Guardian Unlimited

Special report Water

Saturday 23 August 2003

A handful of hope

Ugandan villagers celebrate as they trade a disease-ridden pond for a 'miracle' £800 well

Angelique Chrisafis in Kisaaka, Uganda

On the morning of the village party two girls in torn dresses scramble uphill heaving two dusty jerrycans full of a milky-grey liquid.

"It's water," explains eight-year-old Dorothy Nabatanzi, contemplating the brown rim of sludge around the mouth of her can.

Twice a day since she was small, Dorothy has left her thatched homestead in the village of Kisaaka, central Uganda, and set off down the hill to a forest clearing. There she has filled three 10-litre cans with water for her parents and eight brothers and sisters to wash in, cook with and drink. It was a simple task as there was only one water source within a mile - shared by 500 people and their cattle, pigs and goats.

First, Dorothy would step carefully on to a log bridging the stagnant green pool. Then she would force a space between the thick algae, floating animal and human excrement, and hovering flies, and plunge her plastic cans into the cloudy water. If she dragged her hand through the water, it would emerge webbed with slime. If she looked hard at the pond's surface, she would see bubbles emerging from the mass of parasites breeding beneath. When her six- or seven-year-old friends felt thirsty, they would cup their hands and drink straight from the pond, straining the water through their dirty T-shirts so as not to swallow the lumps of weed.

Sometimes the children would see cattle led into the centre of the pool to lap up the water, defecating into it as they went. Nevertheless, it was the only place in the village to drink.

"I know it is contaminated," shrugs Dorothy. "They told us at school it was unsafe and my mother likes to boil it first."

But this can of murky water is the last Dorothy will draw. She will use it to wash for the grand celebration: the opening of the village's new well.

Politicians, counsellors and dignitaries were already climbing out of four-wheel drives and making their way down the slope to a makeshift stage next to the stagnant pool. There they sip bottled Coke and lead the chanting: "Clean water for everyone, everywhere!" The

community primary school has rehearsed two songs about water and secondary pupils perform a play in which the lead characters noisily re-enact the village curse - diarrhoea - to loud applause.

Kisaaka shares an irony with most of central Uganda. There is a vast supply of water in the country's massive lakes and rivers, replenished during two rainy seasons, yet the people have no clean water to drink. Across the country more than 40% of the population are forced to sip from rancid, infected sources or die of thirst. The government admits that water must be its priority, but resources for well building are limited. In Mpigi district, which includes Kisaaka, only around a third of people have access to safe water - yet clear, clean water gushes through the rock beneath the soil.

Kisaaka's new hand-dug 16ft well, which sits a few metres from the old smelly source, took two weeks to build and cost around £830. It seems absurdly simple. But Kisaaka's community of subsistence farmers, who have no electricity and live on one meal a day, see it as a miracle. A local non-government organisation, Kyakulumbye Development Foundation, in partnership with the British NGO WaterAid, trained and paid village masons £300 to dig, line and seal the well. They taught them to change the plastic pipes every three months, fence the site and watch for excited children who could break the pump by playing on it.

"We had heard of other new wells that broke down and were left, so communities had to go back to their old source," says Salongo Yosia Bafamimwa, the newly appointed pump mechanic. He has 14 children, including three sets of twins, who spent most of their childhood doubled up with stomach cramps and diarrhoea.

"Drinking from the stagnant source was killing the village," says one local health visitor. Kisaaka has endured a cholera epidemic, persistent intestinal worms, skin disease, hacking coughs, constant debilitating diarrhoea and dysentery and, most prolific of all, malaria, from ingesting the larvae of mosquitoes that breed in the stagnant pool. Corlder Kasozi, a doctor who runs the local health centre, says he saw 20 to 30 cases of malaria a day, with rare cases admitted in comas. Some villagers were becoming resistant to malarial drugs. "A clean water source is the only solution," he says.

Sophia Lubega Nalongo, 48, a widow with eight children, is stirring a vat of food for the feast over a charcoal fire. Her 17-year-old son Kiirza cannot join the celebration as he is lying in a malarial fever. "I tried as a rule to boil this water but the children would drink it straight from the pond when they went to collect it," she says. "It's unbelievable to have clean water in our midst, which the children can drink from the pump. The old water stank.

"When I heated it, a thick foam came to the surface, like the lather on a soap - which is how we knew it was contaminated with faeces. I can't afford drugs for the children when they get malaria, so I treat them with herbs first and if it doesn't work, I try to save the money [around 15p] for 10 Panadol painkillers."

