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Sustainable Development: Targets, timetables, partnerships

The contributions to this issue of *WATERfront* report achievement throughout the developing world in virtually every aspect of water supply, sanitation and hygiene programming.

They record accomplishments great and small, just begun or nearing completion, from pilot projects to national programmes. The settings range from an urban slum and a village primary school to a city's school system and a nation's countryside. The partners include central government, local authorities, neighbourhood cooperatives, families and schoolchildren.

Yet these and similar programmes still fall short of the needs. Over a billion of the world's people still lack safe drinking water. More than double that number still lack adequate sanitation. Water-borne diseases still account for at least 5 million deaths every year in the developing world.

And every year some 11 million children under five still fall prey to the vicious cycle of poverty and environmental degradation, losing their lives to causes like diarrhoea readily prevented by safe water and hygienic surroundings.

Johannesburg: interlocking partnerships, interlocking goals

Against this backdrop more than 100 heads of state joined the 22,000 participants at the World Summit for Sustainable Development, which met in Johannesburg at the end of August to debate workable ways and means for reenergizing the fight against worldwide poverty and a relentlessly deteriorating natural environment. Water and sanitation issues featured at the heart of the Summit's entire agenda – water and sanitation, energy, health, agriculture and biodiversity.

“One of our major challenges is making sustainable development go to scale, to make something that has worked in a dozen places work in a thousand places.”

New targets and timetables were set to spur action, including a commitment to halve by 2015 the proportion of the world's people who lack clean water and proper sanitation.

But resonant goal-setting was for once not the sole outcome of a UN conference. The Summit also saw the launch of more than 300 voluntary partnerships by and between governments, non-governmental organizations, inter-governmental agencies and business corporations, to underpin government initiatives and bring additional resources and expertise to bear on safeguarding our world and its future. Funds were pledged for more than 20 major partnerships for water and sanitation alone.

The UNICEF proposal to the Summit reflected the emphasis on interlocking goals for sustainable development. Providing safe water and clean facilities in schools will not only protect children's health but encourage them, especially girls, to stay in school. And ensuring a quality education for all children can help a single generation make a giant leap for their nation's future.

“One of our major challenges,” said the Summit's Secretary-General afterwards, “is making sustainable development go to scale, to make something that has worked in a dozen places work in a thousand places.” Not a dramatic agenda, but a practical agenda for UNICEF and its partners for our work this year and the years to come.

adopting appropriate technologies suited to the local conditions. These have included piped water machine-pumped from deep wells; gravity-fed piped water systems; rainwater harvesting; shallow wells; and borewells fitted with the XI-2 handpump. The action taken by these provinces to provide safe water has benefited many millions of the rural poor and has served as a model for other provinces.

But despite this progress, some 24 million people in impoverished water-scarce areas still have no access to safe water. Central government has now committed substantial resources to supplying safe water for all the rural poor, aiming to achieve safe water for all within the tenth five-year development plan, 2001–2005.

The achievements

By mid-2000, thanks to joint efforts and collaboration from the local authorities and user communities, safe water supply in the six project provinces had soared to 98% in Shanxi, 97% in Hebei and Shaanxi, 96% in Yunnan, and 95% in Gansu and Xinjiang. Roughly a third of this coverage was contributed by borewells drilled with UNICEF support and fitted with XI-2 handpumps, which are well accepted by the users. During the project cycle the provincial and local authorities extended the scheme also to many non-project counties, raising the funds from their own resources with the communities contributing.

Most significantly, the XI-2 handpump has proved capable of functioning smoothly in a wide range of climates and topographies, even in ex-



Long hours spent queuing for a limited supply of unsafe water.

tremely cold weather at 30 degrees below freezing.

Factors for success

Positive lessons have been learned on the key factors for effectiveness in providing safe water to the rural poor:

- High-level political commitment; adequate financial allocations from government with matching funds at appropriate levels; and the appointment of a focal agency, the Ministry of Water Resources, responsible for overall implementation.
- Establishing WES programme committees as implementation teams, with offices set up at the centre and in each province, county, township and village, headed by personnel assigned specific responsibilities for planning, implementation and monitoring.
- Building up both the technical and general management abilities of these teams at every level, including the grassroots, through training, exchange of experiences and review meetings to identify problems and develop solutions. Technical skills – for drilling, handpump installation, and organization and management – were successfully transferred to the personnel responsible for these tasks.
- Intensive social mobilization and demand creation, calling on the help of a number of partners – including the national Women’s Federation, Civilization Campaign, youth leagues and the National Working Committee for Children and Women – together with media campaigns to motivate communities to change their sanitation and hygiene behaviours, foster demand, and raise financial contributions for installing and maintaining the XI-2 handpumps. The various media used for social mobilization included television, radio, village loudspeakers, leaflets, and wall newspapers and messages. The actual events of well drilling and handpump installation attracted crowds of village onlookers



Safe water to our homes at long last, within our lifetime.

(men, women and children) and were seized as an opportunity to educate villagers on the proper use of water and hygienic storage in the home, as well as demonstrating how the handpumps work and how they should be used and maintained.

- Sound technical training and workmanship in drilling the borewells and installing the XI-2 handpumps, together with efficient organization and management at community level. A recent survey found that virtually all the borewells and XI-2 handpumps in the six provinces (well over 99%) were functioning well and being fully used. Some of these handpumps have been operating for more than



Safe water supply brings smiles to millions of children in remote villages.

eight years, but were in good condition with minimal repairs needed.

- Gender balance. The project gained in many ways from the gender balance that prevails in the field of development in China, especially in the water supply and environmental sanitation sector. Many women were also serving capably as city mayors, deputy general directors and chief administrators of their county, township or village, supervising planning, fund allocations and project implementation. In the villages, men are usually in charge of hauling the household's water over the longer distances, while women generally fetch the water from sources nearer home or within the family compound.

Challenges remaining

The following issues were dealt with in all the project areas but need to be better integrated, through systematic organization and cohesive management to ensure sustainability:

- Sanitation and hygiene education to be meshed more strongly with water supply in order to improve health and nutrition and bring economic gains.
- Costs of drilling and handpump installation to be further reduced: at present the cost of a borewell with XI-2 handpump ranges from \$825 to \$1,765, depending on the depth of aquifer, local soil and topography, and drilling technology used.
- Project management and monitoring to be upgraded: water quality should be monitored on a regular basis, and systematic procedures need to be established for community-based handpump maintenance and repairs and for collecting fees from users.
- A sustainable distribution system to be developed for handpump spare parts, so that villagers can buy them easily and carry out repairs promptly.

Providing safe water is one of the priorities for rural development in China, especially for the remoter water-scarce and poverty-stricken rural areas as well as areas where the groundwater is contaminated by naturally occurring fluoride and arsenic.

Improving the quality of life

Over its years of implementation from 1996 to 2000, the rural water supply project has come to serve about 2.5 million rural poor, including some 790,000 women and 760,000 children. The XI-2 handpump project has not only reached the formerly unreached and satisfied their daily need for safe water, it has also brought other tangible benefits:

■ Better health from safe water and improved sanitation and hygiene.

A recent government survey in Shaanxi and Yunnan found that the incidence of dysentery had declined on average by 42%, diarrhoea by 60% and hepatitis A by 67%, which represents a saving in costs of medical care of about \$10 per person per year.

■ Better livelihoods.

Families have increased their incomes substantially by planting vegetable gardens; producing bean curd and noodles for local consumption; and raising livestock. In one project county the number of livestock has grown thirteenfold since the project started.

■ Better education opportunities and a cleaner environment for children.

The prosperity brought by the water supply has prompted communities to build new village schools as well as constructing and repairing local roads and drainage systems. Some village schools have planted fruit trees and grow vegetables in the school compound to aug-

ment school income. Many families have improved their farmhouses and sent their children to school. In Shaanxi and Yunnan the rates for primary school enrolment, already high at almost 97%, were nearing 99% by the end of the project cycle.

All in all, the project has lived up to the hopes that rural water supply would alleviate poverty and foster sustainable community development.

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Notes

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Improving child health through diarrhoea prevention: a framework for action

by Chris McGahey, Coordinator of Community-Based Programs, Environmental Health Project (EHP), USAID, and Massee Bateman, Director, EHP

Diarrhoea is the second most serious killer of children under five, accounting for nearly one fifth of child deaths – an estimated 1.9 million deaths annually (Murray and Lopez 1996). Not only is diarrhoea a life-threatening disease, it is also one of the most frequent significant childhood illnesses. For example, in some studies in Latin America, young children have an average of more than ten episodes of diarrhoea each year. While the death rate from diarrhoea has come down during the course of the child survival revolution, the frequency of illness has changed little if at all in many settings. This burden of diarrhoea has an impact on the health system, the household and the nutritional status of the child. The means to prevent diarrhoea are understood, but significant challenges must be addressed to do so at scale. We present here a framework – the Hygiene Improvement Framework – that helps us understand the means to prevent diarrhoea and the obstacles that must be overcome to do so.

The problem: frequent diarrhoea

One of the most widely recognized achievements of the child survival revolution has been the successful introduction of oral rehydration solution (ORS) and oral rehydration therapy (ORT), which are credited with more than halving childhood deaths due to diarrhoea. Nonetheless, the frequent application of this therapy in the home, in the community and in health facilities has costs. Frequent consultations and hospitalizations for diarrhoea are a strain on overburdened health services. In the home, there are many direct and indirect costs of diarrhoea in children: expenses of treatment, lost wages for

parents or missed school for older siblings who must stay home to care for the sick child, additional strain on overburdened mothers, and so on. In addition, it is well documented that diarrhoea – especially frequent and prolonged episodes and dysentery – is an important contributor to malnutrition (Martorell et al. 1975, Alam et al. 2000), and even mild malnutrition is associated with increased risk of death from a variety of childhood illnesses (Pelletier et al. 1995).

Diarrhoea is a preventable disease

The means to prevent diarrhoea via water supply, sanitation, and hygiene have been demonstrated in numerous field locations and have been well documented. Esrey et al. 1991 and Hutley et al. 1997 reviewed all relevant field studies addressing diarrhoeal prevention. Figure 1 summarizes what these studies revealed about the effectiveness of various interventions.

Two conclusions can be drawn from these data. First, improved water quality and quantity effectively prevent diarrhoeal diseases, but excreta disposal and handwashing can also – by themselves – have significant impacts on diarrhoeal disease. Second, interventions aimed at improving hygiene, such as handwashing, can lead to as significant a reduction in diarrhoeal diseases as hardware improvement.

