WATER, SANITATION & ENVIRONMENT

-- Compiled by Syed Nasiruddin

Global View

Water

Throughout history human progress has depended on access to clean water and on the ability of societies to harness the potential of water as a productive resource. Water for life in the household and water for livelihoods through production are two of the foundations for human development.

Access to water for life is a basic human need and a fundamental human right. Yet in our increasingly prosperous world, more than 1 billion people are denied the right to clean water and 2.6 billion people lack access to adequate sanitation. These headline numbers capture only one dimension of the problem. Every year some 1.8 million children die as a result of diarrhea and other diseases caused by unclean water and poor sanitation. At the start of the 21st century un-clean water is the world's second biggest killer of children. Every day millions of women and young girls collect water for their families – a ritual that reinforces gender inequalities in employment and education.

Many countries have made extraordinary progress in providing clean water and sanitation. Across the developing world people living in slums and rural villages are providing leadership by example, mobilizing resources and displaying energy and innovation in tackling their problems. At the start of the 21st century we have the finance, technology and capacity to consign the water and sanitation crisis to history just as surely as today's rich countries did a century ago. What has been lacking is a concerted drive to extend access to water and sanitation for all through well designed and properly financed national plans, backed by a global plan of action to galvanize political will and mobilize resources.

Population growth, urbanization, industrial development and the needs of agriculture are driving up demand for a finite resource. Meanwhile, the recognition is growing that the needs of the environment must also be factored in to future water use patterns. Two obvious dangers emerge. First, as national competition for water intensifies, people with the weakest rights – small farmers and women among them – will see their

entitlements to water eroded by more powerful constituencies. Second, water is the ultimate fugitive resource, traversing borders through rivers, lakes and aquifers – a fact that points to the potential for cross-border tensions in water-stressed regions. Both dangers can be addressed and averted through public policies and international cooperation – but the warning signs are clearly visible on both fronts.

Across the world agriculture and industry are adjusting to tightening hydrological constraints. But while scarcity is a widespread problem, it is not experienced by all. In water-stressed parts of India irrigation pumps extract water from aquifers 24 hours a day for wealthy farmers, while neighboring stallholders depend on the vagaries of rain. Here, too, the underlying cause of scarcity in the large majority of cases is institutional and political, not a physical deficiency of supplies. In many countries scarcity is the product of public policies that have encouraged overuse of water through subsidies and under pricing.

There is more than enough water in the world for domestic purposes, for agriculture and for industry. The problem is that some people – notably the poor – are systematically exclude from access by their poverty, by their limited legal rights or by public policies that limit access to the infrastructures that provide water for life and for livelihoods. In short, scarcity is manufactured through political processes and institutions that disadvantage the poor. When it comes to clean water, the pattern in many countries is that the poor get less, pay more and bear the brunt of the human development costs associated with scarcity. Poor people living in slums often pay 5 – 10 times more per litre of water than wealthy people living in the same city.

While basic needs vary, the minimum threshold is about 20 liters a day. Most of the 1.1 billion people categorized as lacking access to clean water use about 5 liters a day -- one-tenth of the average daily amount used in rich countries to flush toilets.

"The human right to water", declares the United Nations Committee on Economic, Social and Cultural Rights, "entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic use." These five core attributes represent the foundations for water security.

Water stress is reflected in ecological stress. River systems that no longer reach the sea, shrinking lakes and sinking groundwater tables are among the most noticeable symptoms of water overuse. The decline of river systems – from the Colorado River in the Unites States to the Yellow River in China – is a highly visible product of overuse. Less visible, but no less detrimental to human development is rapid depletion of groundwater in

South Asia. In parts of India groundwater tables are falling by more than 1 metre a year, jeopardizing future agricultural production.

These are real symptoms of scarcity, but the scarcity has been induced by policy failures. Countries have been using far more water than they have, as defined by the rate of replenishment. The result : a large water-based ecological debt that will be transferred to future generations.

Future water-use scenarios raise cause for serious concern. For almost a century water use has been growing almost twice as fast population. The trend will continue. Agriculture will remain the largest user of water –it currently accounts for more than 80% of use in developing countries. But the demands of industry and urban users are growing rapidly.

Demand-side policies are likely to be more effective. Increasing the "Crop per drop" ratio through new productivity-enhancing technology has the potential to reduce pressure on water systems. More broadly, water pricing policies needs to better reflect the scarcity value of water.