Betty Naiga, 45, another widow, will join the village's new water committee to oversee the maintenance of the well and collect a small revenue from families for its upkeep. Her four-year-old daughter Resty sits with her, subdued and in pain after constant parasitic infection. "Almost 10 times a month the children's illnesses would become so debilitating I had to take them to the health centre, sometimes walking them [up to two miles]. Water is essential in the household, everything you do is centred around it and without clean water, we would not survive here," she says.

Steven Semambo, a primary school teacher and choirmaster, says: "At least now the children will be well enough to attend lessons. At least 20 children were off sick each week because of water. Those that attended would run down to drink straight from the stagnant pool when they were thirsty."

The next question is sanitation - building latrines for those who have none at home and are forced to defecate in the open. NGO workers have been teaching hand-washing to children and families who cannot afford soap.

Away from the celebration, in her mud-built homestead, 85-year-old Kasalina Nsekambabaye is proof that if you survived the water, you could live to a grand old age. She shuffles to her door to say: "The clean water has made me very happy. God bless everyone who brought it to us."

In the shade stands Kasalina's five grandchildren, orphaned by Uganda's Aids epidemic. Beside them is a pink plastic tub with the last of the fetid water from the old source evaporating in the sun. "Now we can look forward to good health," Kasalina says.

Where every glass is a gamble

Wells can be contaminated by the unwashed hands of the very people who depend on them

Rory Carroll in Mlakala, Malawi

Today is a good day, the women decide, peering into the murk. On the water's surface is an assortment of bugs, vegetation and unidentified floating objects but the women are judging the colour.

The pool is a cloudy grey-green. Not as dark as yesterday, is the consensus, and definitely better than the week before.

Striving to avoid the more visible gunk the women of Mlakala, a remote village in the southern Machinga district of Malawi, scoop the water, emptying bright plastic containers into metal buckets which they carry on their heads back home.

This is the water their families will use for the day's cooking, washing and drinking. "All we can do is hope it's clean. I've got a good feeling about it today," says Paciche Adam, 54.

In this part of the world drinking water is a lottery. Some days you win, some you lose, risking your health, even your life. High stakes - and poverty -give the villagers no choice but to take the gamble.

Mlakala, which translates into English as "Being Lame", is named after a disabled chief. It is also an apt way to describe the impact of contaminated water since the ensuing diseases leave people physically and financially crippled.

Some other villages in Machinga have pumps but the 1,000 inhabitants of Mlakala rely on the murky spring. About the size of two parking spaces, it is surrounded by fields of rice and maize.

Open pools such as this are known as unprotected wells because there is little to prevent contamination. The soil acts as a natural filter and initially the water can be safe, says James Longwe, a programme manager in Machinga for WaterAid. "The problem is it doesn't stay clean."

Wind whips earth and vegetation into the pool but the real enemy is the rain, which washes in animal and human faeces from surrounding fields, polluting the water with highly infectious

micro-organisms such as Vibrio cholerae. "It might be four or five days before you get sick, diarrhoea, constipation, dysentery. Young people end up urinating blood," says Kanduro Mwamadi, 45, brother of the headman.

"We know that boiling the water makes it safer, but look around. There aren't many trees left so where are we supposed to get the firewood?"

A report by the Blantyre-based Institute for Policy Interaction noted that a per capita income of $160 (£100) made Malawi one of the poorest countries in the world. A third of the population do not have proper food and the average life expectancy is 44 years. "Water and sanitation and rural infrastructure are severely inadequate: over two-thirds of households use pit latrines, and potable water is available to only half the population," the report said.

According to WaterAid, Mlakala's well is liable to be contaminated by some of the dozens of women and children who trudge there up to 10 times a day, dipping in possibly unwashed hands and feet. "Or else the buckets might be dirty, there's lots of different ways it can happen," says Longwe.

With a mixture of curiosity and apprehension the villagers watch him extract a sample for laboratory analysis. Their optimism about the day's water quality masks a grim reality. Asked who had been sick recently, about half raise their hands.

Paciche Adam has just spent a month caring for her 27-year-old daughter, Ntua, who was bedridden with diarrhoea. Two fewer people tending crops means less food on the table and less surplus to sell. The family also had to pay for medicine and the bus fare to the clinic.

The poverty trap will deepen from December because that is the start of the rainy season: water becomes more contaminated making more people sick just when crops need more workers. Completing the vicious circle, one of the symptoms of dysentery is dehydration and to rehydrate is to risk fresh infection.

