waterpoints

Ten thousand latrines for Acapulco

Unicef and the Mexican Government have launched a plan to build 10 000 ecological latrines for the city of Acapulco by the end of the century.

The latrines operate without water, require minimal maintenance, and do not need a complex drainage system. Traditional latrines have been contaminating water supplies in the poorest neighbourhoods of the cities, causing up to 15 000 cases of intestinal infections among young children each year.

The installation of the new system will be backed up with a health promotion programme and training on the use and maintenance of the toilets.

Unicef's *Progress of Nations 1997* report noted that almost three billion people around the world lack access to a decent toilet. As we report in practically every issue of *Waterlines*, these unhygienic conditions contribute to the deaths of more than two million children annually from diarrhoeal diseases.

Toilets to go

Outbreaks of cholera, typhoid and other waterborne diseases in refugee camps could be cut dramatically with a new type of portable toilet that has a built-in miniature sewage plant, writes Ian Anderson in a recent issue of *New Scientist.*

Unlike septic tanks and latrines dug in the ground, the toilet stops sewage from seeping into water supplies. It stores and treats waste for up to 140 days and, by the time the effluent is released intro gravel pits, the bacteria counts are extremely low.

The toilet, developed in Australia, will undergo its first large-scale trial in Papua New Guinea, in the shanty-towns that have sprung up in recent years in the country's capital, Port Moresby, which has a very limited sewage system.

The idea came from Paul Turner, a parasitologist and specialist in tropical medicine at the James Cook University in Townsville, and Mark Langford, a wastewater treatment specialist with Townsville City Council. 'In aboriginal communities we visited in outback Australia, we often saw expensive sanitation systems that just did not work,' says Langford. 'They'd been given water systems that needed flushing. But these were in communities with no running water. It was not hard to see that something cheaper and more suitable was needed.'

A local plastics manufacturer helped to develop the toilet and is now manufacturing it. Turner says that the toilet works like a full-scale sewage treatment plant but needs no water.

The waste enters a primary tank where the solids fall to the bottom and are broken down anaerobically by bacteria. The sludge can stay there for up to five years before it has to be pumped out. The liquid effluent flows into a secondary container with a series of tanks containing aerobic and anaerobic bacteria.

Inside these tanks, clumps of plastic mimic the rocks found in a large-scale plant. Bacteria growing on the plastic scavenge nutrients from the effluent, breaking it down until it is virtually free of pathogens. The bacteria are sealed inside the system and do not leach into the surrounding groundwater. A solar-powered fan disperses odours.

By the time the treated effluent is pumped into a gravel pit, *Escherichia coli* counts are as low as 62 organisms in 100ml, about 10 000 times lower than a septic tank.

Each toilet can cope with regular use by up to 20 people. Turner says that toilets can be packed into a container and shipped to a refugee area or to the site of a natural disaster where sanitation is urgently needed. They take about 90 minutes to assemble.

'The system is completely enclosed so it could make a vast difference in the control of typhoid and cholera,' he says.

For a front-line view, we turned to John Adams of Oxfam UK. He told *Waterlines*: 'the system looks very interesting; in some ways it is like the Oxfam Sanitation Unit developed for refugee camps in Bangladesh in the 1970s, except that latter used a system of drying-beds.' He stresses, however, two important questions not addressed: cost, 'this kind of unit tends to be very expensive. The second question is operation and maintenance or, more specifically, tolerance of overloading — 20 people per toilet is a relatively small number in an emergency; and how will the unit cope with stones, plastic, paper, wood etc. which finds its way into toilets in poor communities? It will be good to see how the trials in Port Moresby go. If they are still working in a couple of years' time, they will have passed an important test'.

And Sohrab Baghri, Research Associate with the Assessment and Programme Design for Emergency Sanitation Project (APDES) based at WEDC, while also pointing out the cost implications and the operation and maintenance headaches, told *Waterlines* that other factors affecting the likely success of the new latrine were: the materials used for anal cleaning; and adaptations for women and children — 'in emergency situations a high percentage of the population'. He also asks whether the inventors have taken into consideration socio-cultural aspects: 'if this has been ignored, the system could be rejected'.

APDES

Here's some information about APDES itself. As Waterlines continually emphasizes, sanitation in emergencies still is not a high enough priority when compared with other interventions such as health care, food and water supply — despite the fact that inadequate sanitary, refuse and sludge-disposal facilities and bad hygiene practices leads to widespread disease.

