the respective geographical area.

5.60 The incentive scheme has caught on like wild fire and the number of Panchayats who have received this Puraskar is steadily going up. From a mere 40 village/block panchayats from six States that received the award in 2005, in the year 2007, the number of awardees have gone up to 4959 from 22 States. Maharashtra, which got 13 awards in 2005, received 1974 awards in 2007—a significant achievement—followed by Gujarat with 576 awards. Box 5.6 highlights the efforts of Suravadi Panchayat in this area.

#### Beyond Nirmal Gram—Monitoring for Sustainability

5.61 Once the village, block, or district Panchayat has received the Puraskar, there is a responsibility thrust on them, to maintain the Nirmal Gram status. The sustainability features mentioned in the Maharashtra success story on sanitation are worth emulating. Specially, community involvement with women and children would sustain the Nirmal Gram status. Such

grams have to move now to the next stage of sustained SWM and proper street drainages.

#### 5.62 The Way Forward

- Open defecation-free status is the basic objective of the programme. The sanitation campaign should focus on creating awareness about the importance of sanitation among people with special emphasis on children. Awareness can spread rapidly from children to parents to community, which will create demand for sanitation. The software component of the programme like IEC, NGP will receive more priority.
- Once individual or community toilets are provided demand for water would increase.
- Rural sanitation has to be promoted on low water, low-cost, and eco-sanitation models without causing further stress on water resources. Such systems will be actively promoted, encouraged, incentivized, and rewarded.

#### **Box 5.6** **How Suravadi Panchayat in Phaltan Block in Satara District of Maharashtra won the Nirmal Gram Puraskar (NGP)**

This Panchayat that has a population of 2891 people has 412 households out of which 112 are BPL households. The Panchayat has a village primary school, an anganwadi centre, and a Primary Health Centre five km away. There was no community toilet facility in the village. Men, women, and children used to defecate in the open. Out of 47 individual toilets 34 were not in use (used only for other purposes). Village was always highly stinking, no drainage, many ill with diseases like jaundice, flu, cholera, etc. Several village meetings were held for stoppage of open defecation. It looked like a Herculean task in the beginning, as people were not coming forward for construction of toilets.

Things began to change when Sant Gadge Baba Gram Swachhata Abhiyan started in year 2000 and motivational campaign and meetings were organized by Panchayat. The school teachers and students were involved in this campaign. Sanitation campaign started with making a 28-seater complex and few individual units. Persons still going for open defecation were penalized with no distribution of wheat and kerosene from FPS. It was also decided to give Rs 500 to every family to construct its own latrine. Construction of toilets geared up slowly but taken up in later stages by community participation. The Gram Panchayat and youth group of the same village monitored the sanitation programme.

Everybody is using toilets in the village today. Recognition of community is shown by painting all houses using toilets in pink colour. With the campaign, people also gained knowledge on bio-gas plants and about conservation of sources. The scheme was also linked with and benefited through other rural developmental schemes like Yaswant Gram Samruddhi Yojana.

To sustain the programme women and children get regular knowledge on cleanliness through school. Extra classes have been organized for students on promotion of sanitation and hygiene activities in the schools. The village now has a better school facility and the Panchayat is fully involved, as it had initiated this campaign. There is a feeling of pride with their becoming the first village in the entire State to get the NGP award.

*Present sanitation status in the village is as follows:*

Number of Households:	412
Status of Toilets:	100% using toilets
	Community Complexes (28 users)
	10 Gobar gas plants linked to toilets