In the nearby town of Mpira, staff at the Catholic missionary clinic conduct a rollcall of the hundreds of children who have been treated for blood diarrhoea.

Pale and shivering in her father's arms, Alice February, just shy of her third birthday, appears severely dehydrated and underweight. "I suppose it was the water," says her father, Magasu, a farmer.

The clinic's nurse, Gift Radge, concurs and says Alice probably has dysentery. "If necessary we'll put her on a drip," he says.

In some villages more than a third of the children have been treated for waterborne illnesses but in reality far more are stricken. "We don't charge much for the medicine but it's still too much for many parents, so the children are not brought in to us," Radge says.

Traditional remedies can be effective in treating waterborne diseases but if the victim is also infected with HIV a spell of diarrhoea or worms can spell death. Based on the rate among women visiting prenatal clinics in urban areas, a third of the adult population could have the virus.

But back in Machinga the WaterAid programme manager, James Longwe, has some good news. The sample from Mlakala's pool has revealed 12 counts of faecal coliform per 100ml.

That was 12 counts too many for World Health Organisation guidelines but just about safe for human consumption, something WaterAid will work to improve.

The women have been proved right: it was a good day for the well. They could only hope for the same tomorrow.

First person

Stella Musanda
Zambia

I come here to draw water four times a day. Each time I collect 10 litres. It takes me 25 minutes to get here and then another 25 minutes to get home again. It is a long way to come for this water.

The water itself is very bad. I do boil it at home but it is still terrible for us. We get ill all the time from it - we all know it is bad.

I worry so much feeding it to my children. I only give it to Joseph [at 18 months the youngest of three] twice a day as I am afraid if I give him too much water from this source then he will be sick and die.

So I try to only give him small amounts. But it is a difficult balance as I know he must drink water to survive.

I hope in the future my children, [the others are Jackson, seven, and Christina, four], will all have clean water - then we won't worry.

I hope they can be educated then they can help us. They all go to school at the local church, so they will have an education.

Alphonsine Razafindravaonirina
Madagascar

It is great we will have a standpipe in the village. It is a sign of great progress for us. The women will spend less time going to get water and also we will be able to get water whenever we need it, even at night. We can't do that at the moment because it is too far and the path is too slippery.

It will change the health of the villagers which will be a great relief, especially for the parents. The water from this source isn't good for you, especially in the rainy season. At the moment we get a lot of illnesses involving diarrhoea and also malaria. The mosquitoes are attracted by the unclean water.

At the moment it takes roughly an hour a day to collect water: I come two to three times a day and collect two buckets each time. My children help me too.

It is quite tiring, so I hope that when we have a water supply close to home we will be less worn out in the evenings. We will be able to spend more time with our families or working in the fields.

Fatima Omar
Mozambique

Before we had the well I used to collect my water from the swamp. It was very bad and we used to get many diseases like diarrhoea. We didn't have many buckets and so we would use the same one that we used with our latrine to collect water, and this spread more diseases.

In the wet season water would flow in to the swamp from the village, taking all the dirt and rubbish with it. It was filthy. Then in the dry season there would by very little water and we would have to dig out holes at the bottom of the mud. This was very hard work - it was tiring and I used to get back problems, too.

Two years ago we dug our well in our yard. But it was still unprotected and so the water was still dirty and we still had stomach problems. Now that we have this well the water is much cleaner and we don't have stomach problems any more.

Often before the children could not wash before they went to school or they would have to go to collect water before they could wash themselves. They always had to collect water before school.

Now they can wash very quickly and then go to school. Their health is much better too now. The well has released our burden.

We look after the well and maintain it. If the rope breaks we buy a new rope, we buy new buckets if we need to. We keep the well clean and we keep the bucket inside the well.

Deadly bugs

Bacteria and parasites commonly found where water is scarce or contaminated

Cholera
Bacteria spread mainly by contaminated water and food. Attaches to intestinal wall, multiplying to produce poisonous chemical, which prevents body processing water. Up to 14 litres of diarrhoea can be passed in one day. Can lead to death in 24 hours.

Bacillary dysentery
140 million people infected each year, resulting in 300,000 deaths. Bacteria enter the body through water, food or flies and infects large intestine. Symptoms include fever and blood diarrhoea.

Typhoid
Fever affects 17 million people, 600,000 die each year. Contracted after drinking contaminated water. Onset of fever, headache, nausea and constipation, followed by diarrhoea and haemorrhaging.