The Hygiene Improvement Framework

Drawing on these results and the experience of a wide range of global partners, EHP advocates *the Hygiene Improvement Framework* – an integrated approach which links hardware, hygiene promotion, and an enabling environment – to prevent diarrhoeal disease. This framework is based on the recognition that behaviours – especially drinking safe water, sanitary disposal of faeces, and washing hands with good technique at appropriate times – are the

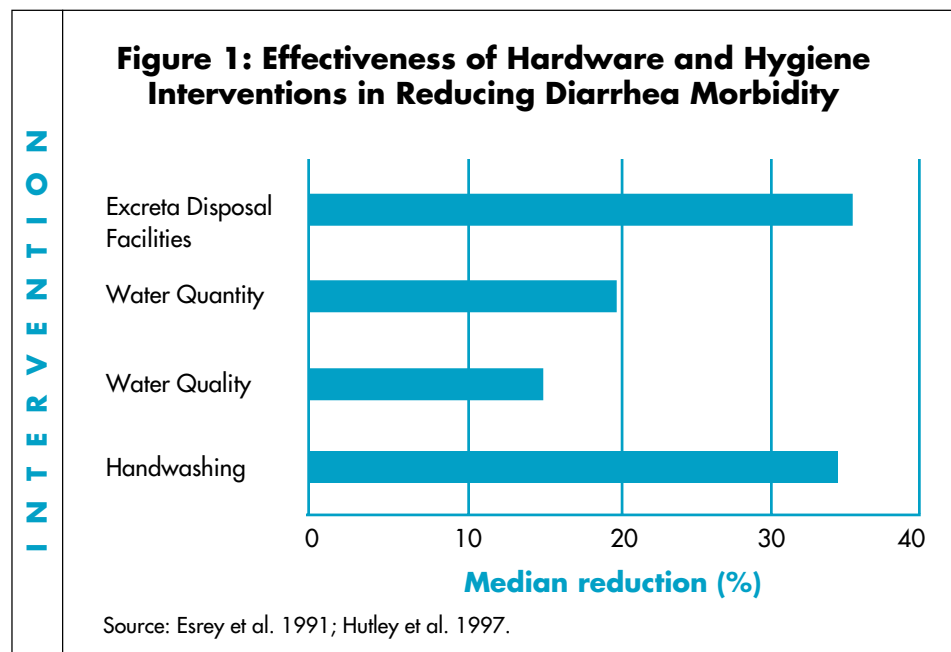
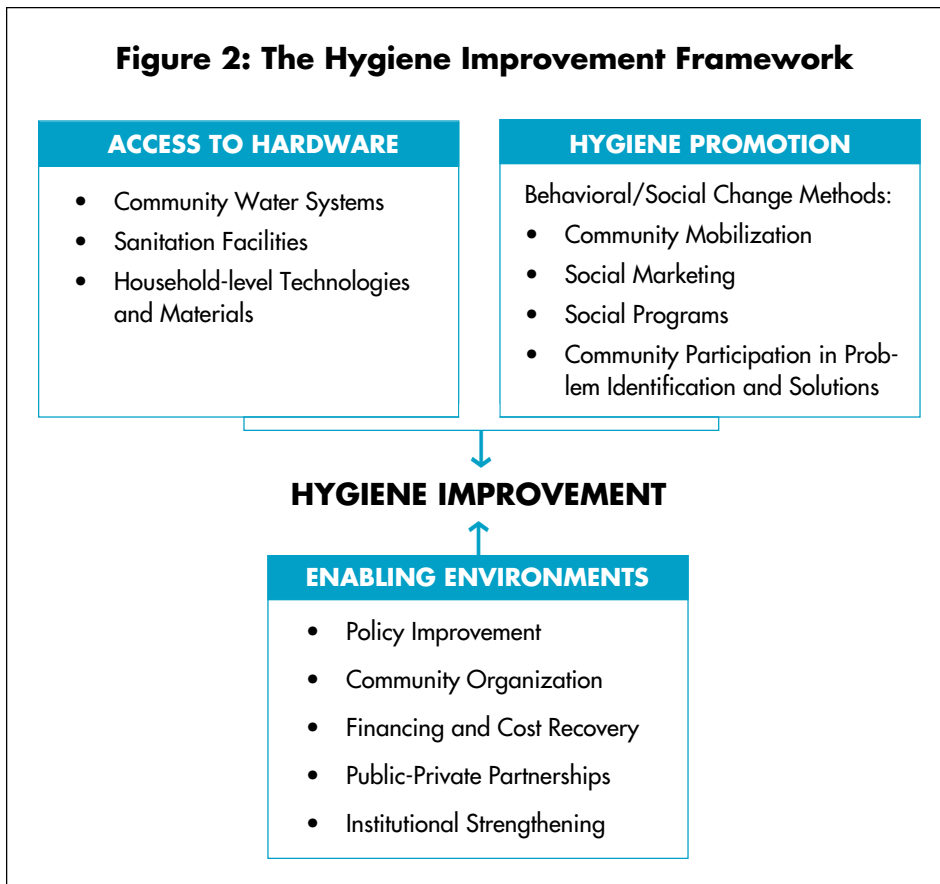


Figure 2: The Hygiene Improvement Framework

key determinants of diarrhoea risk. In order to prevent diarrhoea these behaviours – ‘hygiene improvement’ in figure 2 – must be supported by hardware and materials, ‘software’ or promotion of the behaviours, and an enabling institutional and policy environment to achieve these improvements at scale and in a sustainable fashion. Each component should be viewed as a necessary part of the Hygiene Improvement Framework.

Reducing the burden of diarrhoeal disease: the challenges

Challenge 1: Keep doing things that are already a part of child health programmes, and increase their coverage.

Many elements of child health programmes contribute to diarrhoea prevention, reduction of severity of disease, and decreased mortality. These not only include ORT, but also exclusive breastfeeding, micronutrient supple-

mentation, complementary feeding, and measles vaccinations.

Challenge 2: Develop effective hygiene promotion strategies and programmes.

In recognition of the importance of diarrhoea prevention and the role of the health sector, sanitary disposal of faeces and handwashing are included among the 16 ‘key practices’ for household and community advocated by the IMCI programme (Integrated Management of Childhood Illness). In order to respond to this mandate, hygiene promotion activities will need to be designed in the context of the Hygiene Improvement Framework. (Is water abundant or scarce? Are facilities for sanitary disposal of faeces – typically latrines – available currently? Is soap available? Are there opportunities to collaborate with other programmes addressing critical issues in hardware and enabling environments? And so on.) Also, hygiene behaviours are typically deeply rooted in local culture and social values,

and may require different skills from those commonly available for behaviour promotion programmes if hygiene promotion is likely to be appropriate and effective.

Challenge 3: Work in partnership.

Infrequently, if ever, can one programme or agent address all features of the Hygiene Improvement Framework effectively. The elements represented do not exist in one sector alone, and may be subject to many influences. To be truly effective in bringing down the burden of diarrhoeal disease, collaboration and coordination between sectors, agencies and institutions will be needed. Fortunately, many good examples exist or are developing. For example, in Nicaragua the Ministry of Health is implementing a comprehensive diarrhoea prevention strategy, harnessing the combined energies of the water and sanitation sector, USAID-supported assistance in water and sanitation and hygiene behaviour change, and local non-governmental and private voluntary organizations. These partnership efforts will deserve special attention for documentation, both for advocacy and to provide guidance to others through lessons learned.

The promise

Diarrhoea is an important cause of death of children under five and a burdensome disease in many regards. It can be prevented. We know what to do. As public health programming becomes more sophisticated in efforts to work in complex partnerships, this burden can be reduced.

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Environmental Health Project (EHP)

The Environmental Health Project (EHP) is sponsored by the United States Agency for International Development (USAID) to assist the agency to achieve reductions in illness and death among children under five in developing countries from diarrhoeal disease, malaria, and acute respiratory infections, and to reduce the burden of infectious diseases of public health importance.

A catalytic role for WES interventions: Bashibo school, Nigeria

by Z.O. Agberemi, assistant WES project officer, UNICEF Lagos, and Saaondo Anom, WES project officer, UNICEF Enugu

Low rates of primary school enrolment and attendance are a major concern in Nigeria, affecting the nation's literacy and socio-economic development. Several factors are responsible, notably unwelcoming school environments characterized by inadequate classrooms, poorly motivated teachers, and lack of access to safe water and sanitation.

Addressing these problems involves a holistic approach targeting mainly behavioural change towards sustainable upgrading of school environments to increase children's enrolment and attendance. Schools provide a favourable setting for improving children's knowledge of water and environmental sanitation, which they can then pass on to other members of the community. Targeting schools for WES projects also provides the opportunity to integrate both the 'hardware' and 'software' components for effective service delivery. These were the rationales for incorporating the WES in Schools concept into the overall WES programme in Nigeria.

While endemic guinea worm remains the first criterion when selecting rural communities for WES activities, the next criterion is the presence of schools. The WES in Schools project calls on the active participation of all the community's stakeholders in providing



Primary school students in a Bashibo classroom.

a safe water source, constructing school latrines and establishing an environmental health club at the school. These clubs have proved effective in achieving behavioural change, as demonstrated in Bashibo. The WES in Schools project has been implemented in many primary schools, but the Bashibo experience stands out for its linkages with other sectors and for its impact on both the schoolchildren and other community members.

Bashibo

With a population estimated at about 2,000, Bashibo is one of the villages of Mbakor community in Tarka Local Government Authority of Benue State in the south. Bashibo's government primary school is the only school serving the community. An ordinary village school, it possesses only four rudimentary classrooms without furniture; the students sit on wooden logs on a dirt floor, and classes are sometimes conducted under the trees for lack of classroom space. Current enrolment is 538 children in the charge of eight teachers.

Bashibo school was selected for the WES in Schools project in June 1999 by the UNICEF-assisted Benue State Rural Water Supply and Sanitation Agency in collaboration with the State Primary Education Board. The Local Government Authority, community members, the school's parent-teacher association and the students themselves all played an active role. One borehole equipped with a handpump and two double-compartment pit latrines were constructed for the school, and the school was also helped to set up a 'sanitation corner' and its Environmental Health Club.

A rapid assessment of the project was conducted in April 2001 with three primary objectives: to assess whether the



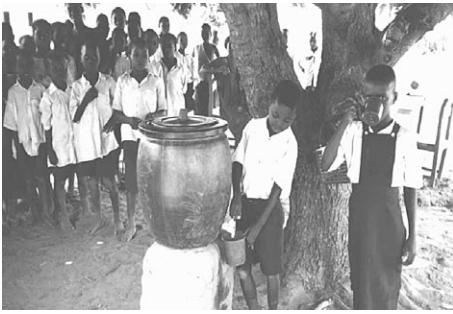
school's borehole and latrines were working and being used; to assess the impact of these services on the school environment; and to evaluate the activities of the Environmental Health Club.

The assessment used structured questionnaires, physical inspection of the facilities, and focus group discussions. A sample of some 25 pupils, 3 teachers and 15 community members was selected for more detailed interviews. Some of the findings:

- Both the borehole and latrines were functioning and being used at the time of the assessment. The borehole serves both the school and surrounding villages.
- The 12 girls and 18 boys of the Environmental Health Club were actively promoting good hygiene in both school and community. They were also advocating household water security and oral rehydration therapy for diarrhoea. The club funds its activities by selling plastic buckets and clay pots fitted with taps and by soliciting donations; in 2000 it raised about 4,000 naira or \$36 from sales.
- With the help of a teacher to



The school borehole.



Pupils taking water from a container fitted with a tap.

coordinate, the club is responsible for operating and managing the WES facilities; the club members check that the latrines are properly maintained and monitor usage of the borehole. By agreement with the community, the borehole is opened for the public in the morning and locked in the evening. One of the schoolteachers was trained as a handpump mechanic to ensure regular upkeep.

- Awareness of hygiene has grown significantly, as attested by the interviewees' responses and general conditions around the school. About 95% of the respondents aged 7–14 reported washing their hands after defecating, while about 90% stated they were following other practices like brushing their teeth and bathing regularly. The head teacher had noted improvements in personal hygiene, with some impact also on the parents, an opinion borne out by the children's general appearance. Before the Environmental Health Club had gone into operation, most of the students had come to school dirty, with ringworm and other skin infections.
- Three out of four of the children interviewed fetched the water for their households from the school borehole, which they claimed is the closest water source and consequently saves them time for relaxing, sports and reading.
- Enrolments at Bashibo school grew from 320 pupils in 1999 to 538 in 2001, and attendance has also

improved. The new WES facilities alone did not spur this change, but there are strong indications that they contributed. The head teacher believes they have done much to make the school more child-friendly, encouraging more children to enrol and stay in school.

Adding a nutrition component

Building on the successful WES activities, the State Primary School Agricultural Revival Programme (PRIM-SARP) has been introduced in Bashibo school. The overall objective is to develop farm projects actively involving schoolchildren, their teachers and other villagers, with the more specific aims of boosting food production through schools, providing food supplements for schoolchildren, and encouraging sound dietary habits.

The Environmental Health Club is the prime mover for PRIM-SARP activities in Bashibo school, with assistance from the State Primary School Education Board and the State Agricultural Development Agency. The activities include:

- Growing various crops – yam, cassava, maize, vegetables and soybeans. The school also has an orchard.
- Preparing soybean milk and orange juice for distribution to the schoolchildren at subsidized rates.
- Promoting good dietary habits both at school and at home.

The school has an arrangement for selling some of the harvest to the students, teachers and other villagers. The school also engages a food vendor to prepare food for the students using some of the produce. During the last harvest a yield of 80 yam tubers, three sacks of soybeans and several other crops made the programme self-sustaining.