- As an incentive mechanism, the Nirmal Grams should be provided funds under the ARWSP for higher service levels from 40 litre per capita per day (LPCD) to 55–60 lpcd per capita. This should be with commitment for meeting the O&M cost from the society.
- Specific policy directives for sanitation campaigns to include special needs of women, adolescent girls, infants, disabled, and the aged will be given.
- Sufficient focus of rural sanitation should be laid on the needs of disaster-prone areas such as hills, mountains, coastal areas, etc.
- The investments required in training, skill development for production of low-water, low-cost sanitation appurtenances suitable for rural areas, and training of self-groups of women, youth, etc. as masons and mistries for embarking on large-scale simple toilet construction activities throughout the country will be made available. The community should be encouraged to avail soft micro credits from the SHGs and for which a separate revolving fund should be provided.
- There is a need to have a monitoring system for the villages, which received the Nirmal Gram Puraskar award so that the success obtained is sustained. Community monitoring with women and children would be the primary choice. A close monitoring mechanism to oversee the coverage of BPL household and in SC/ST household also should be put in place at every State level.
- Schools provided with sanitation facilities should have a separate rain water harvesting system to meet the water requirement for the sanitation purposes.
- The Nirmal Gram Puraskar model of recognizing and rewarding entire village panchayats and PRIs that have been able to bring about total sanitation in many villages through awareness, peer pressure, and local competitive spirit amongst the PRIs will continue to be promoted.
- Segregation of degradable and non-degradable solid waste, black and grey liquid wastewater, and holistic environmental protection and cleanliness through rural sanitation, solid and liquid waste programmes will be promoted as the next area of focus.
- Decentralized sanitation solid and liquid waste

management as business models under various employment and self-employment programmes with appropriate incentives will be encouraged.

#### URBAN SANITATION INCLUDING SWM

5.63 The major issues in urban sanitation are how to expand sewerage and sanitation facility to cover all the people in all cities and towns; how to find resources to do that; how to create awareness about the importance of sanitation and SWM; how to prepare and execute plans that keep up with growing population; and how to finance the O&M costs of the facilities created?

#### STATUS OF URBAN SANITATION AND SOLID WASTE DISPOSAL

5.64 On the basis of information furnished by the State agencies in charge of Urban Water Supply and Sanitation Sector, about 91% of the urban population has got access to water supply and 63% to sewerage and sanitation facilities (47% from sewer and 53% from low cost sanitation) as on 31.3.2004. However, adequacy, equitable distribution, and per capita provision of these basic services may not be as per prescribed norms in most of the cities. For instance, the poor, particularly those living in slums and squatter settlements, are generally deprived of these basic facilities.

5.65 As per assessment made by the Central Pollution Control Board on the status of wastewater generation and treatment in Class I cities and Class II towns during 2003–04 (Table 5.2), about 26254 MLD of wastewater is generated in 921 Class I cities and Class II towns in India (housing more than 70% of urban population). The wastewater treatment capacity developed so far is about 7044 MLD—accounting for 27% of wastewater generated in these two classes of urban centres.

5.66 The pollution effect of sanitation is enormous. Three-fourths of the surface water resources are polluted and 80% of the pollution is due to sewage alone. Poor sanitation conditions, particularly in slums, are often linked to outbreaks of cholera and gastroenteritis. Water-borne diseases are one of the major causes of mortality throughout India and impose a huge burden in terms of loss of life and productivity.

**TABLE 5.2**  
**Status of Water Supply, Wastewater Generation, and Treatment in Class I Cities/Class II Towns in 2003–04**

Parameters	Class I Cities	Class II Towns	Total
Number (as per 2001 census)	423	498	921
Population (millions)	187	37.5	224.5
Water Supply (MLD)	29782	3035	32817
Water Supply (LPCD)	160	81	146
Wastewater generated (MLD)	23826	2428	26054
Wastewater generation (LPCD)	127	65	116
Wastewater treated (MLD)	6955 (29%)	89 (3.67%)	7044 (27%)
Wastewater untreated (MLD)	16871 (71%)	2339 (96.33%)	19210 (73%)

Water and sanitation diseases are responsible for 60% of the environmental health burden. The single major cause of this burden of disease is diarrhoea, which disproportionately affects the children under the age of five.