Bilharzia
Caused by flatworm which lives in human pelvic organs. 200 million people infected each year, leading to 20,000 deaths. Can damage bladder, large intestine, liver and kidneys. Chronic diarrhoea.

Guinea worm
Parasite enters body in contaminated water. Can grow to one metre under skin, causing severe pain. Eventually emerges causing ulcers and fever.

Hookworms
Common intestinal parasite which grows up to 1cm long and 4mm wide. Larvae, often found in unsanitary latrines, enter the skin through soles of feet. Worms lives in small intestine where they suck blood. Can result in stunted growth in children and anaemia.

Trachoma
Main cause of preventable blindness, with 4 million sufferers. Common in areas where there is not enough water to wash regularly. Causes eye discharge, soreness and swelling of eyelids. Eyelashes turn inwards after repeated infection, scratching the cornea.

Taps turn dry as cash runs out

Aid has poured into Malawi, but the 'water mafia' have pocketed the proceeds

Rory Carroll in Mwenera, Malawi

Depending on who you talk to Makulata Falansi is a villain or a victim of the village's woes. Almost a decade has passed since the water stopped and the mother of five remains a prime suspect.

Mwenera, a collection of mud huts outside Lilongwe, the capital of Malawi, speaks of 1994 as a golden age, for that was the year shiny new taps gushed clean water. Installed by an American aid agency, the six outdoor points, called kiosks, meant no more drawing contaminated water from a well and, it was hoped, no more water-borne diseases such as diarrhoea and dysentery.

It was not to be. Within months the authorities disconnected Mwenera's water because of unpaid bills, and the taps have stayed dry. Today they are coated in dust, their concrete bases a place for goats to snooze.

The villagers are back to the dirty well and to this day the recriminations continue: someone pocketed the money that was collected from each household to pay the communal bills and suspicion fell on Falansi, the treasurer of the water committee.

Nursing a newborn son, the 31-year-old denies the allegation and says her family is suffering from polluted water as much as everyone else in the village. "Everything I did was accounted for. It must have been someone else on the committee," she says.

The truth is likely to remain as murky as the liquid hauled up by the frayed blue rope. But one thing is clear: a technically sound project was sunk by the human factor.

WaterAid has several projects in Malawi and the most important is the attempt to reconnect Lilongwe's townships, according to Steven Sugden, the NGO's director for the country. "This is affecting tens of thousands of people."

Mwenera's blame game may appear trivial but it illustrates why decades of effort and hundreds of millions of pounds have yielded disappointments across Africa. Aid pours in, contaminated water keeps trickling out.

Sometimes people never see the aid because corrupt governments trouser the cash. Sometimes the waterpoints are shoddily built and break, or are destroyed in wars.

And sometimes the recipients are simply unable or not trained to manage the aid, a snag often overlooked by aid agencies which get funding to build, but not maintain, waterpoints.

In theory it should have been easy for a community like Mwenera to manage six kiosks, each with four taps. The people might be poor but they are not destitute: the village is part of Area 56, a township outside Lilongwe, and some of the men have jobs in town, guarding offices, washing cars, hawking knick-knacks.

Some of the children have the yellowing hair and potbellies which indicate malnutrition but nobody here starves. Goats and hens roam the village and vegetables sprout from the soil.

In 1994 the state-owned water board fixed the price at a level the community agreed it could pay, with household contributions based on estimates of how much they used. "We knew how unhealthy the well was and were happy to pay," says one woman.

The initial bills were small, in some cases just a few pence per household, and the water committee had no trouble collecting. But after several months a water board official turned up to say the cash had not reached it and that the village would be disconnected unless it paid an outstanding bill of £12.

Recriminations flowed thick and fast, with some blaming Falansi and her late mother-in-law, since they were in charge of the kitty.

Her husband, Mlambila Falansi, 51, says that was a slur and that the so-called "water mafia" were the committee chairman and secretary. "They came and asked my wife for the money," he says.

After being disconnected the aggrieved village agreed to stump up the £12 but balked at the £20 reconnection fee. The money could be found but it was a question of fairness: why should those who paid in good faith be penalised? And in any case, said some, it would be galling to allow the alleged embezzlers to have clean water. So in the end nobody got clean water.

Across Area 56 the story was repeated, with some communities unwittingly running up unpaid bills of thousands of pounds. The water board has been accused of artificially inflating prices but most say its sin was failing to devise a transparent way for communities to pay.

WaterAid is now helping to create such a system in a pilot project which employs someone to stand at a kiosk and monitor how much water each family uses, charging them for each pail. It seems to work.