Looking to the future, one of the greatest challenges is to ensure that strategies for enhancing water productivity extend to the poor. Technology is not neutral in its distributional effects – and the damager is that efforts to get more crops per drop from water resources will by pass poor households.

Sanitation

As a global community we face a vast deficit in sanitation – a deficit overwhelmingly concentrated in developing countries. Not having access to sanitation means that people are forced to defecate in fields, ditches and buckets. The absence of toilets poses particularly severe public health and security problems for women and young girls. Today, almost one in two people in the developing world lacks access to improved sanitation. While the provision of sanitation for all has been a key development goal since the 1970s, progress has been glacial. Coverage rates are improving. But without a rapid increase in the scale and effectiveness of sanitation programmes, the Millennium Development Goal target for 2015 will be missed by a wide margin.

Many obstacles need to be removed if the world is to accelerate progress in sanitation. Perhaps the greatest obstacle of all is stigma. Much has been written about the sense of shame experienced by people lacking access to sanitation facilities. At higher political levels there is an overwhelming tendency to treat sanitation as a problem that should be hidden from view.

The broad category of "improved" provision can be thought of as a sanitation "ladder" extending from very basic pit latrines to improved pit latrines, pour-flush facilities using water and septic tanks, through to conventional sewers. Moving up the ladder has financial implications. It cots some 20 times more to connect a household to a modern sewerage system than to purchase a basic pit latrine.

Moving from open defecation at one extreme to the safe collection, storage and disposal of human excreta and the treatment or recycling of sewage effluents poses different challenges in different contexts. In rural areas sewerage networks are often not available. Improved sanitation usually means passing through a hierarchy of pit latrines, with pourflush latrines and septic tank latrines the plausible options. In urban areas the picture is more mixed. For high density urban areas sewerage systems have obvious advantages. Connections to feeder sewers and trunk sewers are the safest way to separate people and drinking water from human waste: an age-old human development challenge. But where the reach of the sewerage network is limited and the unserved population is large, the capital costs of developing a sewerage system capable of connecting all households can be prohibitive. Under these conditions on-site sanitation or public facilities may be the most viable short to medium-run option.

Environment

Global warming will transform the hydrological patterns that determine the availability of water. The management of water for livelihoods has an even longer history. Since the dawn of civilization in the Indus Valley and Mesopotamia the management of water as a productive resource has been marked by ingenious infrastructure systems that have sought to harness the productive potential of water while limiting its potential for destruction. Human vulnerability in the face of failure in these endeavours, or as a result of shifts in the hydrological cycle, is reflected in the demise of civilizations, the collapse of agricultural systems and environmental destruction. Faced with the threat of climate change and mounting pressure on the world's freshwater resources, the 21st century water governance challenge may prove to be among the most daunting faced in human history.

Climate change is transforming the nature of global water insecurity. While the threat posed by rising temperatures is now firmly established on the international agenda, insufficient attention has been paid to the implications for vulnerable agricultural products in developing countries.

Even with drastic reductions in carbon emissions, past emissions mean that the world now has to live with dangerous climate change.

Climate change is not a future threat, but a reality to which countries and people have to adapt.

The impact of the surge in greenhouse gases is already becoming apparent. The Earth has warmed by 0.7^{o}C over the past century – but the pace of change is quickening. Glaciers are shrinking and sea levels are rising. Rising sea levels will be among the most powerful determinants of water security for a large share of the world's population in the 21st century. Increased salinization could dramatically reduce freshwater availability for many countries, while coastal flooding threatens millions of livelihoods.

For a large share of the world's people in developing countries climate change projections point to less secure livelihoods, greater vulnerability to hunger and poverty, worsening social inequalities and more environmental degradation. Climate change – unlike the tsunami in the Indian Ocean or the earthquake in Kashmir -- threatens not a one-time catastrophe but a slowly unfolding disaster.

Global warming may already be with us, but the much greater warming forecast for the 21st century will produce vast changes in evaporation and precipitation, allied to a more unpredictable hydrological cycle. Higher air temperatures will increase evaporation from the world's oceans, intensifying the water cycle. They will also mean faster evaporation of water from land, so that less rainfall reaches rivers. These changes will be accompanied by new rainfall patterns and more extreme weather events, including floods and droughts.