5.67 It is estimated that about 115000 MT of municipal solid waste is generated daily in the country. Per capita waste generation in cities varies from 0.2 kg to 0.6 kg per day depending upon the size of population. An assessment has been made that per capita waste generation is increasing by about 1.3% per year. With growth of urban population ranging between 3 to 3.5% per annum, the annual increase in overall quantity of solid waste generated in the cities is assessed at about 5%. The collection efficiency ranges between 70 to 90% in major metro cities, whereas in several smaller cities it is below 50%. It has been estimated that the ULBs spend about Rs 500 to Rs 1500 per tonne on solid waste collection, transportation, treatment, and disposal. About 60–70% of this amount is spent on street sweeping, 20–30% on transportation, and less than 5% on final disposal of waste, which shows that hardly any attention is given to scientific and safe disposal of waste. Landfill sites have not yet been identified by many municipalities and in several municipalities, the landfill sites have been exhausted and the respective local bodies do not have resources to acquire new land. Due to

lack of disposal sites, even the collection efficiency gets affected.

5.68 SWM is a part of public health and sanitation, and according to the Indian constitution, it falls under State list. Since this activity is non-exclusive, non-rivalled, and essential, the responsibility for providing the service lies within the public domain. As this activity is of local nature, it is entrusted to the ULBs. The ULB undertakes the task of solid waste service delivery, with its own staff, equipment, and funds. In a few cases, part of the said work is contracted out to private enterprises. The management of municipal solid waste is one of the most important obligatory functions of the urban local bodies, which is closely associated with urban environmental conditions. The 74th constitutional amendment gives constitutional recognition for local self government institutions specifying the powers and responsibilities.

5.69 Very few ULBs in the country have prepared long-term action plans for effective SWM in their respective cities. For obtaining a long-term economic solution, planning of the system on long-term sustainable basis is very essential. The Ministry of Environment and Forests (MoEF), GoI, has notified Municipal Solid Waste (Management and Handling) Rules, 2000 to tackle this problem. The increase in quantity of municipal solid waste generation with increase in the urban population is quite obvious. Efforts towards waste recycle, reuse, and resource recovery for reduction in waste and adoption of more advanced technological measures for effective and economical disposal of municipal solid waste is the need of the hour.

5.70 There has been no major effort in the past to create community awareness, either about the likely perils due to poor waste management or the simple steps that every citizen can take, which will help in reducing waste generation and promote effective management of solid waste generated. The degree of community sensitization and public awareness is low.

5.71 Since in most of our cities there are many unauthorized housing colonies that are not provided sewerage facilities, their waste go untreated polluting

the water bodies in which it is drained. Cities need to treat the sewage from the entire city.

5.72 Growing urbanization has made storm water draining systems inadequate increasing the frequency of flooding of cities like Mumbai.

#### PERFORMANCE REVIEW OF THE SECTOR IN TENTH PLAN

5.73 The Tenth Plan targeted a coverage of providing sewerage and sanitation facilities to 75% of the population from 57% at the beginning of the Plan. An investment requirement of Rs 23157 crore was worked out for sanitation and Rs 2322 crore for SWM. There was no scheme at the beginning of the Tenth Plan to assist the States in the sanitation sector and the Plan recommended an enhanced scope for the AUWSP to include sanitation. With the launch of JNNURM and UIDSSMT, the AUWSP programme is subsumed in UIDSSMT and the scheme now includes funding for sanitation also.

5.74 The Central Scheme of Solid Waste Management and Drainage in airfield towns was also launched in the Tenth Plan. Bird hits are among the major causes of air crashes in our country leading to the loss of costly defence aircrafts and loss of invaluable lives of pilots. An Inter-Ministerial Joint Sub-Group constituted by the Ministry of Defence recommended to provide proper sanitation facilities, including SWM and drainage to over-come the bird menace in the following 10 towns having airfields of the Indian Air Force at Gwalior (MP), Ambala (Haryana), Hindon (UP), Jodhpur (Rajasthan), Tezpur (Assam), Dundigal (AP), Sirsa (Haryana), Adampur (Punjab), Pune (Maharashtra), and Bareilly (UP).