The success of the PRIM-SARP programme in Bashibo can be largely attributed to the existing WES activities. The vegetable garden is irrigated by



The school's sanitation corner, with sacks of the soybean crop

runoff from the borehole, while the Environmental Health Club supplied a ready-made group of committed children to implement and promote the programme. Unsurprisingly, the school has become a model for integrated programming and has attracted numerous visitors from around Nigeria and beyond.

Lessons learned

- Installing WES facilities in the school stimulated the children's interest in operating and managing them.
- Water and sanitation can play a catalytic role in providing a child-friendly school environment for effective learning.
- Schools offer a favourable setting for convergent programming that benefits children's overall development.
- Active involvement of all the stakeholders, including children, will ensure sustainable programme development for increasing school enrolments and attendance.

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Produce grown by the school.

Universal sanitation in rural Thailand

by T.V. Luong*, Ongart Chanacharnmongkol** and Thira Thatsanatheb***

Sanitation is to maintain and control the exits and entrances from and to the human body. Do not let them be the sources and transmission routes of diseases...

Several millions of baht are spent annually for the treatment of people suffering from gastrointestinal diseases. With this amount of expenditure, human excreta can be systematically controlled. When excreta are safely disposed of, sickness from these communicable diseases could eventually be halved...

*— His Royal Highness Prince Mahidol of Songkhla, M.D. (Harvard),
father of the present King of Thailand, 1924*

Thailand has achieved remarkable success in providing safe drinking water and sanitary excreta disposal in rural areas. By 1999, 92% of the rural population had access to safe drinking water, while 98% of rural families had built and were using sanitary latrines.¹ These figures reflect more than five decades of endeavour, with support in the early years from the World Health Organization, UNICEF, the United Nations Development Programme and the United States Agency for International Development.

These achievements are largely attributable to the Thai government's farsightedness and determination to protect the environment and ensure sustainable development for rural areas. Strong political will and the commitment of government personnel at all levels to institute rural water supply and environmental sanitation, reinforced by intensive health education for behaviour change, added momentum to the goal of achieving universal sanitation before the dawn of the 21st century. This paper presents the strategy and lessons learned in Thailand for universal sanitation and health for all.

The promotion of sanitation in Thailand can be dated back about a century. Bangkok's first sanitation law,

passed in 1897, aimed to curb the communicable diseases caused by poor environmental sanitation; the primary focus was garbage collection and building public latrines. A hookworm eradication project initiated in 1918 emphasized the use of pit latrines. In 1926 the Ministry of the Interior issued regulations banning defecation in rivers and canals. All ramshackle latrines along the banks of rivers and canals were destroyed, while a campaign was launched to educate the public on improving sanitation and hygiene.

Following the establishment of the Ministry of Public Health in 1942, environmental sanitation became a cornerstone of the nation's programme for overall health development. The village health and sanitation project, initiated in 1960 to combat the prevalence of water-borne and excreta-borne diseases, supplied the impetus to expand the sanitation programme nationwide. The rural environmental sanitation (RES) programme, as an integral component of the national health development plan, was incorporated into all of Thailand's five-year economic and social development plans,² starting from the first five-year plan in 1961 until the current eighth five-year plan, 1997–2001.

From project approach to national strategy

The village health and sanitation project laid the foundation for the subsequent RES programme and the nation's present-day achievement of universal sanitation. The project focused on the construction of sanitary latrines, recognizing villagers' capacity for creativity and self-reliance in improving their living conditions without undue dependency on government help. Many of the project approaches described below have been gradually adopted as national strategy.

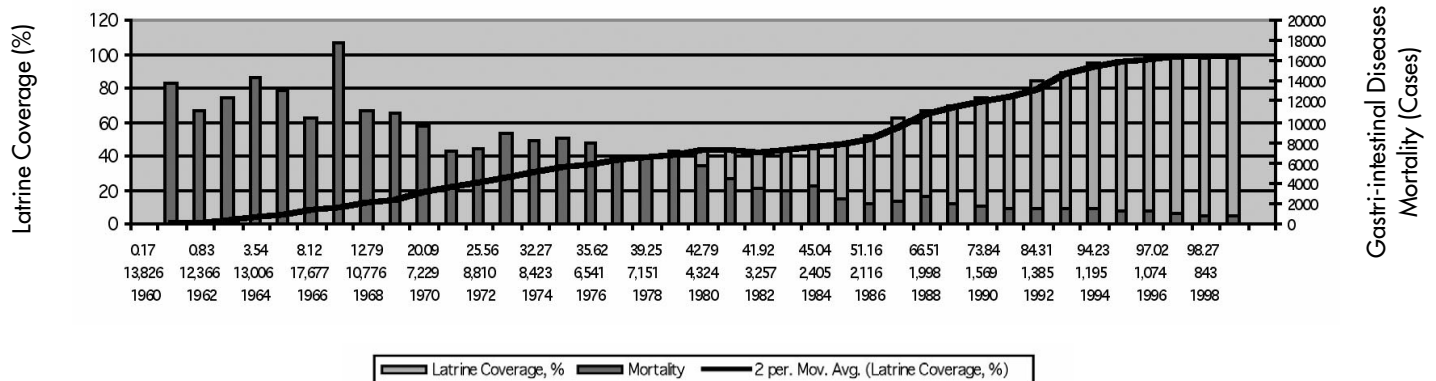
■ *Strong political support and cooperation of concerned government agencies.* Two successive prime ministers chaired the national health and sanitation development conferences held in 1962 and 1963 which secured the commitment of local and provincial authorities to taking the

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Figure 1: Latrine Coverage & Gastro-intestinal Diseases Mortality, Thailand



RES programme nationwide. The budgetary allocations and approval to recruit staff issued by the National Economic and Social Development Board, Bureau of Budget and Department of Technical and Economic Cooperation enabled effective programme implementation.

- **Intensive training.** Project personnel and technical staff of central and local government at every level, including village leaders and village volunteers, were trained for their roles in the RES programme.
- **Social mobilization and community health education conducted by mobile units and village volunteers.** Villagers selected their own volunteers at one volunteer for every ten families.
- **Promotion of water-seal latrines.** This latrine technology proved to suit Thai culture and existing habits. The gooseneck water-seal latrine was first developed in 1924 by Mr. Sawadi Mahagayi, governor of Sukhothai province, and is now widely used in Thailand and other countries.
- **Provision of supplies, equipment and transport.** The government issued suitable latrine pans, slabs and moulds for latrine construction, as well as films and slide projectors for health education. Adequate transport for project implementation and follow-up was also arranged.
- **Government-allocated demonstration budgets as revolving funds for latrine construction.** In the early years, water-seal latrines were supplied free to families from these demonstration budgets, but it was found that most of the latrines were not used and not properly maintained. To foster people's ownership and involvement, villages were encouraged to use their demonstration budget to set up a revolving fund for building village latrines. These revolving funds were initially managed by health officers and subsequently transferred to the village committees chaired by the village headman. Commuting the demonstration budgets to revolving funds meant that the demand for latrines could be met more speedily, and also generated financial resources from the communities for improved sanitation.
- **Systematic qualitative and quantitative monitoring of progress.** The government assigned qualified officers to help all 75 provincial authorities monitor progress on a regular basis (except Bangkok city, handled separately). In addition, periodic conferences both national and provincial were held for sanitarians and health officials to review progress, identify constraints and suggest solutions for improvement.
- **Awards for achievement.** The 'Golden Ring' awarded since 1987 for achieving 100% sanitation sparked competition between the provinces and helped to accelerate momentum towards universal sanitation.
- **Latrines a residency requirement.** The Ministry of the Interior issued letters in 1989 asking all local administrations to advise families to build a sanitary latrine before applying to register as residents in their locality.
- **Research and development.** Support was consistently provided for research and development, to refine technologies and techniques, and to strengthen skills in health education, communications and social mobilization.

Legacy of the village health and sanitation project

Responsibility for implementing the project was transferred in 1966 to the then Sanitation Division, Department of Health, Ministry of Public Health. The project was renamed and accorded an annual budget allocation from the government's regular resources. The Sanitation Division was later merged with the Environmental Health Division to form the Environmental Health Bureau, Department of Health, Ministry of Public Health.

From its inception the project supplied an opportunity to build up the

capacity of various academic institutions. One such institution is the Faculty of Public Health, Mahidol University. Over the years, Mahidol University has educated large numbers of public health personnel to serve the nation's needs.

The project also changed the attitudes of medical institutions and public health officers towards promoting latrines. Support for the project from the medical staff of Siriraj Hospital (a leading Thai teaching hospital) has accelerated the improvement of rural health nationwide.

Furthermore, the project energized the government to adopt intensive health education and community participation as a strategy for involving regional and provincial health officers, research centres and village volunteers in the bid to achieve primary health care throughout the nation.

The Rural Environmental Sanitation (RES) programme

The RES programme, now part of the national rural development programme, promotes a package of seven components: water supply, human excreta disposal, solid waste/garbage disposal, sanitary food handling, household hygiene, vector control, and wastewater disposal. Government technical personnel and village masons were trained in constructing water-seal latrines and large cement jars or tanks for water storage, with the aim of transferring low-cost technologies to the grassroots and building up the ability of village artisans to serve their community. For programme implementation, part of the funding is allocated by central government, part contributed by local government, and part raised from the communities and private sector.

For planning the RES programme activities each year, every village is surveyed against the government's basic minimum needs criteria. An implementation plan is drawn up for each village based on the results of the survey. These village plans are then incorporated into the province's rural development plan, which comprises the following ele-

ments: demonstration activities; training of village leaders and other relevant personnel; government demonstration budgets for latrine construction, preferably administered as village revolving funds with villagers contributing; intensive health education; and lastly, research and development.³

Lessons learned

The lessons to be learned from the success of the Thai government and people in achieving universal sanitation could be summarized as follows:

- Strong political commitment and good leadership in government at all levels and at the grassroots
- Effective training, to build up the capacities of government staff at all levels and community leaders
- Intensive and effective health education for behaviour change, reaching most families and communities
- Establishment of revolving funds at the grassroots to shift the financial investment from government to community, speed up responsiveness to demand, and generate local employment
- Stimulating active community participation and behaviour change through the primary health care system and the efforts of village volunteers
- Active involvement of non-governmental organizations and the private sector
- Effective collaboration between ministries and coordination between sectors
- Mobilization of resources from government agencies, non-governmental organizations and the private sector
- Transferring technology, skill and knowledge to all levels and to the grassroots
- Research and development to formulate innovative approaches, improve existing technologies, and

refine methodologies for health education and social mobilization.

Looking ahead: the Clean Environment programme

Thailand has now achieved almost universal coverage of safe drinking water and sanitation in rural areas, except for a few very remote villages in the highlands and some households near river banks, where support for building sanitary latrines is to continue. To further improve water supplies, the Thai government is taking action to upgrade the quality of all piped water throughout the nation including rural areas, so that all the nation's water will be safe to drink straight from the tap.

Since the basic needs are largely met, the government is now promoting a clean environment and better health and hygiene. The Clean Environment programme started up a few years ago under the banner Healthy Living/Healthy City/Healthy School. The programme promotes food hygiene, a healthy workplace, and happiness and cleanliness in both home and village. The government is also linking the tourism industry to the programme, aiming to attract both Thai and international tourists and to promote tourism for local economic growth without exploiting the local environment.⁴

Health for all

Thailand's success in achieving universal sanitation and safe water has brought a substantial reduction in mortality from gastrointestinal diseases. As shown in figure 1, sanitary latrine coverage grew from less than 1% in 1960 to over 98% in 1999 – and mortality from gastrointestinal diseases fell more than sixteenfold over the same period.¹

¹ Ministry of Public Health, Thailand, *Public health statistics, 1990–1999*, Bangkok, 1999.

² Department of Health, Ministry of Public Health, Thailand and UNICEF, *Four decades of latrine development*, Bangkok, 1985.