Projections for India highlight the complexity of climate change patterns. Most modeling exercises point to an increase in rainfall for the country as a whole. However, an increased proportion of rain will fall during intensive monsoon episodes in parts of the country that are already well endowed with rainfall. Meanwhile, two thirds of the country – including semi-arid areas in Andhra Pradesh, Gujarat, Madhya Pradesh, Maharashtra and Rajasthan -- will have fewer rainy days. This will translate into a net loss for water security, placing a premium on water harvesting and storage. One factor that will shape the profile of winners and losers is adaptive capacity. Irrigation systems will offer some protection, and large-scale commercial farmers are well placed to invest in technologies that raise water productivity. Risk will be skewed towards producers who depend on rainfall and lack the assets to adapt through investment.

Climate change presents challenges of a different order. Mitigation is an imperative. In 1992 the Earth Summit in Rio de Janeiro produced a Framework Convention on Climate Change, establishing the principle that greenhouse gases should be stabilized at levels that would prevent human influence on climates. Developed counties were encouraged to stablize

emissions at 1990 levels by 2000. If the international community fails in this area, the prospects for human development in the 21st century will suffer a grave setback.

Beyond mitigation, the development of adaptation strategies should be seen as a first-order priority. That is true for both bilateral aid and multi-lateral initiatives. Once again the starting point is national planning. Constrained by limited capacity and sometimes by weak governance, few developing countries.

Policy Initiatives

The starting point and the unifying principle for public action in water and sanitation is the recognition that water is a basic human right. In 2002 the United Nations Committee on Economic, Social and Cultural Rights adopted a General Comment on "the human right to water …for personal and domestic uses", establishing a non-legally binding normative frame –work for the "progressive realization" of the human right to water and sanitation.

Exclusion from water and sanitation services on the basis of poverty, ability to pay, group membership or place of habitation is a violation of the human right to water. If water is a human right that Government has a duty to uphold. It is the responsibility of national governments to secure the progressive realization of the right to water through a legislative and regulatory framework that applies to all service providers, public and private. The corollary is that many of the world's governments, developed as well as developing, are falling far short of their obligations.

The low priority attached to water and sanitation is apparent at many levels. With a few notable exceptions, clean water has seldom been a make or break issue in national elections – and it is difficult to think of a single case where access to toilets has been a core concern. Pressure for radical reform has been conspicuous by its absence.

Clean water, the sanitary removal of excreta and personal hygiene are the three foundations for any strategy to enhance public health. Collectively, these are the most potent antidotes to the parasitic diseases and other infections transmitted through flies and other vectors that blight so many lives in areas where stagnant water is the primary source for drinking, cooking and washing. While clean water and personal hygiene can make a difference on their own, the benefits for public health will be diminished without adequate sanitation, drainage and wider infrastructure for disposing of excreta. That is why public policies for water and sanitation need to be seen as part of an integrated strategy.

As concern over scarcity has mounted, the global debate on water resource management has focused on food security. The question commonly posed is whether the world has enough water to meet the food needs of a growing population. Less attention has been directed towards another issue with equally important implications for human development and global poverty reduction : how to mange water resources to meet rising food needs while protecting the access of poor and vulnerable people to the water that sustains their livelihoods.

These are broad global projections. They do not take into account that distributional factors that shape real food security as distinct from food availability. Nor do they capture large variations between and within regions. But they do point to intensified pressure on already overstretched water resources. India, to take just one case, will have 270 million more people living in urban areas in 2025 than in 1995. Many of these people will be employed in water-intensive -- and labour-intensive – industries operating in water-stressed parts of the country.

As concern over global water supply and food availability increases, governments should look beyond the scarcity equation to wider human development issues. Giving equity and empowerment more prominence in the governance framework is a starting point.

There are three main requirements for addressing the challenge. The first is to prepare a transparent national strategy setting out how water resources will be allocated in the years ahead, to provide predictability. The second is to integrate that framework into national poverty reduction planning exercises, such as the Poverty Reduction Strategy Paper, to ensure that water policy is aligned with wider human development goals. The third is to recognize the rights to water of poor households with customary entitlements and to enforce rights provision by creating institutions that empower the poor. Protecting and extending the water rights of women farmers should be a central priority in all countries.

Indian Perspective

Water

Water supply and sanitation in India is considered to be inadequate, despite longstanding efforts by the various levels of government and communities at improving coverage.