5.75 All the schemes are under execution and are at different stages of execution and were expected to be completed in the Tenth Plan itself, but have not been completed.

#### ELEVENTH FIVE YEAR PLAN TARGETS FOR URBAN SANITATION

5.76 The target fixed for urban sanitation is 100% population coverage with 70% by sewerage facility and 30% by low-cost sanitation. For SWM 100%

population is proposed to be covered with appropriate SWM. It has been estimated that the fund requirement for these programmes is Rs 53168 crore for sanitation and Rs 2212 crore for SWM.

5.77 While funds to the tune of Rs 40000 crore would be available from the JNNURM for water supply and sanitation, at this stage it would be difficult to predict the availability for sanitation and SWM separately. External assistance could be tapped and States/UTs should increase their outlays in their regular budget for these programmes. Some amount of contribution by beneficiaries is desirable as it reflects their need. Leverage of funds through PPP should also be used.

5.78 The importance of effective administration and citizen cooperation in SWM cannot be overestimated. The case of Surat shows what these can be accomplished (see Box 5.7).

#### 5.79 Initiatives Required in Eleventh Five Year Plan

- Recycling and reuse of sewage after the desired degree of treatment (depending upon the end use) for various non-potable purposes should be encouraged. Industries and commercial establishments must be persuaded to adopt reuse of treated sewage and recycle treated trade effluents to the extent possible in order to cut down the fresh water demand.

#### Box 5.7

##### Success in SWM—The Case of Surat

The outbreak of a plague-like disease in Surat in 1994 brought solid waste to the attention of the public. The contrast between the scrupulously clean Indian homes and the heaps of rubbish and filth commonly found in the urban public spaces was much discussed in the newspapers of the day. Urban filth was deemed to be bad for both public health and the urban economy.

Accordingly, the situation created an intense political will to clean up the city. Money and professional management was mobilized on a PSP/PPP basis and there was a major cleaning of the urban areas. Today, Surat is one of the cleanest cities in India, indicating how rapidly and effectively this can be achieved if political will and the organization are present.



Moreover, incentives in the form of rebate on water cess, concessions in customs and excise duty on equipment and machinery, tax holiday, etc., should be considered by the GoI for agencies dealing with planning, developing, and operating such reuse treatment plants as well as users of treated sewage and trade effluents. Similarly, for dense urban neighbourhoods, decentralized waste treatment systems that are cheaper and reduce the distance that the sewage is transported form a viable alternative to large treatment plants.

- Targeted subsidy may be made available to the SCs and STs, and other disadvantaged groups living in urban slums on taking house service connections for water supply/sewerage, metering, construction of latrine, subsidized water rates, etc. and accordingly adequate funds may be earmarked for the purpose so as to avoid any possible diversion of funds by the State Governments/ULBs. At the same time internal earmarking of funds for the urban slums under JNNURM/UIDSSMT schemes should be made mandatory. It is also very much necessary to monitor the physical and financial progress of the implementation of such programmes on a regular basis by the funding agencies so as to ensure fulfilment of the envisaged objectives.
- Comprehensive storm water drainage system has to be provided in all the cities and towns based on need, in order to avoid water logging in residential areas/flooding of streets during the monsoon period.
- There is a need to have a national centre for water excellence, which looks at especially the drinking water and sanitation sector in rural and urban water areas.
- We need to find a way to provide sewerage facilities to unauthorized housing colonies without giving them a right to the land by implication.

#### SOLID WASTE MANAGEMENT (SWM)

- Urban waste management by ULBs is already under stress because of paucity of resources and inadequacies of the system. Unless concerted efforts are made to improve the flow of resources to SWM and build up systems that incorporate the basic requirements of a proper waste management

practice, the problem of urban waste will be further aggravated and cause environmental health problems.