Community-based management of water services in rural Zimbabwe, 1997–2001

by Ngoni Mudege, Paul Taylor and Peter Bury, consultants, UNICEF Harare

Following five years of pilot projects with six rural district councils (RDCs), Zimbabwe in 1997 adopted community-based management as its national strategy for rural water supplies. This review focuses on the practical issues of managing handpumps and headworks: the linkages between water provision, hygiene behaviours and sanitation are of course important but not discussed here.

Community-based management (CBM) implies that the user community has full control, ownership, authority and responsibility for developing and managing water services. But CBM should not be perceived as a choice between a top-down or a bottom-up approach. Rather, it is the establishment of a management system in which full collaboration between community and local authority is essential; each plays clearly defined but separate roles, and each understands and accepts the role of the other.

Why CBM in Zimbabwe?

The centralized handpump maintenance programme originally adopted in Zimbabwe failed to keep pumps in

Users take charge of water points

In Bulilimamngwe district the users of one water point have been paying for water, generating about Z\$3,000 (\$56) to pay the village mechanic and to purchase grease and spare parts. Users who default are reported to the kraal head, and security officers selected from the community prevent the defaulters from fetching water. The community reports that very few have defaulted, peer pressure being more effective than the policing by security officers.

working order and has proved unsustainable as government resources have dwindled. In recent years an increasing number of water systems have fallen into disrepair, to the point where water supply was effectively decreasing. It is now recognized that the essential ingredients for sustainability are ownership by the users, with management and decision making handled by those who benefit.

It has also been recognized that communities do have the capacity to manage and maintain their water supplies. Training of pump minders selected from their communities has demonstrated their ability to acquire the technical skills for upkeep of handpumps and their headworks, and communities have shown the organizational ability to mobilize joint action for sustaining their potable water supply.

Institutional support

The CBM programme is overseen by the National Action Committee, which coordinates all the line ministries involved and which developed the national strategy and an implementation guide. Trainer's guides and training materials have also been produced.

The Committee is supported by the National Coordination Unit, which promotes and monitors the introduction of CBM throughout rural Zimbabwe. Provincial and district subcommittees for water and sanitation disseminate the national policy, guidelines and training materials, and coordinate and guide the introduction of CBM.

CBM has so far been introduced mainly in RDCs where water and sanitation are supported by external funding agencies, and the experience from these projects has been used to refine the national strategy. But introducing CBM

via externally funded projects can cost more than necessary, and in many rural districts CBM has not yet been introduced to replace the collapsing centralized system.

Achievements

- CBM is now an integral part of the national water and sanitation programme.
- Experience from pilot projects since the early 1990s has helped to refine policy, guidelines and training materials.
- CBM has now been introduced in over 30 RDCs covering nearly half the country.
- The majority of rural communities and RDC staff have learned and adopted the basic principles of CBM.
- At every level from capital to village, increasing numbers have been trained for their role in supporting CBM.
- Spares for Zimbabwean handpumps are now available throughout the country.
- Where CBM has been introduced, a number of user communities are paying at least part of the costs of repairs and spare parts.
- Community financing and locally available repair skills have significantly reduced the down time of handpumps.

Key principles

CBM is most likely to succeed if all the actors embrace four principles embodied in the national guidelines:

- The user communities own their water services.

Participatory approaches to CBM

Zimbabwe's CBM initiative has adopted participatory methods to create awareness, promote attitude and behaviour changes, and facilitate community planning. Visual aids such as posters and pocket charts, developed by the government's participatory health and hygiene education programme, have been widely used to mobilize the communities. Experience from other international and regional programmes aiming to transform hygiene and sanitation behaviours was also called on to help strengthen Zimbabwe's participatory approach and achieve productive community involvement.

- The user communities meet all the management costs, including operation and maintenance of the water points and their headworks, but the RDC authorities may choose to subsidize disadvantaged communities or specific technical needs.
- The RDC backstops the communities by helping them to formulate their plans, by coordinating and facilitating whatever advice, training and help they might need, and by drawing up the legal instruments to support CBM.
- The user communities consult with the RDC when developing new water services, to ensure informed decisions about choice of technology and levels of service.

Promoting CBM and putting it into action is a complex process involving a wide range of actors at every level of administration, as well as the private manufacturers and artisans who contribute to construction, repairs and provision of spare parts. Many factors influence the process, including socio-economic changes, population size and composition, and the development of new technologies. The approach has to be flexible, focused on process, building on existing experience and skills, and based on joint learning by doing and monitoring.

No blueprint prescriptions exist that cover every situation, but some guidelines should inform every strategy:

- The role of the support agents at various levels is primarily to listen, to guide and to facilitate the finding of the best solutions, building on existing practices, knowledge and skills.
- The user communities have to be self-organized, with enough community personnel properly trained as pump caretakers and mechanics, able to ensure that the water systems are managed sustainably, and able to collect the necessary funds from users. The private sector contributes by providing spare parts and other supplies.
- The RDCs and their councillors, with technical support from their district authority and other allies, play the lead role in formulating policy, allocating resources and advocating CBM in their constituencies. The RDC has proved a workable unit for introducing CBM, providing a base for support agencies to help the communities build up their capacity and for the private sector to play its part.
- The National Action Committee, working through the National Coordinating Unit and the provincial subcommittees for water and sanitation, provides the RDCs with updated policy guidelines and training materials.

Challenges and remedies

Capacity building

- **Problem.** Training has been extensive, with thousands of community members and artisans now equipped to manage water services. But little was done to brief the RDCs and their councillors how to introduce and support CBM, which led to poor strategic planning, policy formulation and management.

Remedy. RDC staff are now being trained in management skills. They

have clear policies with realistic plans and budget allocations.

- **Problem.** Many training materials were available to support various aspects of CBM, including community development and organization, pump mechanic training, and participatory materials for health and hygiene education. These smoothed the path for introducing CBM, but they had not been tailored to the Zimbabwe context and had to be adjusted ad hoc. They were also not supported by basic information materials suitable for distribution.

Remedy. The training materials have been adjusted to reflect a more integrated approach to CBM and are now accompanied by simple handouts on such topics as the principles of CBM, prices for spare parts, roles and responsibilities.

- **Problem.** Community groups and artisans often received only the one training session, with little or no follow-up or refresher training. They consequently felt isolated and were slow to go into action with CBM.

Remedy. Follow-up now takes place at regular intervals, especially in the early stages, to encourage communities to understand and adopt their full range of roles and responsibilities. Artisans are also being supervised and given refresher training.

Monitoring

- **Problem.** Monitoring is an important tool for effective management, assessment and course correction. The RDCs were collecting information on some aspects of implementation but were not always effective in monitoring progress overall with CBM.

Remedy. The RDCs have now been supplied with an affordable and efficient monitoring system, used to adjust implementation plans and resource allocations.

- **Problem.** A key objective was to

Monitoring in Kadoma district

In Kadoma district, records are being kept in the local language to monitor water points and conditions in the villages. The sanitation data survey progress with constructing latrines, collapsed and filled-up latrines, and use of builders. The water data report whether village water points are functioning, periods of down time, and use of pump mechanics. The district authorities admit that their monitoring system still needs some perfecting.

reduce the down time of handpumps. While there is plenty of evidence that pumps are now being repaired quickly in many communities, the RDCs lacked a system for longer-term monitoring whether the goals are being achieved of reduced down time, improved coverage and health benefits.

Remedy. The RDCs now have a workable system for monitoring the longer-term impact of CBM.

- **Problem.** Communities have taken full control over their water facilities, make financial contributions and are active in repairing broken-down water points. But the water points are not maintained to any agreed standard; headworks are neglected and the communities do little preventive upkeep.

Remedy. Programme implementation should include mechanisms for communities to establish their own standards for water services against which to monitor their own performance.

Policy issues

- **Problem.** Zimbabwe is still in the process of decentralizing various functions to the local RDC authorities, and the central government agencies sometimes have yet to coordinate their approach. In the case of CBM for rural water supply, the National Action Committee

adopted the new approach while alternative systems are still in use, making it difficult for some RDCs to define their own policy in the face of contradictory messages. Within the same rural district, the government may be providing spare parts and technical skills free of charge to some communities while other communities are paying full cost. For a time no clarity existed on which spares or technical skills should be paid for by communities, subsidized or supplied free.

Remedy. The RDCs now have a policy on what support to give to communities for specific repair problems.

- **Problem.** Headworks were not being constructed and in some cases not maintained. This stemmed from overemphasis on community management of the handpump; headworks upkeep was neglected and the link to health and hygiene education was weak.

Remedy. The community's role in managing headworks is now clearly articulated by the RDCs and included in all the training, support and monitoring activities.

Looking ahead

- **Problem.** The introduction of CBM has so far been funded mainly by external agencies, who have financed much of the training and the distribution of tools for repairs. Communities have demonstrated their willingness to handle repairs, and the RDCs are expected to continue to accept their support role to communities. But the RDCs have not planned how they will take over the role when external assistance has been withdrawn, and most districts have no long-term vision for integrating CBM into the RDCs' overall development programme.

Remedy. Longer-term strategies are being formulated for integrating CBM into the RDCs' general planning and management frame-

work. The RDCs are allocating appropriate resources, and now have a clear position on how they will be partnering the communities.

- **Problem.** Despite good evidence of community willingness to pay for repairs and even for expensive spare parts, it is too early to tell whether the user communities will continue willing and able to cover the larger costs of breakdowns and replacements as the water systems age and wear out.

Remedy. Appropriate policies and modalities have been drawn up for RDCs and user communities to help them prepare for future high costs from major breakdowns and other unforeseen expenses as the systems need to be expanded and replaced.

- **Problem.** Zimbabwe has a good institutional framework, from national level to community level, to support community development. But because of the nation's economic and other difficulties, resources are dwindling for these institutions and weakening their ability to deliver. High turnover of staff in ministries and RDCs is also affecting efficiency.

Remedy. As experience is gained with CBM, the support institutions may be able to redefine their roles according to their capacity and continue to devolve responsibilities to the local authorities and communities.

Comprehensive strategies for CBM

Makoni, Bikita and Kadoma RDCs have developed comprehensive strategies for CBM and have set aside annual allocations for it from their own resources. In their first council resolution on the new approach, the Kadoma RDC councillors described CBM as 'a way of life' for their area.

Launching total school health in Chennai city, India

by Sumita Ganguly, sanitation coordinator, UNICEF Delhi, Jaya Gokulamini, WES project officer, UNICEF Chennai, and Alka Malhotra, WES consultant, UNICEF Delhi

Why schools?

After the family, schools are the most important places of learning for children. They are the obvious focal points for instilling healthy behaviours and responsible attitudes in future generations. Compared to adults, children are far more receptive to learning and adopting new ideas and practices. Moreover, they carry these messages home from school to their homes and communities.

- Schools offer a ready-made, child-centred, organized setting for promoting life skills and positive attitudes to hygiene. Children's ability to attain their full potential stems directly from the synergy of good health, sound nutrition and appropriate education.
- School health is an investment in the nation's future, since children in poor health cannot concentrate on learning and are prone to absenteeism and dropping out. The combination of poor health, poor learning and lack of psychosocial stimulation in income-poor homes carries a high cost for a nation's human development.

School sanitation is fundamental. If school toilets are absent or poorly maintained, schools become unhygienic places transmitting disease. Moreover, children predictably avoid unventilated, dirty toilets and prefer to defecate in the open, which does not encourage respect for hygiene or protect the environment.

The challenge in Chennai

The education authorities of Chennai (formerly Madras), capital of India's southernmost state of Tamil Nadu, run 274 primary and middle schools, 45 high schools and 19 higher secondary

The overall objective is to 'ensure easy access to sanitation and drinking water facilities in all schools and promote learning of hygiene and health practices among schoolchildren'.

schools, which provide schooling primarily for the poorer city children. An innovative 'total school health' programme was launched for all these schools in late 1999, with UNICEF assistance.

The overall objective is to 'ensure easy access to sanitation and drinking water facilities in all schools and promote learning of hygiene and health practices among schoolchildren'. The project also aims to help the children develop self-reliance and good judgement, and empower them to take some responsibility for their own health and

that of their families and community.