Small steps, big changes

Success doesn't always have to depend on scale

Andrew Simms

When Britain's public utilities, including water, were controversially privatised, public monopolies became, overnight, virtual private monopolies. Britain's experience is now being pushed to poor countries worldwide. But lessons from the frontline of getting clean drinking water and sanitation to the people who need it suggest that small may be much more beautiful.

The reputations of big water companies have been badly damaged by high-profile failures and, in the face of all this pain for no gain, many of the real innovations are taking place at the

community level, often spontaneously, or through dynamic cooperation between voluntary groups, small-scale entrepreneurs and officialdom.

"Government officials usually prefer big contracts when equipment is involved," says Ravi Narayanan, director of WaterAid. "But for the same amount of money they could get better value by going local."

A classic example is the support WaterAid gives to a simple innovation promoted in southern India. Small vacuum pumps are attached to bicycles. Operated by two or three people, they are used to clear out septic tanks. Using affordable and locally appropriate technology has the benefit of both developing local capacity to solve problems and preventing the leakage of wealth out of the area when foreign consultants, water and civil engineering companies come to call.

Some lessons catch even the experts by surprise. Gilbert White and David Bradley have studied water in east Africa for many years. They remark on the "unexpected" benefits of a simple change in technology for carrying water. Using a plastic jerrycan instead of the traditional head-carried debe allowed, "men to carry water on a bicycle or cart and thereby avoid the ridicule that would have been the consequence of a debe as headload." With more family members able to carry water, a family's daily burden is reduced.

White and Bradley describe how, after periods of relative neglect: "One area that is receiving increased attention is the use of small-scale private entrepreneurs and community-based organisations in the provision of both vended water and public standpipes. They are emerging between the cracks of failed delivery systems involving much greater investment requirements."

The Intermediate Technology Development Group is Britain's leading advocate of small-scale solutions to the problems of poverty. Its approach achieves what is impossible for the big water companies, who must answer first to their distant global shareholders.

It tries to understand water from the view of poor people who make no distinction between the water they need for drinking and cooking and the supplies they put to productive uses, such as watering livestock, gardens or crops, or put on sale. Many people make a living bringing water to neighbourhoods, and they would also stand to lose their incomes if big business took over.

In Sudan the Intermediate Technology Development Group worked with villagers to refurbish a local dam, increasing the supply of water to irrigate land for local people. The family of one single mother, Nima, was able with help from relatives and neighbours to cultivate four acres of crops. Nima earned enough to repay part of a debt run up to meet her farm's running costs, secure her family's food needs for one year, send her elder son to university, visit the Sudanese capital Khartoum for medical treatment, and hire premises for a catering business.

This is where water provides a perfect metaphor for rethinking economics. Poor countries and poor communities with little or no negotiating power, which are forced to link up with big business and the global economy, become like leaky buckets. Money that comes in through aid or investment tends to leak straight back out again to pay, for example, water companies, civil engineering firms and their ever-hungry shareholders. Small then becomes not only beautiful, but the best way to plug economic leaks.

· *Andrew Simms is policy director of the New Economics Foundation and a regular contributor to the World Disasters Report.*

We must work together

Stephen Turner

WaterAid is Britain's only major charity which is dedicated exclusively to providing clean water, effective sanitation and hygiene education to the world's poorest people.

Failure to make significant inroads into the number of people without access to water and sanitation is, in large part, a failure of government. A failure that means millions of poor people are denied a basic human right.

But this doesn't mean we should give up on governments. Rather the opposite - governments are vital to the expansion of water and sanitation services - they provide 90% of the available funds.

Some NGOs, like WaterAid, have built up a wealth of experience in project work helping local communities to establish their own self-managed water supplies and sanitation systems.

Many lessons have been learnt on how to increase the sustainability of projects through community participation, lessons which are now shared with local and national governments. NGOs have a role in supporting governments to make informed choices which take into account the views and interests of poor communities.

When people are empowered and have the ability to speak out we can see enormous change. In Uganda, the government has listened to the organised voices of the poorest and has prioritised water and sanitation in its poverty reduction plan.

Much heat but little enlightenment is generated in the antagonistic debate on the role of the private sector. Its role is complex and the debate is not best served by either overselling the benefits to the poorest people or by campaigning against any kind of private sector involvement. In exploring private sector involvement, citizens should be involved in decision-making. Governments and the public sector should manage this process and should consider involving the small-scale, local private sector in preference to large multinationals.