- It is recommended that all the cities and towns have to be provided with appropriate SWM facilities giving due emphasis to the magnitude of the problem.
- Soil fertility is being badly affected by excessive use of chemical fertilizers and inadequate use of organic fertilizers. Large quantities of urban waste can be a useful solution to this problem. Compulsory production of compost from urban solid waste in cities and towns and promotion of application of this organic manure in agriculture and horticulture should be implemented, as this may have a significant positive impact on soil fertility.
- The Report of the Inter Ministerial Task Force on the 'Integrated Plant Nutrient Management using city compost' constituted by the Ministry of Urban Development in March 2005 as per the directive of the Hon'ble Supreme Court of India has recommended technical, financial, qualitative, marketing, and sustainability aspects of utilization of Municipal Solid Waste for compost purpose. Recommendations of the Task Force need to be implemented through provision of various fiscal incentives/concessions.
- Quality standards for compost will have to be prescribed by Bureau of Indian Standards at the earliest. At the same time, it should be made mandatory that compost sold in the market should clearly indicate the exact chemical composition (Nitrogen, Phosphorus, and Potassium, NPK, etc.) on the bags for the benefit of users.
- To the extent possible materials such as metal, glass, plastic, rubber, tin, and paper available in the municipal waste must be recycled back as they have adequate salvage value. Inorganic and inert material such as sand, grit, stones, bricks, concrete, rubble, etc. may also be used for making low-cost bricks, road material, aggregates, etc. As such, efforts should be made to reuse the same and enough incentives in the form of tax concessions, subsidies, etc. may be given to the entrepreneurs dealing with such materials/processes.
- Our cities are littered with uncollected solid waste and no public place or street is free of litter. Though much recycling takes place by rag pickers and waste

collectors, a lot is left to be disposed off. To keep cities clean, citizen involvement is essential to sort waste at source and minimize waste that needs to be collected and disposed. A programme should be implemented to obtain citizens' cooperation. NGOs should be encouraged to provide organizational support and identity to the rag pickers so that better recycling occurs. Adequate land should be earmarked/allotted at the planning stage itself by the respective ULBs for setting up of sanitary landfills, compost plants, and other processing units including provision for future expansion.

- Awareness campaigns on various aspects of water quality, importance of safe drinking water, its handling and storage, water conservation in homes, use of sanitary toilets, separate storage of dry and wet garbage and its hygienic disposal, vector control, personal hygiene, etc. should be mounted.

#### PPP IN URBAN SANITATION AND SWM

5.80 Though privatization of water supply and sanitation sector could not make significant progress as of now, there is substantial potential and urgent need for the same in near future. By and large, the tariff rates being charged from the consumers are very low and there is a general reluctance for enhancing the same. Under the circumstances, without aiming at full cost recovery, privatization cannot be a successful proposition. It is felt that it would be easier and convenient to introduce privatization in new areas where the private companies will have a free hand to take up the task of planning, designing, execution, O&M, billing, and collection including tapping of raw water from the selected source either on Build Own Operate (BOO) or Build Own Operate Transfer (BOOT) basis. Few examples to infuse confidence in private entrepreneurs are—the successful award of Chennai service contract for O&M of 61 sewage pumping stations in the city, and of Rajkot and Surat contracting out a number of municipal services to private firms as well as community groups.

5.81 There were some public concerns on PPP projects in the water supply sector in the country because of which the projects were either stalled or dropped. If the community could be involved in PPP projects there would be more acceptability to such projects. PPP can

be redesigned as Public–Private Community Partnership to overcome the hurdle.