A preliminary survey of 197 Chennai schools left no doubt that there was need. A good 54% of the schools did not have safe drinking water, and about half did not have handwashing facilities; 14% had no toilets at all, and 20% had only one toilet. Only 56% of toilets were properly maintained. On average, one toilet had to serve 120 children in the primary schools and 150 children in the high schools. A third of the schools had no space for outdoor play and 22% did not have adequate lighting. Only one out of ten had a telephone, though radio was available in 54% and television in 12%.

Health check-ups of 98,000 children by the city health department in April 2000 found that 17% had dental caries and 52% had worms. Children were also suffering from anaemia, vitamin A deficiency, scabies and middle-ear infections.

Potential for the nation

UNICEF India considers it a strategic priority to enable government agencies, communities and families to secure for children their rights to a safe environment, clean drinking water, clean surroundings, and the privacy, dignity and safety of properly maintained latrines. Such latrines do not only improve the quality of life; they also provide the facilities so essential for girls, both in school and at home, to safeguard their basic health and personal care needs.

In India, unhygienic practices and contaminated water continue to cause diarrhoea and ill health, which together account for nearly 450,000 under-five deaths each year. Nearly 20% of infant deaths are still caused by diarrhoea, and lack of sanitation still fosters recurrent infections leading to malnutrition, which impairs the growth of more than 58 million of India's under-fives, or roughly every other child. It has been estimated that over 70% of the health problems of the nation's primary schoolers are caused by inadequate hygiene.

India has a huge infrastructure of primary schools, with approximately 100 million children enrolled. A school-based programme for sanitation and hygiene could reach, through these children, nearly half of the nation's households. The potential is enormous for influencing attitudes and behaviour, and for stimulating critical thinking and creativity, throughout every community of the nation, rural and urban alike.

Upgrading water and sanitation

Health education in schools lacks credibility without adequate water and sanitation facilities. Funds from the state government's Namakku Namme scheme have been used in the past for such infrastructure items as well-designed toilets and urinals; the scheme encourages the public to contribute funds or labour for community improvements, with the state government covering up to 75% of the costs.

The Chennai corporation decided to call on the scheme for upgrading the city schools. The proposal was drawn up in 1999, UNICEF contributing \$53,000 and Tamil Nadu contributing \$160,000 from Namakku Namme funds.

Building works were held over to 2001 for 77 schools needing new toilet units after demolition of their old unusable ones. In the meantime, virtually every other school had its facilities repaired and upgraded, according to need. Urinals and toilet units were refurbished or new ones installed, tanks supplied for water storage, tubewells reconditioned, and older tubewells fitted with electric pumps.

Improving the surroundings

Stagnant water from poor drainage at water points was a common problem. Although the project did not allocate funds for improving drainage, many schools have installed drains on their own initiative, some of them raising the funds from their parent-teacher association. Many of the schools maintain small gardens, and are using the wastewater for irrigation.

Garbage disposal in the Chennai schools is mostly handled by placing cardboard bins in the classrooms and compounds, emptied by the children. Some schools have dug garbage pits for solid waste, while others have placed larger bins in the compounds. After a year of implementing the school health programme, the city's teachers and education supervisors asked the city to provide garbage collection service for the schools, requesting garbage bins of the same type placed all over the city.

The head teachers are responsible for seeing that their school organizes the garbage for collection.

Hygiene education

Activities began with discussions between the city's deputy commissioners for education and for health. Health Education and Promotion International, Inc. (HEPI) had already developed a series of manuals and teacher's guides, which were adapted and translated into Tamil for use in Chennai.

HEPI planned and conducted the training programme: three days of training in January 2000 for the city's 12 education supervisors; two days of training in February for all the city's head teachers, some 350 of them; training in March for two health coordinators from each school, some 700 teachers; two days of training in July for the education supervisors to assist in training all the remaining teachers; and in August, training in batches for the 2,500 teachers remaining. Within eight months, every teacher involved in the programme had been trained how to use the manuals and teacher's guides.

The curriculum is built around eight broad topics, followed through from first to twelfth grades: the whole human being; responsibility and health; social health; safety and health; environmental health; nutrition; drugs; and consumer health. Each topic for each grade is subdivided into four units, for children at different levels of ability. Emphasis is placed throughout on helping them develop life skills – for analysing, listening, judging, communicating, decision-making, planning, interacting, problem-solving, cooperating and negotiating. The Tamil version of the manuals contains songs that can be set to locally popular tunes to carry messages on health and hygiene.

Since alcoholism and substance abuse are fairly prevalent in the children's home environments, both teachers and students relate to these issues and are now discussing them openly at school.

Organizational structure

From the start, the initiative has been taken by the deputy commissioner for education, Mr. Vijaykumar, and his team of enthusiastic teachers and supervisors. While other city departments have played their part, notably the building and health departments, these intersectoral linkages have thrived more on good will than on established mechanisms for service delivery. UNICEF's support has been used primarily for the development of resource materials and training activities, with about half the UNICEF funds going towards construction of the 77 new toilet units.

The programme is monitored through monthly review meetings held by the education department, and surprise inspection visits to schools by the deputy commissioner for education. The schools are visited each week by the education supervisors, who report back to the district education officers. The schools' parent-teacher associations hold meetings once a month to which community representatives are invited.

What has worked

- Health and hygiene education is now built into the curriculum of all the city schools.
- Although the syllabus is structured, it offers scope for flexibility and creativity in planning the lessons.
- A resource group on hygiene and health education has been assembled comprising education supervisors, teachers and members of a local non-governmental organization.
- All the city schools in Chennai follow a common syllabus and timetable, and have established school health clubs. The club members monitor the personal hygiene of their peers as well as conditions in the school and classrooms.
- Programme activities receive constant supervision, to encourage, motivate and support, with the emphasis on practical help for teachers.

Follow-up work

- After only one year of operation, the programme had brought visible changes. Physical conditions had improved, and standardized tests given at year's end up to the eleventh grade showed generally encouraging progress in the children's health knowledge, attitudes and skills. The testing also pinpointed weaknesses in some topics, which teachers are now working to remedy. But sustaining the programme will require more systematic coordination between the city departments, to strengthen the partnerships that worked so well in the first 18 months.

The curriculum is built around eight broad topics, followed through from first to twelfth grades: the whole human being; responsibility and health; social health; safety and health; environmental health; nutrition; drugs; and consumer health. Each topic for each grade is subdivided into four units, for children at different levels of ability.

- An independent assessment revealed that the toilet facilities were used properly in only 60% of the schools. To correct this problem a training programme was drawn up for the city's maintenance staff, on maintenance and repair of toilets and water systems. Students and teachers are also being reoriented on use and maintenance.
- The linkage between the children and their communities was the last project element to be developed. A community action programme for water and sanitation awareness went into operation at the end of 2001.

Improving child health, from page 5

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Database on the decade's progress for children

The World Summit for Children in 1990 adopted a number of goals to safeguard children's future, including improved water supply and sanitation, reducing the toll of diarrhoeal diseases, and eradicating guinea worm. The decade's achievements will be reviewed at this year's special session on children of the UN General Assembly.

In the meantime UNICEF's Statistics and Monitoring Section has posted comprehensive statistics on the goals at www.childinfo.org. The webpages provide brief regional overviews and graphics as well as detailed country-by-country data covering the past ten years.

Bashibo school, Nigeria, from page 7

- The Bashibo students have demonstrated the effectiveness of children as agents of sustained change in hygiene behaviour, both in schools and in the community as a whole.
- Successful WES interventions in schools can attract support for developing other basic services in schools.

The Bashibo experience showcases an effective strategy for achieving a child-friendly school environment and also for improving schoolchildren's nutritional status. It suggests that an integrated approach works best for making schools attractive to children, offering lessons of possible value for Nigeria and other nations striving to make basic education genuinely universal by providing child-friendly schools.

Universal sanitation in rural Thailand, from page 10

³ Sanitation Division, Department of Health, Ministry of Public Health, Thailand, *Sanitation programme for rural areas*, Bangkok, 1995.

⁴ Ministry of Public Health, Thailand, *The Eighth Five-Year National Health Development Plan, 1997–2001*, Bangkok, 1997.

Evaluating rural latrines in Guinea, 1998–2001

by Madelein Weglin-Schuringa, consultant, IRC, The Hague, and Ousseynou Guène, consultant, CREPA (Centre régional pour l'eau potable et l'assainissement), Ouagadougou

The programme for rural sanitation in Guinea started out in 1989 by building ventilated improved pit (VIP) latrines in schools and various public places, too expensive for families at \$500 each. In 1994, the approach switched to simple pit latrines (one or two compartments) at \$250 to \$300, still beyond the reach of all but the richest rural households.

1997 saw the introduction of SanPlat latrines to two regions, in Upper Guinea and Middle Guinea, with a combined population of some 1.5 million in nearly 213,000 households. The sanitary platform latrines cost far less – \$45 for a family latrine and \$160 for a public latrine. Community involvement is key: nearly half the cost of installing a public latrine, and three quarters the cost of a family latrine, is borne by the users. Two years after the programme had gone fully operational, it was evaluated to assess achievement and formulate recommendations for the future.

By way of background, Guinea is a small West African country with a population of 7.4 million, home since 1990 to nearly a million refugees from Liberia and Sierra Leone. Internal displacement has resulted from recent attacks across the borders. The 1999 *Demographic and Health Survey* found that two out of five rural inhabitants had access to safe drinking water, but only 5% had acceptable sanitation; 51% were using no latrine at all while 42% were using traditional latrines, rarely if ever hygienic.

Development of a sanitation policy for Guinea has sometimes been complicated by the lack of a single supervising body. The national guidance committee comprises representatives from seven ministries – hydraulics and energy, health, promotion of women and children, communications, education, decentralization, and international cooperation.

Evaluation methodology

The evaluation teams adopted a participatory approach to survey communities reachable in the rainy season representing 12% of the programme areas. Interview guidelines and checklists were developed specifically for the evaluation. The teams interviewed village masons manufacturing SanPlat footslabs, the staff of the local rural development authority (Communauté Rurale de Développement), village women, men, children and teenagers. Their views were asked on the different technologies (SanPlat latrines, single or double VIP latrines), level of demand and use, impact on behaviour change, knowledge of hygiene messages, and the programme's durability and replicability. Two-day workshops were convened to obtain the opinions of the national partners, non-governmental organizations, programme staff and consultants.

The evaluation focused on two primary issues:

- **Technical performance.** Assessment of the latrines took into account the different users (schools, health centres, families); the soil conditions (rock, sand, silt); the materials used to build the superstructure (concrete blocks, fired bricks, sun-dried bricks, thatch or wooden frames, unroofed or roofed with metal sheet, thatch or leaves); the age and type of latrine; and the users' attitudes and practices.
- **Support strategies.** The evaluators also reviewed the effectiveness of the different strategies for helping families and communities install latrines – the numbers built so far, ease of construction and user involvement, management and distribution of materials by the rural authority, and UNICEF's contribution of imported materials.



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The programme

The primary goals for sanitation in the two programme regions were to increase the numbers of hygienic latrines and improve hygiene behaviours, especially hand-washing at the appropriate times. Between 1997 and 2000, some 8,800 family latrines were built (against a goal of 10,000 latrines to serve about 560,000 family members), and 487 public latrines in schools, health centres and marketplaces (against a goal of 600 public latrines).

The strategies:

- Community leaders and rural authorities are trained on the necessity of hygienic latrines, the danger of faeces for health and the environment, the advantages of SanPlat latrines, and the division of roles between UNICEF, the authorities and the community.
- Village masons building SanPlat latrines are trained and monitored by national non-governmental organizations.
- The rural authorities meet twice a year to review the needs.
- The rural authorities handle the local management of imported materials, select the village masons for training, decide on the beneficiaries and siting of latrines, and in general oversee all the local activities.

The village masons, equipped with tools by UNICEF, manufacture and install the SanPlat footslabs and build the superstructure only for the public latrines. Demand for the SanPlat latrines is high enough to justify training generous numbers of local masons.