The rural population of India comprises more than 700 million people residing in about 1.42 million habitations spread over 15 diverse ecological regions. It is true that providi8ng drinking water to such a large population is an enormous challenge. Out country is also characterized by non-uniformity in level of awareness, socio-economic development, education, poverty, practices and rituals which add to the complexity of providing water.

The health burden of poor water quality is enormous. It is estimated that around 37.7 million Indian are affected by waterborne diseases annually, 1.5 million children are estimated to die of diarrhoea alone and 73 million working days are lost due to waterborne disease each year. The problems of chemical contamination is also prevalent in India with 1,95,813 habitations in the country are affected by poor water quality. The major chemical parameters of concern are fluoride and arsenic. Iron is also emerging as a major problem with many habitations showing excess iron in the water samples.

The provision of clean drinking water has been given priority in the Constitution of India, with Article 47 conferring the duty of providing clean drinking water and improving public health standards to the State. The government has undertaken various programmes since independence to provide safe drinking water to the rural masses. Till the 10^{th} plan, an estimated total of RS. 1.105 billion spent on providing safe drinking water. One would argue that the expenditure is huge but it is also true that despite such expenditure lack of safe and secure drinking water continues to be a major hurdle and a national economic burden.

On one hand the pressures of development is changing the distribution of water in the country, access to adequate water has been cited as the primary factor responsible for limiting development. The average availability of water is reducing steadily with the growing population and it is estimated that by 2020 India will become a water stressed nation. Groundwater is the major source of water in our country with 85% of the population dependent on it.

The 2001 Census reported that 68.2 per cent of households in India have access to safe drinking water. According to latest estimates, 94 per

cent of the rural population and 91 per cent of the people living in urban areas have access to safe drinking water. Data available with the Department of Drinking Water Supply shows that of the 1.42 billion rural habitations in the country, 1.27 million are fully covered (FC), 0.13 million are partially covered (PC) and 15.917are not covered (NC). However, coverage refers to installed capacity, and not average actual supply over a sustained period or the quality of water being supplied which is the most essential part.

While accessing drinking water continues to be a problem, assuring that it is safe is a challenge by itself. Water quality problems are caused by pollution and over-exploitation. The rapid pace of industrialization and greater emphasis on agricultural growth combined with financial and technological constraints and non-enforcement of laws have led to generation of large quantities of waste and pollution. The problem is sometimes aggravated due to the non-uniform distribution of rainfall. Individual practices also play an important role in determining the quality of water.

Water quality is affected by both point and non-point sources of pollution. These include sewage discharge, discharge from industries, run-off from agricultural fields and urban run-off. Water quality is also affected by floods and droughts and can also arise from lack of awareness and education among users. The need for user involvement in maintaining water quality and looking at other aspects like hygiene, environment sanitation, storage and disposal are critical elements to maintain the quality of water resources.

The government policies and programmes has also undergone a series of transition ever since independence. To begin with, the emphasis was on setting up physical infrastructure in form of hand pumps. Thereafter one has seen a transition from technology measures to a socio-technological approach seeking close participation of people. A national water policy was drafted in 1987 which was subsequently revised in 2002. For ensuring sustainability of the systems, steps were initiated in 1999 to institutionalize community participation in the implementation of rural drinking water supply schemes through the sector reforms project. Sector Reform ushers in a paradigm shift from “Government oriented supply driven approach” to “People oriented demand responsive approach.”

Water quality

Water quality monitoring is now being considered an important part of the government programme. Since 2000, water quality monitoring has been accorded a high priority and institutional mechanisms have been

developed at national, state, district, block and panchayat levels. The government has also outlined requisite mechanisms to monitor the quality of drinking water and devise effective Information, Education and Communication (IEC) interventions to disseminate information and educate people on health and hygiene.

The Government of India launched the National Rural Drinking Water Quality Monitoring and Surveillance Programme in February 2006. This envisages institutionalization of community participation for monitoring and surveillance of drinking water sources at the grassroots level by gram Panchayts and Village Water and Sanitation Committees, followed by checking the positively tested samples at the district and stat level laboratories. One major problem when it comes to addressing the problems related to water is that the provisions for water are distributed across various ministries and institutions. With several institutions involved in water supply, inter-sectoral coordination becomes critical for the success of any programme.