## CLEAN LIVING CONDITIONS

### INTRODUCTION

5.82 Achievement of health objectives involves much more than curative or preventive medical care. Many of the communicable diseases in India can be prevented through a combination of health and non-health interventions. We need a comprehensive approach that encompasses individual health care, public health, sanitation, clean drinking water, access to food and knowledge about hygiene and feeding practice, etc. A direct relationship exists between water, sanitation, and health. Safe drinking water and sanitation are critical determinants, which directly contribute nearly 70–80% in reducing the burden of communicable diseases. Inadequate provision of safe drinking water, improper disposal of human waste, and lack of adequate systems for disposal of sewage and solid wastes leads to unhealthy and unhygienic conditions. This coupled with overall ignorance of personal and environmental hygiene are the main causes of a large number of water-borne diseases in the country.

### CLEAN WATER SUPPLY

5.83 The water supply and sanitation sector will face enormous challenges over the coming decades. In India, the groundwater is consumed directly without any sort of treatment and disinfection. Its quality is therefore a cause of concern. The national objectives of reducing morbidity and mortality largely depend on the reduction of diarrhoea, jaundice, etc. In fact, no water supply and sanitation programme can be successful if water-related illnesses are not reduced. It is a matter of concern that despite the progress made with water supply, the level of water-related illnesses continues to be high. Approximately 10 million cases of diarrhoea, more than 7.2 lakh typhoid cases, and 1.5 lakh viral hepatitis cases occur every year (Annexure 5.1). A majority of them are contributed by unclean water supply and poor sanitation. Micro-level studies revealed that availability of clean water; sanitation, and hygiene interventions reduce diarrhoeal diseases on average by between one-quarter and one-third.

5.84 Causes of contamination of water are indiscriminate use of chemical fertilizers and chemicals, poor hygienic environment of the water sources, improper disposal of sewage and solid waste, pollution from untreated industrial effluents, and over-exploitation leading to quality degradation. Thus, the supply of additional quantity of water by itself does not ensure good health, proper handling of water and prevention of contamination are also equally important.

#### SANITATION

5.85 Sanitation covers the whole range of activities including human waste disposal, liquid and solid wastes from household, and industrial waste. Lack of drains and the presence of ditches create unsanitary conditions, which contaminate water, breed mosquitoes, and cause water-borne diseases. Malaria, typhoid, jaundice, cholera, dengue, and diarrhoea are all connected to unsanitary conditions (Annexure 5.2). Chikungunya fever has emerged as an epidemic outbreak after more than three decades. These diseases can be prevented by appropriate sanitation system. Unfortunately, access to sanitation facilities continues to be grossly inadequate.

5.86 Census 2001 indicates that of the 200 million dwelling units across the country, only some 40 million dwelling units have a toilet inside the house. Only 61% households in urban areas and 17% households in rural areas have access to improved sanitation.<sup>1</sup> While households having bathroom facility within the house is abysmally low in rural areas and urban areas in the poor performing States, the position in respect of connectivity for wastewater outlet is even more alarming. While closed drainage is available in the urban areas at least in the developed States, a large percentage of bathrooms across all States in the country have no drainage system particularly in the rural areas. This percentage is as high as 73.88 in Orissa, 72.69 in Assam and 71.81 in Chhattisgarh. The non-availability of toilets within the house is as high in Bihar (71.94%), Chhattisgarh (76.78%), and in Jharkhand

(73.03%). In urban areas, the percentage of households not having toilet is marked in the case of Goa (15.26%), Maharashtra (17.75%), Chandigarh (17.83%), Delhi (19.58%), and Tamil Nadu (14.84%).<sup>2</sup> Top priority needs to be accorded to improving sanitary conditions and ensuring a clean microenvironment at home and at the workplace, which must now include factories, coalmines, quarries, and roads. The TSC aims to eliminate the practice of open defecation completely by 2012.

#### ENVIRONMENTAL POLLUTION

5.87 Serious environmental health problems affect millions of people who suffer from respiratory and other diseases caused or exacerbated by biological and chemical agents, both indoors and outdoors. Millions are exposed to unnecessary chemical and physical hazards in their home, workplace, or wider environment. Concern about the health effects of the high levels of air pollution observed in many mega cities is growing; moreover, it is likely that this problem will continue to grow because countries are trapped in the trade-offs of economic growth and environmental protection. Population in urban areas are at risk of suffering adverse health effects due to rising problems of severe air and water pollution.