The rural authorities assign latrines according to community ability to build on time, rather than level of need. Various approaches are used. Some rural authorities employ a quota system; some supply cement to the first households that dig their pit and obtain the sand and gravel for the concrete squatting slab; some give priority to the more influential families in the district. In the

course of the evaluation all the rural authorities expressed satisfaction with the sanitation programme and their commitment to running it as well as possible.

Technical performance

The evaluators found that the pits were being dug to the recommended depth (3 to 4 meters) and occasionally deeper. The squatting slabs and drophole covers were standing up well, with only three slabs broken because of a mistake in the manufacture. The superstructures were better in Upper Guinea, where families had built thatched huts. In Middle Guinea, many of the superstructures were flimsy material tacked to wooden frames, and few families had built their own. Overall, both family and public latrines were clean, odourless, and used by all members of the family. The pits were filling up slowly, but because of intense biological activity, not low level of use.

Behaviour change

The two key objectives are to instill sound practices for building, maintaining and using latrines, and to ensure hand-washing with water and soap at the critical times. (The initial goals were set at 50% to wash their hands before eating, 35% after defecating and 25% before preparing food, and 50% to dispose of children's faeces in latrines.)



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The strategy is spearheaded by the production and diffusion of messages in the local languages on how to maintain and use water points; how to store water safely; why latrines should be built, maintained and used; why faeces carry risk; and why hands should be washed at certain times. Every possible partner is trained to disseminate these messages – community leaders, village masons, rural authority staff, rural radio, school-teachers and students. Special emphasis goes to environmental education in schools.

The nine stations of the rural radio service have been a key resource. They broadcast practical, lively and popular programmes in the local languages on every aspect of hygiene. The messages are then reinforced by everyone active locally in the sanitation programme.

Evaluation findings

- The evaluators observed real motivation at every level of administration from national to local.
- The switch from VIP to SanPlat latrines has paid off in the rural areas because the SanPlat latrines are easy to build, cheap, hygienic, and preferred by users. They have become widely known over the past three years.
- The rural authorities have proven their capacity to manage the programme. Their selection of masons for training has been efficient. Their handling of materials supplied by UNICEF seems transparent. Their achievement is reflected in the numbers of new

continued on page 20

UNICEF's water and sanitation programming in emergencies

by WES Section, UNICEF New York

These notes are intended for colleagues in UNICEF country offices, but we hope they will be useful to all those who work at our side, both in readying for emergencies and in coping with emergencies and their aftermath.

Basic policy

UNICEF's current policies and strategies in the WES sector are defined in *UNICEF strategies in water and environmental sanitation (E/ICEF/1995/17)*, approved by the UNICEF Executive Board in 1995 and commonly known as the WES strategy paper. Paragraphs 54 to 56 lay down some key principles for WES programming in emergencies:

- 'Within the limits of the resources UNICEF is able to mobilize, and in close coordination with other concerned organizations, UNICEF will provide assistance in water supply, environmental sanitation

and hygiene education in emergencies. Assistance will be aimed at meeting immediate needs and expediting rehabilitation...

- 'Although the response to emergencies needs to be rapid and coordinated, the extent and intensity of UNICEF support will be contingent upon the availability of sufficient human resources to the WES sector...
- 'In affected rural and periurban areas, UNICEF will focus on the most affected and vulnerable populations and seek to ensure the rapid availability of basic minimum water supplies and facilities for the safe disposal of excreta using low-cost appropriate technologies. Particular attention will be given to sanitation in situations involving large concentrations of displaced persons.'

The Board document on emergencies presented the next year confirmed UNICEF's mandate to assist in emergencies, highlighting community water supply as one of three priority areas along with primary health care and basic education (*A conceptual framework for UNICEF emergency intervention, E/ICEF/1996/16*, para. 12). UNICEF's core commitments for first-stage emergency assistance have since been spelled out in detail – see box.

Where we stand now

The Executive Board is therefore clear in committing UNICEF to provide WES help in emergencies, though the policy documents note at the same time that the extent of the activities depends on the availability of human and financial resources, and should follow a flexible approach adaptable to specific situations.

In the field, UNICEF continues very active in WES programming for emergencies. In countries with large ongoing WES programmes, UNICEF is often the lead agency during emergency interventions – Ethiopia, India – and can usually perform the role well with existing staff and other resources.

More problematic are emergencies in countries where UNICEF has limited or non-existent WES programmes – Colombia, Dominican Republic. In these countries UNICEF is often called upon to provide emergency WES inputs simply because UNICEF is on the ground and trusted by the government and other partners, and because WES interventions are often the most urgent of the needs. Such requests, from both governments and populations, are difficult to honour – but also difficult to deny – in the growing number of countries where UNICEF was once the lead agency for WES but has cut back its

Core commitments for first-stage emergency assistance

To ensure the initial provision of water and sanitation for children and women, in collaboration with all partners, UNICEF will:

1. Ensure the availability of a minimum safe water supply, through provision of technical and material support to external implementing partners.
2. Provide bleach, chlorine or purification tablets, and detailed user and safety instructions in the local language.
3. Provide jerry cans, or appropriate alternative, with user instructions and messages, in the local language, on handling of water and disposal of excreta and solid waste.
4. Provide soap and disseminate key hygiene messages on the dangers of cholera and other water- and excreta-related diseases.
5. Facilitate safe excreta and solid waste disposal through provision of: shovels; cash for contracting local service companies to dispose of solid waste; messages on the importance of keeping excreta (including infant faeces) buried and away from habitations and public areas; messages on disposal of human and animal corpses; and instructions on, and support for, construction of trench and pit latrines.

programme, is no longer as active in the sector, and has fewer resources to make available for emergencies.

Preparing for disaster

Nevertheless, the mandate from the Executive Board and the continued country requests for emergency interventions ensure that UNICEF will continue to be active in WES in emergency situations. The types of emergency that require WES interventions will be continuing to recur in many of the countries where UNICEF works, often on a seasonal or multi-year cycle – hurricanes, floods, rainy-season cholera outbreaks and the like.

All UNICEF country offices should therefore include emergency preparedness planning for WES in their country programming cycle irrespective of the existence of ongoing WES programmes. The various notes of core commitments for WES in emergencies outline some procedures for UNICEF country offices, summarized below:

- Include vulnerability analysis (in general, and specifically for WES) as a mandatory part of the country situation analysis, particularly in countries with a history of seasonal or multi-year cyclical emergencies, natural disasters, or recurring civil and political disruption.
- Include emergency preparedness activities within the country programming cycle.
- Ensure an annual source of flexible funding for emergency situations, in consultation with the regional office and UNICEF headquarters.
- Coordinate with government, partner agencies, civil society and the private sector – brief them on UNICEF’s core commitments, assess the capacity of the various partners, assess the capacity of private suppliers and service companies, etc.
- Build capacity in the country office – train WES staff and/or other staff in vulnerability analysis and WES emergency programming, maintain a regional roster of trained WES staff, etc.
- Prepare information notes and instructions ahead of time on each of the UNICEF core commitments (messages to be country-specific, pre-tested, laminated if appropriate, stockpiled in both country and regional office, etc.)
- Ascertain the principal and alternative supply sources and delivery options for all WES items likely to be needed in emergencies.

Note:
UNICEF core corporate commitments in emergencies, *E/ICEF/2000/12, table C.*

Evaluating rural latrines, from page 18

latrines installed, averaging 90% of the goals set for the three-year period.

- Open defecation has become noticeably rarer. Despite travelling numerous villages by foot and car, the evaluation teams saw no faeces on the ground. Villagers still without latrines are now defecating in the bush far from homes and rivers.
- Communities now know the benefits of latrines and the importance of personal and environmental hygiene. The demand for latrines has soared. In Upper Guinea, for example, the number of family latrines has nearly quadrupled, from 875 in 1998 to 3,323 in 2001, while the number of public latrines has nearly tripled, from 108 in 1998 to 286 in 2001. Latrines were being built in 2000 at three times the 1998 pace.
- Knowledge has translated into behaviour change. For example, water sampling found 69% of samples entirely free of coliform bacteria in 2000, compared with 48% in 1998; all the samples showed lower densities of bacteria; and three out of five households in the evaluation areas were drinking safe water in 2000, compared with only two out of five in 1998.
- Reduction in diarrhoea incidence was not objectively verified, but all the interviewees reported noticing it had become less common.
- Recruit and train more masons; retrain some existing masons to higher proficiency
- Continue disseminating messages by rural community radio
- Use broadcasts popular with women to discuss hygiene behaviours and the latrines programme
- Develop local plans of action, to include schools, for incorporation in the yearly planning reviews
- Involve village women more actively in building and maintaining latrines and in hygiene education for their villages.

Recommendations for the future

- Retain the SanPlat latrines with shallower pits (2 meters maximum)
- Promote hand-washing in schools
- Develop appropriate guidelines offering many models of superstructure for masons and rural authorities

Detailed information in French on the Guinea sanitation programme is available from the IRC website, www.irc.nl.

Creating jobs and good refuse management in Guapi, Colombia, 1998–1999

by XXXXX, XXXXX, UNICEF XXXXX

Guapi lies hard by the Pacific Ocean in the department of Cauca, on the banks of the Cauca river. With a surface area of 2,700 square kilometers and a climate that is hot and humid for most of the year, it has a population of 38,000 inhabitants, of whom 12,520 live in the municipal administrative district. Most of the population are employed in fishing, trade, handicrafts, and agriculture and forestry. A few work as public employees or teachers. Poverty is the common denominator.

Eighteen neighbourhoods make up the municipal administrative district, sharing a precarious urban infrastructure – overcrowded houses; streets crossed by contaminated *arroyos* (streams); ramshackle drains and aqueducts; minimal electricity and telephone services; and, until 1998, absolutely no service for the collection and disposal of refuse, which is the subject of this case study.

'All the trash ended up in the river'

Pedro Banguera, coordinator for the new sanitation service, described the old situation: 'Before garbage was collected, Guapi was a disaster. The streets, the neighbourhoods, the street corners were just covered with trash.' Alba María

Figuroa, who found work as a street cleaner, added, 'All the trash collected - all of it - ended up in the river.'

Three gullies crossed the centre of town and washed all detritus down into the river. The town had 15 open garbage dumps. Householders paid children 5 pesos (20 pesos are roughly 1 US cent) to collect their garbage and throw it into the river or onto the nearest patch of waste ground. High tides were expected to carry the refuse away, but this did not always happen, and some of it lodged on the banks of the Guapi river, which is the town's principal transport artery, its water supply, an important source of fish for subsistence, and the town's most popular recreation area.

One had only to walk the streets to realize the gravity of the public health problem and see how the town was being spoiled. According to a 1996 study by the CIMDER Foundation (Centro de Investigaciones Multidisciplinarias para el Desarrollo, Universidad del Valle), pneumonia, bronchitis, malaria, diarrhoeal diseases and skin diseases were among the leading causes of sickness. These diseases affected mainly the children and were clearly associated with the basic hygiene problems caused by the lack of safe drinking water, sewer systems and refuse collection.

A municipal proposal

Over recent years the CIMDER Foundation, with support from UNICEF, has taken various steps to improve the health of Guapi's inhabitants, aided by the community and by local and national authorities. A key finding was the need to strengthen the town's basic public services – water, sewers, and sanitation. Building on the political will that had been demonstrated for these issues, mayor Jesús Francisco Castro included in his January 1998 city plan a programme for collection and disposal of solid waste, together with job creation, which is backed by Colombia's Ministry of Economic Development, the Inter-American Development Bank's Pacific development scheme, and UNICEF.

The programme was designed to set up the corporation that would supply the city sanitation service; ensure that it would be properly managed, operated and maintained; set up a network of small and medium-sized water and hygiene units (PYMES); form groups to protect water and the environment; and organize community education to create a culture favourable to the sanitation service.