The APDES research project aims to tackle this shortfall by providing practical support to field personnel so that they have the skills and confidence to improve sanitary provision to the affected. Specifically it intends to produce guidelines, a checklist and resource pack to assist field-workers to:

- assess the sanitation and hygiene education needs of refugees and displaced communities;
- select the most appropriate interventions; and
- develop a plan for implementing a sanitation and hygiene education programme.

The project will investigate the options for providing excreta-disposal facilities for sites where traditional infiltration methods are inappropriate — such as when the water-table is high or there is rock close to the surface, or where the population density is very high.

One definite outcome will be a set of training modules for field staff to teach them how to use the guidelines and interpret the outputs.

The project manager, Bob Reed of WEDC, asks *Waterlines* readers to share their experiences with the project or to provide any information — such as specific reports — which may be useful.

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Clean pass

Scientists in California may have solved one of America's most vexing environmental problems: cleaning up groundwater contaminated with a potentially carcinogenic fuel additive.

To improve the efficiency of combustion and to minimize air pollution, many US states have added methyl tertiary-butyl ether (MTBE) to vehicle fuel. But MTBE dissolves readily in water and is building up in reservoirs of groundwater used for drinking.

Chemical engineer Marc Sims and molecular biologist Jim Robinson have developed a powerful yet simple device for separating molecules using liquid carbon dioxide. Their contraption sends fluid through a tube made of polypropylene membranes suspended in a chamber of liquid CO_2. The CO_2, but not the fluid, can flow back and forth across the membranes. It collects molecules that prefer to dissolve in liquid CO_2. These molecules gradually disappear from the fluid, which is left slightly carbonated.

Sims and Robinson — who originally used their device to extract the chemicals responsible for the aromas in foods such as oranges, garlic, and butter — have only been experimenting with MTBE-contaminated water for about five months. They found that just one 'pass' through their device reduced MTBE levels up to one million-fold. They are now testing a larger model that can purify water at a rate of 10 litres per minute.

Although the US government classifies MTBE as a 'possible carcinogen' only at concentrations above 20 parts per billion, water smells of turpentine when the chemical is present at just 15 ppb.

Down the drain

With partial funding from the World Bank, Pakistan's government and the Karachi Water And Sewerage Board has embarked on a massive sewerage scheme. Costing a whopping 12 billion rupees, the Greater Karachi Sewerage Plan (GKSP), scheduled to be completed by 2003, aims to superimpose an entirely new drainage system over the existing one.

Conceived in the late 1980s, the plan has survived four successive governments despite the fact that the work done on it so far has already demonstrated its unworkability. Local architect Arif Hasan believes that the existing systems can be integrated into the main disposal system with small decentralized treatment plants. 'What we need is a system which matches the skills and the resources that we already have.'

Karachi has nine big *nullahs*, or creeks, which carry almost all of the city's sewerage into the sea. These *nullahs* have not been properly cleaned in 20 years. Silting, neglect and encroachments have led to overflowing gutters. Critics say that the programme makes no effort to secure *nullah* width nor remove encroachments.

A perfect example of what is really wrong with the scheme is the Baldia Colony project, in which line and trunk sewers were planned at a cost of over 250 million rupees. Supervised by a British firm, 85 per cent of the project has been completed. But nothing actually flows through the newly laid sewers as they have been superimposed on the existing system without being connected. An official report accepts that 'physical conditions have not significantly changed ...one of the reasons for this was that the original designs did not take into account the work already done by the community. Since the sewers are not functioning, only a few houses have bothered to connect, with most sewers emptying into open drains which, in turn, if they are not clogged, empty into *nullahs* and small stream beds.'

In Orangi, because of the participation of the OPP, original designs were modified in accordance with existing site conditions. In fact the plan was modified due to the OPP's resistance. 'The design was made as if Orangi was open, uninhabited land, where there was neither any sewerage system nor any settlement', says Perween Rahman, Director of OPP's Research and Training Institute. He also emphasizes the long-term social and economic consequences of such bad planning: 'it would cause the displacement of people, alienating them from the government's development work and, therefore, making it difficult to recover the cost'.

If Karachi's existing systems were properly mapped, *nullahs* cleaned and encroachments removed, then trunk sewerage lines could be laid at the bottom of these *nullahs*.

Caroline Penn/WaterAid

Community-laid pipes (that work!)