When it comes to dealing with maintaining water quality, the users and in large the communities have to play a key role in maintaining hygiene near water sources. One has to improve the ways in which we collect and store water so as to avoid contamination while collection, storage and use. With the dcentralisation of programmes for water supply it is essential that communities and institutions like Panchayts are actively involved in the planning, implementation and execution of programmes for water supply. These institutions will also have to undertake the monitoring of water sources and be made aware so simple remedial measures. It is true that this will require training and capacity building at a large scale.

There can be little doubt that water is a basic necessity for the survival of humans. There is interplay of various factors that govern access and utilisation of water resources and in light of the increasing demand for water it becomes important to look for holistic and people-centred approaches for water management.

Sanitation

In 1999 a demand-driven and people-centered sanitation program was initiated under the name Total Sanitation Campaign (TSC) or Community-led total sanitation. It evolved from the limited achievements of the first structured programme for rural sanitation in India, the Central Rural Sanitation Programme, which had minimal community participation. Community-led total sanitation is not focused on building infrastructure, but on preventing open defecation through peer pressure and shame.

The Total Sanitation Campaign, concentrates on promoting behaviour change by the community, as against the toilet construction focused approach of earlier programs. The main principles underlying TSC implementation are :

- A community led approach where the whole village ends open defecation and achieves total sanitation.
- Mobilize and motivate communities for behaviour change.
- Minimum cash incentives only for poorest households, posts construction and usage of toilets.
- Different types of technology options so that people can choose according to what they can afford.
- Facilitate availability of sanitary products and nearby places at economical prices. Later
- Give fiscal incentives to Gram Panchayts in the form of prize – such as Normal Gram Puraskar (NGP) -- for achievement of total sanitation by the Gram Panchayat.

The Nirmal Gram Puraskar of the Government of India, introduced in 2004, is a scheme that offers cash rewards to local governments that achieve 100% sanitation i.e. they are 100% open defection free (ODF) and have tackled issues of liquid and solid waste management. The award is given by the President of India. The amount of incentive ranges from Rs. 50,000 to Rs. 5 lakhs, based on population of the Gram Panchayat.

Since its launch, the Nirmal Gram Puraskar has been very successful in putting the spotlight on rural sanitation and each year the numbers of Panchayts winning the prize has shown a geometric increase. The rural sanitation coverage has improved from less than 20 per cent in 2001 to nearly 57 per cent in 2009 and the number of Nirmal Gram Panchayts increased from zero to more than 17,000.

Environment

Sewerage is the core element of physical infrastructure that determines the environmental status of any settlement and as such requires minutes planning development and management. Development of appropriate sewage carriage system with efficient treatment is the key element, which acts as a prerequisite for facilitating balanced and harmonized development. Augmentation of existing inadequate systems/treatment facilities as well as adoption of new technologies of waste

treatment for small and marginal settlements and rural areas presents a gigantic task demanding special efforts.

In the Regional Plan-2001, it has been proposed that the DMA and priority towns should treat sewage before it is discharged into the watercourses or on land or used for irrigation. The other towns where it is not possible to provide a proper system due to topography and for want of resources, low cost sanitation measures may be adopted which can be replaced by regular sewage system subsequently. Sewage should be treated to bring the pollution level to permissible limits as stipulated by the Bureau of Indian Standards (BIS) and Pollution Control Boards irrespective of the type of disposal of the sewage. AS far as possible, areas where the annual rainfall exceeds 75 cm, separate systems for sewage and storm water are recommended. Rural areas, where piped water supply system exists, should be provided with sewerage system with treatment facilities. Low cost sanitation measures such as sanitary latrines with septic tanks and soak pit should be provided in the village with hand-pumps based water supply.

A review of Regional Plan-2001 was done in the year 1999, in which it was observed that only 20% town of NCR were covered with partial sewerage system, while the rural areas did not have any access to such facilities.

Coverage

According to Indian norms, access to improved water supply exists if at least 40 liters/capita/day of safe drinking water are provided within a distance of 1.6 km or 100 meter of elevation difference, to be relaxed as per field conditions. There should be at least one pump per 250 persons.

Access Status

	Urban	**Rural**	**Total**
Improved water supply	96%	84%	88%
Improved sanitation	54%	21%	31%

[Source: Water supply and sanitation in India from Wikipedia (http://en.wikipedia.org)]

In 2008, 88% of the population in India had access to an improved water source, but only 31% had access to improved sanitation. In rural areas, where 72% of India's population lives, the respective shares are 84% for water and only 21% for sanitation. In urban areas, 96% had access to an improved water source and 54% to improved sanitation. Access has improved substantially since 1990 when it was estimated to stand at 72% for water and 18% for sanitation.