Programme launch

The success of the programme would



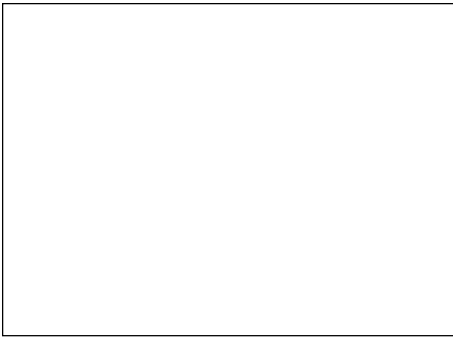
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inevitably depend on the citizenry's support, and a considerable amount of awareness raising would be necessary. It was decided that the awareness-raising campaign should address environmental protection; the relationship between hygiene and health, especially children's health; the collection, transport and disposal of refuse as an indispensable public service; exploitation of the refuse by recycling and by converting the organic component to fertilizer; and the PYMES units as a source of jobs.

The campaign began with visits to the directors of public and private entities, unions, and community organizations. These introductory visits provided information about the programme's history, goals and main points, and were followed up by a later series of 13 talks over three weeks that covered the issues in greater depth. A number of programmes and interviews were also broadcast by the local radio and television stations.

Employees for the PYMES units were selected according to the criteria applied by community leaders for the urban job creation programme, which aims to find employment for the poorest in projects for constructing and improving public spaces or for providing municipal and community services. The group selected to manage the programme was the Guapi Rural Leaders' Cooperative (Precooperativa de Dirigentes Campesinos de Guapi). The Cooperative was chosen because its members had the necessary enthusiasm and had already received training in organization and administration likely to prove useful. The members were

given additional training in solid-waste management, together with legal support to help them meet the conditions required by law and negotiate agreements with the municipality.

Pilot tests were then conducted to make final adjustments to the operation: the types of waste were studied, quantities, collection times, movements, community response, and the influence of road conditions and topography on essentially manual modes of refuse collection and transport. Routes were then drawn up, taking care to ensure that each PYMES unit was allocated an appropriate balance between distances covered and number of households served. The cost-benefit calculations proved not to favour recycling: for example, a kilo of glass for recycling sells for \$25, while the cost of transporting it to the purchase site is \$60. But it was decided to separate and compost organic matter to produce fertilizer.

The procedures chosen for the sanitary landfill were essentially manual, since studies have shown this a good choice when the daily refuse load is below 20 tonnes. Guapi generates less than 10 tonnes a day. Heavy equipment was therefore used only for preparing the landfill site, constructing the access routes, and excavating the layer of covering material. The Guapi landfill is sited on some land upstream, and the refuse brought in by boat. The mayor arranged for a small backhoe for moving soil and a tractor for hauling the refuse from the pier to the landfill.

Since the site is a hollow, the area type of landfill was chosen. Weeds and bushes were cleared, and stepped slopes constructed. Ditches were dug at the foot of the slopes to drain rainwater and also serve as ducts for the leachates created by the waste as it decomposes. The leachate ducts and the gas vents are filled with coconut fibre, an absorbent material very common in the region. A small warehouse was built to house the equipment and tools and provide a place for the workers to change their clothes. A medical unit was also constructed.

Word of mouth

The launch of the refuse collection service was marked by an inaugural parade, which sparked local interest and helped galvanize the collection teams. (The open garbage dumps had already been cleared away, with the help of the authorities and townspeople.) In the first five days more than 30 tonnes of refuse were collected and moved to the new landfill. This operation displaced a vast number of rodents, controlled by an eradication programme.

Citizens from every walk of life approved the change in Guapi:

- 'If we clean up the environment, we'll see a direct impact in the form of improved health. The community not only has the right to health, it also has a responsibility for its health.'

– Luis Cover Diuza, hospital director

- 'If we can create a pretty, clean town, tourists will come, they'll love it, and they'll come back. We women artisans benefit, because the tourists always buy something.'

– Silveria Rodríguez, manager, Coopmujera women's cooperative

- 'The solid-waste programme is a huge step towards respect for the rights of children, and respect for life, recreation, health and a clean environment.'

– Gloria Maritza Grajales, coordinator, local development project

- 'I like the river, swimming with my friends, playing with them in the clean river. It's great that they're taking the trash somewhere else, not in the river.'

– Local boy, his teeth shining in a pleased grin.

Comprehensive management of solid waste in Silvia, Colombia, 1998–1999

by XXXXX, XXXXX, UNICEF XXXXX

The municipality of Silvia is located to the north of the department of Cauca. It covers a mountainous area of 813 square kilometers. Average temperature in the region is 15°C (60°F). Total population is 36,500, of whom around 8,500 live in urban areas. Most of the inhabitants are indigenous, with some whites and people of mixed race. The main economic activities are tourism, trade, agriculture and teaching.

Silvia had long had a system for refuse collection and disposal, but the system had many flaws, not perceived as such by most inhabitants but a concern for the town administration and its indigenous mayor, Alvaro Morales Tombe. Moreover, UNICEF was interested in implementing a pilot solid-waste management programme in a township like Silvia, with the emphasis on educational campaigns and technical assistance.

Accordingly, on 23 December 1998, an agreement was signed by UNICEF and the city council (specifically the health department and the water and sewer corporation) to implement a programme for comprehensive solid-waste management in Silvia's urban areas. This case study describes the progress achieved under that agreement during 1999.

The needs

The first step was to evaluate existing conditions. A number of weaknesses were identified:

- Refuse was hauled by tractor and cart, making four journeys a day three times a week. This was too expensive.
- The landfill could not be considered sanitary. The access routes were poor; it did not have gas vents or ducts for leachates and rainwater;

the waste was not sufficiently compacted; and faulty techniques were used to extract the material for the covering layer.

- The warehouse used for storing the materials to be recycled was inadequate, and the materials were stored incorrectly. Cardboard was not packed, for example, and broken glass was stored in bags, which made it tricky to handle.
- Rubble was mixed in with the other waste. Offal from the municipal abattoir was dumped in a concrete bin out in the open, attracting carrion birds.
- Neither the composting area nor the worm-bin was managed correctly.
- Management of hospital waste was inadequate. Syringes were not properly disposed of at the hospital (their points were not bent over), and the medical waste was stored opposite the paediatric ward. Furthermore, a route had not been dedicated for the hospital collection service.

Recommendations

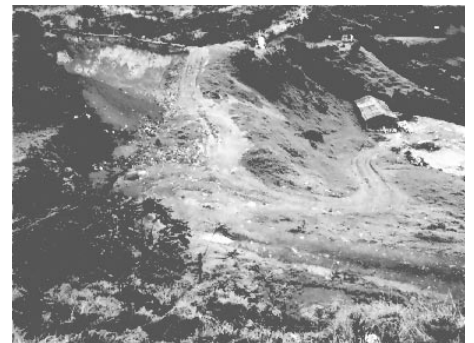
A number of purely technical recommendations were made, such as upgrading the landfill, improving transport, creating a dedicated hospital access route, and organizing separate routes for organic and inorganic waste. The key recommendation was to educate the townspeople on the problems created by inappropriate waste management.

The emphasis was therefore placed on a campaign to instill the habit of separating organic from inorganic waste at source, in the household. The campaign also aimed to achieve other goals – to unite the community in a common purpose and increase people's sense of

belonging; create jobs from recycling; and improve the appearance of the town and its surrounding countryside, an important consideration for attracting tourists to Silvia.

Laying the groundwork

The environmental education campaign was inaugurated by a four-day workshop in January 1999. The first two days of the workshop were attended by 14 people developing the sanitation service. For the third and fourth days they were



Landfill at the beginning of the project.



Compost production.



Relleno sanitario landfill.

joined by 145 others, including community leaders, municipal officials, teachers, students and townspeople.

The workshop set out to raise awareness of the importance of managing the environment, promote individual and collective action, and introduce new habits for organizing solid waste. The workshop began by testing the participants' existing knowledge; in the later sessions the participants discussed the nature and characteristics of solid waste, explored possible solutions to the problems created by waste, and learned about recycling for generating income. The participants also made recycled paper (used to print their workshop attendance certificates) and explored other artistic uses for recyclable materials.

The Committee

Very soon afterwards, on 19 January, the Municipal Committee for Recovery and Processing of Solid Waste was formed, comprising both community residents and officials who had been appropriately trained. The Committee included an educational committee and a technical commission. The Committee's first decision was to call on teachers and students of the eleventh grade to spearhead the environmental education campaign. On the same day a decree was introduced requiring all citizens to separate their organic and inorganic waste at source, to enter into force after the education campaign.



Young people working on the project.

Young environmental educators

Students in the tenth and eleventh grades from Silvia's three high schools trained as campaign workers. The first phase of their training introduced them to the programme's history and goals and how they would be involved. The second phase focused on the situation in Silvia and the rights and duties of its citizens as regards their environment. The third phase of the training concentrated on sanitation and appropriate strategies for managing solid waste – separating at source, recycling, composting, burying and incineration.

Pilot testing in the San Agustín quarter of town identified various problems the students had in communicating the core message. Further training was therefore arranged, both to improve the students' communication skills and to strengthen their grasp of the technical issues. The pilot phase also served to finalize the door-to-door promotion strategy the students would be following.

Each student was assigned particular apartment blocks and families, and the dates for the visits were set. Each family was visited three times. During the first visit the students explained the purpose of the programme. During the second visit they discussed the health risks from inappropriate management of solid waste, how the waste should be managed, and the benefits of effective management. During the third visit they handed out information brochures and buckets for the household's organic waste. This door-to-door approach was supplemented by public



Store for recycling.

talks and meetings on environmental education, hosted by broadcaster Andes Estéreo. Lastly, to complete the circle, the students briefed and trained primary school pupils, so that environmental education became a regular feature of daily life in Silvia.

While the education campaign was under way, work went ahead on renovating the landfill, improving collection and transport, and supplying safer working equipment for sanitation workers. The programme proved such a success that extra land was purchased adjoining the landfill, to allow for eventual expansion.

As a result of the programme, Silvia is cleaner and its townspeople have acquired a greater sense of community spirit and greater environmental awareness. The sanitation service is paying off financially as well, selling 19 tonnes of organic fertilizer a month at \$100 per tonne. Thanks to this income and the \$3.50 per month paid by consumers, the service is self-supporting and does not need subsidizing.



Residents of Silvia.

When UNICEF crossed the Tigris: upgrading water treatment in Baghdad

by Zaid Jurji, currently WES officer, UNICEF Yemen

Baghdad, with more than 5.5 million inhabitants, is served by water through eight treatment plants. Karkh treatment plant, the largest in Iraq, serves about 70% of the city's inhabitants and Sabba Nissan plant about 15%; the remainder are served by six smaller plants and a few compact water treatment plants. Four of the six smaller plants should have been phased out of service over a decade ago because of deteriorated boundary conditions, but for lack of funds they have been kept in service to compensate the city's severe water deficit.

The Al-Rashid plant

The river Tigris bisects the city from north to south, splitting Baghdad into an eastern half – Karkh – and a western half – Rasafa. Except for the Karkh plant, all the water treatment plants are located on the Tigris within Baghdad. The Al-Rashid plant is the furthest downstream, to the south, within the city. It was built back in the 1950s and serves more than 200,000 people. In the rest of Baghdad water is provided through ring-shaped main trunks, with the treatment plants acting as injection points and the water flow adjustable by network valves, but the Al-Rashid plant is an isolated network and the only source of drinking water for its area.

sketch #1

The problems

The Al-Rashid plant was in poor shape for a number of reasons including age, and most of the problems were caused by its location and boundary conditions. In the middle of the Tigris facing the plant, an island about 1,500 meters long and 250 meters wide has been formed over the years by river sediments left to accumulate (sketch 1).

Upstream to the north of the plant and on the same bank, two sources contaminate the river water. The first is the effluent discharged by the state factory for vegetable oil products, whose effluent treatment unit is inoperative. Effluent is therefore discharged directly into the river.

The second source of contamination is the effluent from a stormwater pumping station. This station was designed to collect water from a storm network and pump it into the river, but because households have illegally connected their septic tanks and cesspools to the network, the pumping station is in effect pumping raw sewage directly into the river.