If they develop this wider perspective, charities and NGOs do contribute alternate perspectives by promoting local solutions to local problems and challenging governments to broaden their options for the delivery of water and sanitation services for the poor.

· *Stephen Turner is the deputy director of WaterAid.*

Facts and figures

$2.03bn: Total western aid earmarked for water

$42.5bn: Total western aid budget

£10: Buys a simple suction pump in Bangladesh to pump water from a reservoir

£30: Pays for the salary of a Bangladeshi hygiene educator for one month, who can deliver hygiene education to 200 slum-dwelling families

10%: The proportion of aid that needs to be devoted to water and sanitation for the UN to meet its targets

5%: The proportion of world aid that actually is devoted to water and sanitation

2%: The proportion of the aid budget of Britain's Department for International Development spent on water projects

40bn: Working hours lost to water-carrying each year in Africa

73m: Working days lost in India due to water problems

384,000: People need to be provided with satisfactory sanitation every day so the UN can reach its targets

280,000: People need to be provided with water every day so the UN can reach its targets

52.4%: The proportion of the Ugandan population with full water access - up from 44.1% in 1997-98 - thanks to concerted government campaign

$513m: The amount Uganda owes its creditors

$1.45bn: The amount that would be needed to provide universal water access in Uganda

15 seconds: The time until the next child dies of a water-related disease

· *Sources: OECD, DFID, World Health Organisation, UNICEF*

One river's journey through troubled times

Huge dams have turned the mighty Euphrates into a fraction of its former self - to the fury of countries downstream

Brian Whitaker

Rising in the Kurdish mountains of eastern Turkey, the Euphrates River meanders for more than 1,700 miles through ancient history and troubled modern politics.

It is mentioned in the Book of Genesis as one of four rivers that bounded the Garden of Eden and its waters sustained great civilisations from the Babylonians to the Abbasids. Fearsome rulers, from Nebuchadnezzar to Saddam Hussein, have built their palaces on its banks.

The name "Euphrates" is Greek for "the good and abounding river", but today the water's flow has been reduced to a fraction of what it once was.

Turkey

During the 1960s, Turkey began building a series of dams on the Euphrates, to generate electricity and increase the amount of farmland in what is known as the south-eastern Anatolia project (Gap). This culminated in 1990 with the completion of the project's centrepiece - the Ataturk dam, which is 600ft high and more than a mile in length.

The purpose of Gap was not just economic. It was seen as a way of bringing development to Turkey's politically alienated Kurdish population.

Before the dam was completed 30 cubic kilometres of water passed along the Euphrates each year. The dam has reduced that flow by almost a half, to 16 cubic kilometres a year - much to the annoyance of neighbouring Syria. One minor compensation for Damascus is that although it now receives less water, the flow has become steady, without the seasonal spate.

Syria

As Turkey began work on its dams, Syria was developing ambitious plans to harness the river for irrigation and electricity. The Thawra ("Revolution") dam at Tabaqa, inaugurated in 1973, created an artificial lake 50 miles long holding 12bn cubic metres of water.

Although Syria has had some success with power generation, according to Tony Allan of the King's College/SOAS Water Research Group, it has been less successful with irrigation.

"Syria has had some bad experiences over the past decades trying to develop the Euphrates water for agriculture," Professor Allan said. "It has been trying to do this on poor saline land which also contains gypsum, with the result that irrigation gives bad yields."

In the early 90s, reduced flows of Euphrates water from Turkey led to severe problems for Syria's electricity industry. Seven of the 10 turbines at Tabaqa had to be shut down and at the peak of the crisis there were power cuts throughout the country.

Syria claims - with some justification - that it has been harmed by Turkey's use of the Euphrates, but its own behaviour has not been consistent with its complaints. On the Orontes, a much smaller river, it prevents all the water from flowing into Turkey.

Damascus is probably too weak to confront Ankara directly but it has shown its displeasure in other ways, by giving protection to Kurdish dissidents from its northern neighbour. That was seen by analysts as a signal that excessive use of Euphrates water could have serious political and security costs.

Iraq

Syria's construction of the Thawra dam angered Baghdad by reducing the amount of Euphrates water downstream, and in 1974 the neighbours almost came to blows. Baghdad threatened to bomb the dam and moved troops to the border, while Damascus deployed aircraft. The standoff was defused through the diplomatic efforts of the Soviet Union and Saudi Arabia.

In 1998 Syria and Iraq agreed to work together against Turkey's activities on the Euphrates and the Tigris (which flows along part of the Syrian border and into Iraq), leading to a boycott of companies involved in the Gap project.