West Bengal Scenario

Water

Water is an increasingly scarce resource in West Bengal as in most other parts of India. The main source of water in West Bengal is rainfall, and because of relatively high rainfall, the State is well endowed with ground water resources. However, the distribution is not uniform over the regions. The demand for water is generated from a number of sources. There are economic functions in the agriculture sector, the urban sector, the industrial sector, the power sector and for transport and navigation. In addition, there are the survival needs of the domestic household sector, the forest sector and a range of ecological systems.

All aspects of water resources systems are closely related to patterns of land use. Since patterns of regional development are constrained by water availability, water allocation requires a balancing between regions and also between different sectors in any given region. The land use pattern in rural and urban West Bengal suggests that the aggregate demand of water may, in future, far exceed the endowment in a given location.

The quantity dimension of the water resource problem is reflected through the gradual scarcity of water; the quality dimension is manifested in water pollution of different kinds. Environment degradation leads to degradation of both air and water and acts as an impediment to healthy life. While air pollution is basically an urban phenomenon, floating dust particles and chemical materials out of mostly agricultural activities may pollute surface and underground water in rural areas. Rural and urban waste water including water wastes from cattle, chemical industries, breweries and distilleries, vegetable oil refineries, paper and pulp makers, tanneries and pesticide plants contribute to the pollution.

Sources of drinking water

Clean water is essential for life. Drinking water supplies must use uncontaminated sources as treatment, chemicals and equipment are too expensive for benefiting communities. There are different sources of water supply as follows :

a) Rainwater harvesting -- Falling rain water is one of the cleanest naturally occurring water and can be collected from pre-cleaned roofs, where it runs via guttering into a storage tank;

b) Spring – In some areas spring can be tapped, protected and used directly from the source;

c) Gravity-fed schemes – In hilly areas water can be piped down to communities from higher water sources;

d) Hand-dug wells – It is a common method of abstracting ground water which is usually safe to drink because permeable layers of earth act as fine filters removing bacteria and other impurities as water seeps through;

e) Tubewells – These are small diameter holes drilled by hand-powered methods of auguring and sludging and can be built quickly and cheaply;

f) Hand pumps – These are preferable as they are sealed around the well and prevent contamination.

VLOM

For maintenance and use of tools and spare parts, centralized maintenance structure is a cause of many problems in hand-pump programmes and maintenance at the village level is considered the best. So VLOM system, meaning Village Level Operation and Maintenance, was introduced. Greater community choice of service, financial accountability and cost effectiveness has gained more importance within the VLOM concept.

Water quality

More than access to water, water quality is a challenge in the state of West Bengal. Eight out of nineteen districts of the state have excess arsenic in ground water.

The first of arsenicosis or arsenic poisoning was discovered in West Bengal in 1982. Since then, it has been found that the problem of excess arsenic in drinking water exists in at least 75 blocks spread over 8 districts, accounting for an estimated population of over 13.5 million people. These districts are Malda, Murshidabad, Nadia, North 24-Parganas, South 24-Parganas, Bardhaman, Howrah and Hooghly.

Arsenic contamination of ground water in West Bengal is of geological origin, deriving from geological strata underlying gangetic plain. The increasing use of tube well water to provide drinking water as well as for sanitation and irrigation means that this is an urgent problem requiring immediate public intervention. Simple removal of arsenic from water, or

shifting to other sources of human drinking water supply, may not be adequate to eliminate the problem, as there is evidence that the food chain is now also being affected. The effect on the cattle population is also potentially very serious and requires focused attention.

Excess arsenic in drinking water gives rise to a number of health problems, including gastro-intestinal disturbances, hyper-pigmentation and neuropathy, and even skin cancer in severe cases. There is social implications and impact on people's livelihoods also. This means, identification and treatment of those affected, the provision of alternative sources of drinking water and an effective communication strategy are required along with technical and infrastructural measures.

Responding to the threat, UNICEF assisted the state Government to develop and implement the Joint Plan of action for arsenic mitigation that included setting up 20 arsenic testing laboratories in the affected districts in 2002.

These laboratories, managed by NGOs, tested public water sources and found more than 25 per cent water source unsafe.

Through GIS mapping the government alerted itself to the need for alternative water sources and accordingly drew up a "Master Plan for Arsenic Mitigation".