Both these sources of contamination release their effluent within 300 meters upstream of the Al-Rashid plant. And because of the island, the contamination is concentrated by flowing only through the western river channel between the island and the Al-Rashid water intake. Alongside these problems, a lack of spare parts, equipment and skilled staff, together with improper operations and maintenance, have affected the plant's overall efficiency, both qualitative and quantitative.

Through the oil-for-food humanitarian aid programme, the Baghdad Water Authority obtained new

equipment for the Al-Rashid plant such as high-lift and low-lift pumping sets and alum dosing pumps. The plant's management could install only some of the new equipment; a dearth of skilled labourers and cash prevented them from installing the rest of it and repairing the other equipment. The Baghdad Water Authority therefore requested UNICEF assistance.

Refurbishing the plant

UNICEF and the Water Authority's technical staff jointly undertook a comprehensive assessment of the plant's requirements, focusing on installation of the new equipment, repairs and rehabilitation of the existing equipment, and procurement of locally available spare parts and materials.

The comprehensive assessment generated a comprehensive to-do list:

- *Low-lift assembly.* Replace the flow control valves of the low-lift pumps; replace defective segments of the piping connections; install a low-lift pump set with starter, the work to include cabling, piping modifications and construction of a new concrete base; replace defective circuit breakers within the control panel; replace all the defective checker plates of the cable trays; repair the low-lift chamber maintenance crane; carry out simple civil works such as repairing broken tiles, defective plasterwork, lighting, repainting, etc.
- *Flash mixing and sedimentation tanks.* Overhaul the flocculators and replace their starters; overhaul the motors of the sludge scrapers along with their gearboxes and replace their starters; replace the starter for the flash mixer with wiring; replace corroded parts of the scraper steel skeletons, clean rust off other parts

sketch #2

building, leaking roofs, defective plasterwork, broken windowglass, repaint, etc.; repair the plant's lighting system; build a structure to shade the chlorine cylinders from the sun; provide an air-conditioner for the administration room; install some partitions in the administration building; repair the plant's vehicle.

and repaint with anticorrosive paint; calibrate scraper operations.

- *Filters.* Replace the filter media (sand and gravel); replace broken filter nozzles; overhaul the motorized valves controlling water flow within the filters.
- *Aluminium sulphate chamber.* Install alum dosing pumps with all modifications, wiring and controls; repair defective alum mixing tanks and paint with non-poisonous epoxy; replace the water supply piping system for the alum mixing tanks; replace the alum solution conveyance pipe; make simple civil repairs within the chamber.
- *Ground storage and high-lift assembly.* Replace the valves controlling water flow from the filters; replace defective segments of the high-lift pumps' piping system; overhaul the high-lift pumps' central control panel by replacing defective components and rewiring; overhaul air blowers and starters; treat groundwater migration to the high-lift chamber.
- *Chlorine unit.* Install chlorinators and replace the chlorine injection piping system; replace ventilation fans; overhaul the lifting crane for chlorine cylinders.
- *Power generator.* Conduct comprehensive maintenance for the generator sets; replace the fuel piping system.
- *Miscellaneous.* Conduct civil repairs to the plant's administration

Modifying the intake structure

Because of the contamination problems already mentioned, the first proposal was to shift the intake structure, pipes and strainers to the island bank facing the Al-Rashid plant, extending the five intake pipes by 70 meters (sketch 2). But laboratory tests for water quality found bacteria counts of 35,000 at the existing intake and 20,000 at the proposed new intake, which was still too high a contamination level. It was therefore decided to extend the intake pipes by 300 meters to the farther side of the island, where the contamination sources have no effect (sketch 3).

The original calculations for this second option envisioned steel or ductile pipes 400 mm in diameter, but the Hazen-Williams equations for friction loss indicated that this width of pipe was not feasible since the available net positive suction head (NPSH) would be less than the NPSH required by the pumps according to the pumps' performance charts. The design was therefore modified for 500 mm pipes, the calculations indicating this was a workable size. As a safety measure, the Hazen-Williams friction coefficient used was 100, which is normally used for old steel pipes.

Having the intake pipes cross the river meant that boats could no longer use the western channel. Some lobbying and advocacy with the Ministry of Irrigation was needed to show the

benefit of the project, and approval to go ahead was granted.

Redesigning the intake structure required the following work:

- Building a steel framework 130 meters long across the river to carry the intake pipelines. This entailed erecting 68 I-section steel piles in the river bed, varying in length from 5 to 8 meters, welded together by I-section steel girders, bracings and beams.
- Clearing and excavating the section of island crossed by the pipes. More than 11,000 cubic meters of earth were moved to create a shallow cutting 250 meters long and 15 meters wide.
- Building a steel intake structure, similar to the existing one, on the farther side of the island.
- Laying and welding 1,500 meters of steel and ductile pipes. UNICEF procured 800 meters locally, and the Baghdad Water Authority provided the remaining 700 meters.
- Supplying and installing a vacuum system for the low-lift pumps to ensure smooth priming and operation.

The first rehabilitation phase for the Al-Rashid plant was completed in four months, by the end of March 1999. An efficiency evaluation found that efficiency (both qualitative and quantitative) had risen from less than 40% to about 70%. This figure has since been improved by additional modifications to the intake structure.

sketch #3

Stepping up the pace for hygiene improvement

The contributions to this issue of *WATERfront* report achievement throughout the developing world in virtually every aspect of water supply, sanitation and hygiene programming.

They record accomplishments great and small, just begun or nearing completion, from pilot projects to national programmes. The settings range from an urban slum and a village primary school to a city's school system and a nation's countryside. The partners include central government, local authorities, neighbourhood cooperatives, families and schoolchildren.

UNICEF is currently working on ways to refine and consolidate the lessons learned from these and other water and environmental sanitation (WES) programmes spanning three decades. Funding has dwindled the world over for safeguarding children's right to develop to their fullest potential for living healthy, happy, productive lives. Now more than ever, WES interventions require careful and creative planning in order to ensure long-lasting gains and make the most efficient use of resources both financial and human.

How can UNICEF with its modest funding hope to make a difference? UNICEF's present thinking on WES programming reflects two overarching sets of considerations:

- The growing awareness that improved hygiene behaviours, even more than the provision of safe drinking water and sanitation, have the most enduring impact on lifelong health
- The critical role of hygiene improvement and other WES interventions for meeting the priority goals proposed in UNICEF's medium-term strategic plan for the years 2002 to 2005.

Hygiene promotion to the fore

Perhaps the single most important lesson learned from WES programmes around the world is that water and sanitation facilities on their own do not

automatically bring health benefits. While good facilities still need to be installed, their correct use and maintenance is what ultimately leads to disease reduction and healthier children. Hygiene is the key.

The Hygiene Improvement Framework, discussed in this issue by Chris McGahey and Masee Bateman, encapsulates a holistic approach to behavioural change that takes into account all the elements making for affordable, sustainable, long-term health gains.

As the Framework recognizes, hygiene promotion goes well beyond hygiene education, since it is not only the potential users of facilities who need to change their behaviour. Politicians need to recognize the importance of hygiene and work to create a policy climate that enables change. Implementing agencies need to allocate adequate resources for putting policy into practice. Field workers need to be both willing and able to understand people's hygiene behaviour and to build on existing motives for encouraging people to change where needed. The benefits are maximized when all possible partners are called on, including the mass media, private companies and local entrepreneurs.

UNICEF's medium-term goals, 2002 to 2005

The present medium-term plan singles out five organizational priorities for the coming years. WES interventions play a significant role in the first three:

- Integrated early childhood development (ECD)
- Girls' education
- Fighting HIV/AIDS
- Immunization 'plus'
- Protecting children from violence, exploitation, abuse and discrimination.
- *Hygiene improvement and ECD.* Diarrhoeal diseases, largely preventable by sanitation and hygiene, continue to rank among the gravest threats to children under five. They

kill both directly and indirectly, by fostering malnutrition and lowering children's immunity to acute respiratory infections and other illnesses. Wherever hygiene is poor, children also fall prey to infection by intestinal worms that consume the nutrients from their food, setting back their health and growth.

- *Hygiene improvement and girls' education.* The links between children's health and education are well known: children who are often sick tend to miss school, and cannot learn properly when they do attend class. Girls warrant special attention from WES programmers for two reasons. In numerous cultures girls are expected to stay home to perform household chores, many of them chores that WES and hygiene interventions can alleviate – fetching water, cleaning latrines, disposing of garbage, tending sick family members. Moreover, poorly designed or non-existent sanitation in schools has a disproportionate impact on girls, causing them to come less frequently to school or drop out altogether.
 - *Hygiene improvement and HIV/AIDS.* Improved hygiene and WES facilities can do much to ward off the opportunistic infections that strike at HIV and AIDS sufferers, prolonging their lives as well as relieving the burden of everyday care both for them and for their caregivers.
 - *Hygiene improvement and emergencies.* The medium-term plan stresses the principle of mainstreaming emergency planning and operations into regular programming, to mesh with UNICEF's five organizational priorities.
- Programming predicated on children's right to grow up in a healthy environment must inevitably give precedence to the disadvantaged, the poor,

continued on page 28

Water for the unreached in rural China, 1996–2000

by T.V. Luong¹, Zhao Leshi², Sha Lusheng³, Kyaw-Myint Yap⁴ and Liu Pengxin⁵

Providing safe water is one of the priorities for rural development in China, especially for the remote water-scarce and poverty-stricken rural areas as well as areas where the groundwater is contaminated by naturally occurring fluoride and arsenic.

UNICEF first assisted water supply projects in China in 1985. The formulation of the present UNICEF/government WES programme, 1996–2000, built on past experiences and lessons learned. The WES programme comprises three elements – water supply, sanitation, and hygiene education – adopting an integrated approach dubbed ‘three-in-one’.

The rural water supply project focused on water supply in 14 counties selected from six provinces (Gansu, Hebei, Shaanxi, Shanxi, Xinjiang and Yunnan), with sanitation and hygiene promoted alongside. All the project counties are national poverty counties, situated in remote rural areas with the

dual problems of water shortage and backward economies. The programme provided deep wells and borewells fitted with the Chinese-manufactured XI-2 handpump, which is one of the appropriate technologies promoted by the government to accelerate rural water coverage.

Government commitment

Following the World Summit for Children in 1990, the government drew up a comprehensive national programme of action for children which articulates specific goals for the healthy development of all China’s children. The goal set for water supply was 95% coverage by the year 2000 for the water-scarce and impoverished rural areas.

In 1993 the government published its eighth national plan for alleviating the seven poverties, which lists provision of safe drinking water for humans and livestock as a top priority. Later that same year the Ministry of Water Resources issued national guidelines for



Crossing over hill and dale to fetch water, but from an unsafe source.

the water sector, one document outlining a ten-year programme for rural water supply and a second document reviewing rural water supply in the context of the national programme to combat the seven poverties.

At the 15th national congress of the Chinese Communist Party in 1997, President Jiang Zemin stressed the importance of standards of living and environmental sanitation in both urban and rural settings, reiterating the key role of safe water for economic and social progress in rural areas.

Taking their cues from central government, many provinces allocated sizeable funds for water supply in many of the poor water-scarce rural areas,

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the excluded. UNICEF’s WES planners are developing a system that uses recent data on under-five mortality rates, water supply and sanitation coverage to rank the 50 countries in strongest need of support for hygiene and WES interventions, and the 20 countries requiring particular effort to rectify disparities within the country.

Persuading people to adopt and maintain hygienic habits has long been – and will doubtless long continue to be – one of the most complex challenges facing UNICEF and our partners. Rising to that challenge requires harnessing energy and creativity to make best use of the knowledge that has steadily built up over the years on how to do it.

Communicating behavioural change – Key hygiene improvement messages

Always wash hands:

- after defecating and after handling children’s faeces;
- before feeding and eating; and
- before preparing food.

Where possible, use soap or ash or sand and clean water to thoroughly wash both hands and under fingernails to get rid of germs (pathogens).

Always safely dispose of human excreta, particularly the excreta of young children and infants, and of anyone who has diarrhoea. Ensure that excreta disposal cannot contaminate water, food, crops or the environment.

Always drink water from a safe source, that is, protected from pollution, collected, transported, stored and consumed in a hygienic manner.

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