5.88 Cooking and heating with solid fuels on open fires or traditional stoves results in high levels of indoor air pollution. Indoor smoke contains a range of health-damaging pollutants, such as small particles and carbon monoxide.

5.89 Indian women spend nearly 60% of their reproductive life in either pregnancy or breast-feeding.<sup>3</sup> Most of the women keep their children in the kitchen when they are cooking, thereby exposing the children to the pollutants too. This, combined with malnutrition may retard growth and lead to smaller lungs and a greater prevalence of chronic bronchitis. There is an urgent need for the implementation of control programs to reduce levels of particulate and other

<sup>1</sup> Census of India 2001, Registrar General of India.

<sup>2</sup> Census of India 2001, Registrar General of India.

<sup>3</sup> A. Kotwal (2007), Environment and Health, in O.P. Gupta and O.P. Ghai (eds), Text Book of Preventive & Social Medicine, 2nd edn, New Delhi: C.B.S Publishers.

pollutant emissions. To be effective, these programs should include the participation of the different stakeholders and initiate activities to identify and characterize air pollution problems, as well to estimate potential health impacts. A full understanding of the problem and its potential consequences for the local setting is essential for effectively targeting interventions to reduce the harmful impacts of air pollution.

5.90 Monitoring of air and water quality is crucial for devising programmes and policies related to pollution management. Establishing a reasonably adequate monitoring network with contemporary technology will be given priority. Ways of linking treatment of sewage and industrial effluents to the urban and industrial development planning need to be worked out. The goal should be to ensure that by the end of the Eleventh Plan no untreated sewage or effluent flows into rivers from cities and towns.

#### STRATEGIES DURING THE ELEVENTH FIVE YEAR PLAN

5.91 In order to achieve 100% coverage of clean water and sanitation in rural areas, rural sanitation programme will be linked with the NRHM. The strategies include:

- Convergence of health care, hygiene, sanitation, and drinking water at the village level

- Participation of stakeholders at all levels, from planning, design and location to implementation and management of the projects
- Instituting water quality monitoring and surveillance systems by involving PRIs, community, NGOs, and other CSOs
- Increased attention to IEC campaign

5.92 Efforts will be made to launch a *Sarva Swasthya Abhiyan* in the county that will cover the primary health care, safe drinking water, and sanitation in urban areas.

#### ELEVENTH FIVE YEAR PLAN RECOMMENDED OUTLAYS

5.93 The full coverage of rural drinking water supply is to be achieved by March 2009 and 100% sanitation coverage by the end of the Eleventh Plan (2012) with mass awareness and NGP. The Eleventh Plan Central sector GBS for rural water supply and sanitation is Rs 41826 crore (at 2006–07 prices) and Rs 47306 crore (at current prices) (including Rs 6000 crore for Nirmal Gram Puraskar) and this provision will draw matching provision in the State Plan to the tune of Rs 48875 crore. Thus the total outlays in the Eleventh Five Year Plan for Rural Water Supply and Sanitation sector would be close to Rs 100000 crore. The total outlay for Urban Water Supply and Sanitation sector would be Rs 75000 crore.