The central government responded with Rs. 22 crore to implement the plan which included providing alternative surface such as surface water based piped water schemes (45 percent), ground water based arsenic removal schemes (53 percent).

Meanwhile, a low cost domestic filter has been developed as a short-term arsenic mitigation option. So far, 60% of the 'at risk' population has been covered by alternative sources of arsenic-safe water.

Communication programmes have been put in place to make community aware of arsenic contamination, but challenges still lie ahead.

Encouraged by the early success of the arsenic testing laboratories, 26 general water testing laboratories were further established in 2005 outside the arsenic affected belts to monitor presence of bacteriological contaminates and ensure general water quality.

With fluoride as an emerging threat, 9 fluoride testing laboratories have also been set up.

Presently 86 water quality laboratories are working in the state - 31 through PHED and 55 with NGO assistance and UNICEF's technical and financial support.

Each laboratory has two trained chemists and an assistant and is equipped for testing pH, hardness, iron, residual chlorine, arsenic, fluoride, salinity and bacteriological contamination.

These laboratories also provide services for disinfection, promotion of filters, regeneration of the filter medium, etc.

Building on this infrastructure the state government has decided to utilize the network to test all drinking water sources for chemical and bacteriological parameters once in a year under the National Rural Drinking Water Quality Monitoring and Surveillance Programme.

Sanitation

Quality of life improves with good hygienic practices, access to proper sanitary facilities and improvement of environmental sanitation. Adoption of sanitary practices also reduces disease burden, particularly those which are water borne diseases. This is all the more relevant to the people living below poverty line, who suffer more from such common and preventable diseases due to lack of access to safe water and sanitation facilities. In the interest of sustainable development, access to sanitary facilities and use of safe and quality drinking water have been adduced high priority and the earlier Central Rural Sanitation Programme (CRP) was scaled up and launched as Total Sanitation Campaign (TSC) as a centrally sponsored programme in the year 1999. The programme is currently being implemented in West Bengal in all the eighteen rural districts including the DGHC area in Darjeeling.

The modalities for taking up sanitation programme in an intensive manner in collaboration with the NGOs was developed in Midnapore during the early nineties. Under this model responsibility of delivery of sanitation related services is entrusted with a suitable NGO that sets up a Rural Sanitary Mart (RSM) for manufacturing various sanitary item and arranges to install the same as per demand through their trained personnel. Costs of various sanitary items are fixed by the State Government and the RSMs are allowed certain profit for financial self-sufficiency. The strength of the programme is participation of the people, which is promoted by the Panchayts through generation of awareness about the good hygienic practices. The Panchayts are responsible for taking up the campaign in their respective areas and developing an efficient system for delivery of sanitation related supplies and services in collaboration with suitable NGO. Such partnership with the NGOs started as a strategy during the nineties

and the same was further strengthened under the TSC. Considerable success has been achieved through the implementation of TSC in the State. At the beginning of the last decade of the twentieth century, only 12.31% of the rural households in the state had access to sanitary toilets and this rose to around 27% as per Census, 2001. After the TSC was launched as many as 49,68,459 numbers of household toilets have been constructed in the state against a target of constructing 91,81,021 such toilets. More than twelve lakh toilets were constructed prior to launching of the TSC under the Central Rural Sanitation Programme. As a result of that around 74% of the rural households had access to sanitary toilets at the end of March, 2007.

Progress of receiving Nirmal Gram Puraskar by GPs
in West Bengal

Name of District	2004-05	2005-06	2006-07	Total
Cooch Behar	0	0	16	16
Jalpaiguri	0	0	7	7
DGHC	0	0	0	0
Siliguri MP	0	0	0	0
Dakshin Dinajpur	0	0	0	0
Uttar Dinajpur	0	0	1	1
Malda	0	0	0	0
Murshidabad	0	0	4	4
Birbhum	0	0	7	7
Burdwan	1	16	69	86
Bankura	0	0	9	9
Purulia	0	0	0	0
Paschim Medinipur	4	43	24	71
Purba Medinipur	0	22	137	159
Hooghly	2	8	27	37
Howrah	2	25	86	113
Nadia	0	12	23	35
North 24-Parganas	1	0	47	48
South 24-Parganas	0	0	11	11
Total	**10**	**126**	**468**	**604**

Case Study : Peoples' Movement for total sanitation

It is something most Indians do without thinking. But in rural West Bengal, open defecation is fast becoming a rare sight. The common early morning sight of bare bottoms has disappeared completely in East Medinipur. It has become the first Nirmal zila - a district where nobody defecates in the open.