By the time the Euphrates reaches Iraq the quality of its water is relatively poor and, as in Syria, irrigation gives low crop yields. "Before the invasion of Kuwait in 1990, Iraq was importing 90% of its food," said Prof Allan, whose book, The Middle East Water Question, is one of the most authoritative studies of the region's hydropolitics. Although 13 years of sanctions forced Iraq to use its water more effectively, he predicts the country will default again to the food importing ways of an oil economy.

About 40 miles north of Basra, water from the Tigris merges with the Euphrates in the region that was once famous for the Madan, or Marsh Arabs, who lived in reed houses built on stilts. This 8,000-square mile wetland was home to 250,000 Marsh Arabs though today, as a result of drainage and persecution, only 40,000 live there.

Draining of the marshes, which began in the 80s, ostensibly to create agricultural land, was viewed as a way of punishing the people for their opposition to Saddam. Now Saddam has gone, Lady Nicholson, a member of the European parliament and an activist on behalf of the Marsh Arabs, has launched a campaign to restore the area to its natural state. But Prof Allan is sceptical: "The reduced flow in the Euphrates means that it will never be possible to rehabilitate the wetlands in the south of Iraq."

The Gulf

The Tigris and Euphrates meet to form the Shatt al-Arab waterway which marks the border between Iraq and Iran, eventually reaching the sea at the head of the Gulf - but that is not quite the end of the story.

Before the marshes were drained, they acted as a filter for fertilisers washed down from further north in Iraq. Now that there are no marshes to remove them, these nutrients pass straight into the sea. This encourages algae blooms which consume oxygen in the seawater.

Lack of oxygen is thought to be the cause of what the Kuwaitis call "red tides". One such algae bloom, in 1999, killed an estimated 400 to 500 tonnes of fish.

But it is not only the Kuwaitis who are affected by this. The waters are a major breeding ground for fish from as far away as the Indian Ocean.

Ten questions the west must answer

What rich countries must do to meet their commitments, and how much it will cost

John Vidal

1. Is the political will lacking?

Is the sky blue? Most governments have signed up to the millennium development goals, an ambitious set of environmental, health and education targets which include halving the proportion of people without access to safe drinking water by 2015. Last year, at the Johannesburg earth summit, they committed themselves to halving the proportion of those without sanitation by the same time. But there are few signs that governments will meet their targets. Africa alone says it needs a minimum of $6bn (£3.78bn) a year for 15. The world's richest countries face water problems themselves. The richest nine have now published their water action plan but no extra resources have been committed to water and sanitation.

2. Is more water available?

Up to a point. According to the UN, 20% of the world's population in 30 countries face severe water shortages. This number is expected to rise to 30% of the world's population in 50 countries in 2025. Meanwhile, 1 billion people do not have water within a 15-minute walk of their homes. Some regions, such as south-east Asia, have plentiful water at some times of

the year and little at others. Others have little at any time. Taking more water from rivers leads to agricultural problems; taking more from underground aquifers may not be sustainable. In many areas of China and India the water table is dropping alarmingly and is not being replenished.

3. Can't water quality be improved?

It can - at a price. Unsafe drinking water is the world's No 1 killer, leading, according to the UN, to nearly 250m cases of water-related disease each year and between 5m and 10m deaths. UN figures also show that at any given time up to 50% of all people in the developing world are suffering from one or more of the six main diseases associated with water supply and sanitation - diarrhoea, ascaris, dracunculiasis, hookworm, schistosomiasis and trachoma. It's easy enough to filter water, but can be financially prohibitive on a large scale for many countries.

4. Is there a problem with the drains?

You bet. Two billion people don't have any, and nor do they have bathrooms or toilets. Bad or non-existent sanitation is the flipside of unsafe drinking water. Every year about 2.2 million people die from diarrhoeal diseases and 90% of these deaths are among children, mostly in developing countries and mostly in cities. A significant number are due to a single type of bacterium, shigella, which causes dysentery or bloody diarrhoea. It is easily controlled by improving hygiene, water supply and sanitation. Even in Mediterranean countries one in 10 hospital admissions are because of diarrhoeal diseases. The simple act of washing hands with soap and water reduces shigella and other types of diarrhoea by up to 35%. Education in this area is vital. Many cities have grown vastly in the past 20 years, filling up with people from rural areas who have never learnt about sanitation.