**ANNEXURE 5.1**  
**Cases and Deaths due to Water-borne Diseases in Various States**

States	Diarrhoeal Disease (2006)		Viral Hepatitis (2006)		Typhoid (2006)	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Andhra Pradesh	1215659	124	17846	28	135550	12
Arunachal Pradesh	32032	30	553	6	9098	23
Assam	..	..	..	..	..	..
Bihar	..	..	..	..	..	..
Chhattisgarh	95202	13	1491	2	21474	6
Goa	7631	0	15	0	68	0
Gujarat	382056	4	9396	16	7290	0
Haryana	285342	42	3983	11	5688	4
Himachal Pradesh	347055	28	835	11	26327	5
J&K	519317	32	5882	0	42369	0
Jharkhand	14752	1	51	0	4707	284
Karnataka	939221	1279	14980	24	96147	5
Kerala	475510	4	7018	6	6219	2
MP	318935	88	2499	9	28654	29
Maharashtra	695723	93	43215	131	39663	8
Manipur	13614	17	346	0	2421	2
Meghalaya	178260	33	294	2	6709	1
Mizoram	18063	20	546	11	1392	2
Nagaland	9176	0	112	0	2328	0
Orissa	373748	40	2687	38	15387	9
Punjab	182451	64	3829	17	17008	3
Rajasthan	318169	21	3869	78	14084	131
Sikkim	51433	8	290	2	428	2
Tamil Nadu	116062	12	4523	0	36973	0
Tripura	150750	47	2520	14	18547	19
Uttarakhand	94746	6	3381	0	15020	2
UP	284709	55	3716	6	42648	13
WB	2622968	964	7433	205	110835	70
A&N Islands	22752	2	213	4	3055	0
Chandigarh	..	..	..	..	..	..
D&N Haveli	74661	4	126	3	646	0
Daman & Diu	109	0	3	0	33	0
Delhi	94398	85	4080	42	13774	18
Lakshadweep	7316	0	86	0	6	0
Pondicherry	137443	8	615	7	1936	1
<b>Total</b>	<b>10079263</b>	<b>3124</b>	<b>146433</b>	<b>673</b>	<b>726484</b>	<b>651</b>

Note: '..' means not reported.

Source: MoHFW, GoI, 2006.

**ANNEXURE 5.2**  
**Burden of Major Communicable Diseases in Various States**

States	Malaria (2005)		TB (2006)		ARI	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Andhra Pradesh	39099	0	142057	1184	2465743	434
Arunachal Pradesh	31215	0	1593	38	43426	1
Assam	67885	113	..	..	..	..
Bihar	2733	1	..	..	..	..
Chhattisgarh	187950	3	8689	12	132276	25
Goa	3747	1	2228	0	25559	0
Gujarat	179023	54	41730	238	833339	17
Haryana	33262	0	29900	227	1269205	178
Himachal Pradesh	129	0	14705	140	1545057	161
J&K	268	0	2346	28	383069	0
Jharkhand	193144	21	15516	5	23470	1
Karnataka	83181	26	76687	745	2544300	196
Kerala	2554	6	13840	181	7897043	165
MP	104317	44	18866	132	478278	180
Maharashtra	47608	104	52998	795	657432	192
Manipur	1844	3	482	20	12602	1
Meghalaya	16816	41	1900	29	304097	25
Mizoram	10741	74	936	28	41018	26
Nagaland	2987	0	838	0	11792	0
Orissa	396573	255	11443	178	768445	69
Punjab	1883	0	20612	106	601038	66
Rajasthan	52286	22	71180	695	1299772	126
Sikkim	69	0	2155	36	65304	7
Tamil Nadu	39678	0	28979	73	380708	220
Tripura	18008	20	971	27	279702	98
Uttarakhand	1242	0	3522	8	130683	11
UP	105303	0	109898	161	502869	81
WB	185964	175	89276	820	2020983	894
A&N Islands	3954	0	2898	10	32405	13
Chandigarh	432	0	..	..	..	..
D&N Haveli	1166	0	1544	36	118461	0
Daman and Diu	104	0	25	3	0	0
Delhi	1133	0	13544	993	323392	276
Lakshadweep	0	0	39	0	32093	0
Puducherry	44	0	7738	125	584161	1
<b>Total</b>	<b>1816342</b>	<b>963</b>	<b>789135</b>	<b>7073</b>	<b>25807722</b>	<b>3467</b>

Note: ‘..’ means not reported.

Source: National Health Profile 2006, CBHI, DGHS—MoHFW.