East Medinipur, part of the erstwhile Midnapur district, began its campaign against defecating in the open in March 1990 under the Intensive Sanitation Project (ISP). UNICEF facilitated this project in co-operation with the Central and State governments. The partner NGO Ramakrishna Mission Lokashiksha Parishad (RKMLP) implemented it. UNICEF and RMKLP developed some 12 toilet options at affordable rates.

In 2000, the programme became the Total Sanitation Campaign (TSC). It aims to improve rural quality of life by eliminating manual scavenging by 2007, stopping open defecation, building toilets in all schools and inculcating hygiene.

It is a paradigm shift in the government's approach, from a top-down subsidy driven model to a more demand-led one. Subsidy is restricted to those below the poverty line (BPL). Even in BPL cases, subsidy is only 50 percent of the total cost that starts at Rs 550 for the cheapest latrine model. Others do not get any subsidy.

"The project is a success because of the close and smooth cooperation between all concerned stakeholders," says TSC Coordinator with RKLMP, Chandi Dey. That has meant bringing together elected representatives of Panchayati Raj Institutions (PRIs), government officials, NGOs and the public on a common platform, with a common understanding of total sanitation. Mr. Dey has been with the project since it began 15 years ago, and is the prime mover.

The results have been impressive. All 783,623 households in the 25 blocks of the district have toilets. Only 4.74 percent did when the programme began in 1990. All schools have at least one toilet unit comprising one separate urinal each for boys and girls.

Secretary, DPRD, M N Roy, adds, "The campaign began with demand creation using our IEC materials, meetings, folk media, processions, etc. Communication for behaviour change has to be one-to-one. For this, we developed a village level cadre of motivators."

The strategy for total sanitation involved using printed material, folk songs, bauls, puppetry and street theatre. Teachers, PRI representatives, children or youth club members can become motivators.

TSC is completely decentralized. The project is a three-way partnership. Government and UNICEF are technical advisors and a local NGO or RKLMP the implementer. Each block has a rural sanitary mart (RSM) run by an NGO.

The NGO staff is trained in TSC objectives, and given seed money from UNICEF for a shed to manufacture squatting pans and toilet bowls. This also covers salaries of managers, masons and outreach staff for two years.

Total expenditure on the single unit base model starts from Rs. 550. This includes digging the pit, squatting plate and bowl, and installation, but not superstructure.

The pour flush toilet is a circular pit, five feet deep and five feet in diameter, lined with a supporting honeycomb of bricks. The unlined bottom lets water and urine seep into the ground. The squatting plate and toilet bowl is fixed on top. Different superstructures can be built on top.

A toilet lasts for 6-8 people around five years, after which they need to dig another pit. Humans produce a cubic foot of dry waste a year, becoming manure in about two years.

A family approaches the nearest RSM that sends masons to identify a suitable place for the toilet pit. The family digs it, masons make the honeycomb brick lining, and install the plate and bowl on top completing the basic toilet. Some opt for a concrete room around the toilet. Most prefer a superstructure of bamboo thatch walls and thatch roof.

Nandigram II block of East Medinipur became the first in the country to have toilets in all houses and schools, followed by the Haldia block. The entire district achieved total sanitation in March 2006.

Assignment

People need water as surely as they need oxygen; without it life cannot exists. But water also gives life in a far broader sense. People need clean water and sanitation to sustain their health and maintain their dignity. Hand-pumps and piped water supply are the intervention to ease the problem of drinking water supply. Water Quality Testing Laboratories have been set-up to evaluate safe drinking water. The collaboration with NGOs have been conceived in planning, implementation and following up of rural sanitation programme. In response to the ground water crisis, the revival of small scale water harvesting programmes in India has shown the potential to generate large returns to investments and at the same time to reduce risk and vulnerability. Low cost technologies for drip irrigation have been taken up extensively. Community initiatives to create more and more check dams to support irrigation and re-charge of ground water have also been encouraged. The assignments will reflect the impact after –

- checking water supply schemes about its availability and quality;
- checking hand-pumps about its location, coverage and maintenance;
- Checking Arsenic Testing Laboratories about its service and reach ability;
- Checking rural sanitary marts about its coverage, quality and awareness.

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