5. Can't countries cut pollution?

Yes. Water pollution is increasingly serious and costs a fortune to clean up. All countries have been guilty at some point of recklessly discharging municipal and industrial wastes into water courses. Microbes, salts and pollution from agriculture and industry all contribute to the problem, which is still growing in the industrialising developing countries. Ground water from underground aquifers is particularly difficult to clean up. Sometimes the problems are unforeseen: more than 100 million people in Bangladesh, India, Cambodia and Laos are likely to be affected by arsenic poisoning of ground water supplies after 10m boreholes were dug to avoid river water pollution.

6. Can we use less water?

Of course. Most of the world's fresh water is used for farming, and irrigated land provides 40% of the world's food. This will grow as populations continue to soar in poor countries over the next 40 years. Countries including Israel, the US and parts of Europe have developed drip

systems which can grow plants on much less water but these are not available to developing countries. Hi-tech industries, such as computers, use excessive amounts but it is believed that new technologies could easily save at least a third of water used by industry. On a personal level, the average African family uses about five gallons (23 litres) of water a day, the average American more than 100. In industrialised countries, most people have no idea how much water they consume each day, far less how much water has been used in the processes which provide them with the goods and services they use. Cheap water saving devices can reduce household consumption. Meanwhile, if we learned not to pave over wetlands and cut down forests, we'd find that there was more water for everyone.

7. Is this about poverty?

Exactly. Poor people in south-east Asia and Africa pay an average of 12 times as much for each litre of water than those connected to municipal systems. Up to one in four of the population living in cities in developing countries must buy from vendors, typically spending 10% to 20% of their income on water. In a vicious cycle, the poor are more susceptible to ill health from water than are the well-off and so they stay poor. Meanwhile, consumerism is demanding more and more water.

8. Why not put ecology into the equation?

Ecological ignorance has led to many of the world's existing water problems. The simple fact is that taking too much water from anywhere - river, aquifer or reservoir - will inevitably lead to problems elsewhere. If you reduce river flows, food production will decline as more salt water flows upstream, or farmland will be lost. Pump too much water from below ground and the water table will drop, making it more expensive to pump up and preventing rivers from recharging. Build big dams to generate hydro-electric power and you'll displace people to the cities, deprive downstream users of valuable silt for soil regeneration, and lose up to a third of the fresh water from evaporation. Build canals to bring water efficiently to needy places and you will destroy the diversity of fish in rivers. As it is, irrigation schemes have led to the silting up of rivers and waterlogging of land and tens of millions of people have been forced into unsanitary cities by major projects. Meanwhile, cutting down forests in one place will have a direct effect on the amount of water reaching other places.

9. Can technology get us out of this hole?

Hmm. It's going to have to contribute, but there is no magic bullet. Desalination plants, once ruinously expensive, can be made far more efficient and cheap. The key is to find ways to use less. Agriculture and industry must be modernised, and people can reduce their individual needs by at least a third. The lessons are clear: mega water projects lead to as many problems as they solve and help mostly the richest, but small-scale solutions are not always effective if they are not well funded and managed.

10. Where's the money going to come from?

10. Where's the money going to come from?

The UN estimates that more than $20bn a year is needed for more than a decade to provide a minimum of clean water and sanitation to the poorest. And that is just in the developing world. Thousands of cities around the world have failed to keep up with their growth and old water systems are cracking up. Up to 70% of all water and sanitation projects - large and small - fail within a few years, sometimes because there is no money to maintain them. Global bodies hope that the private sector will invest heavily, but this is politically contentious because water is seen as a public resource. Water privatisation has had a mixed record, and is beset with political and financial scandals. The public sector believes that it has the expertise, but it lacks the money. Governments of poor countries say they cannot attract global funds, yet they continue to finance huge armies, and rich countries which could easily pay for water reform are loth to invest without benefiting their own companies. Priorities are going to have to change.

When £110bn is not enough

Low-tech projects could provide clean water at a 10th of the World Bank's pricetag

Charlotte Denny

For £110bn you could build an awful lot of wells. A 10th of that amount in Madagascar would buy 7.3m of them at £1,500 each, according to WaterAid - enough to bring water to 3.6bn people. In Ethiopia the same sum would buy 23m handpumps for £470 a shot, which could bring water to 2.3bn households. In Ghana, a 40ft hand-dug well with a pump costs £1,500 and the money would be enough to provide wells fitted with handpumps for 2.2bn people.

For the World Bank, however, £110bn is not enough money to solve one of the most urgent global issues of our time: how to get clean water to 1.2bn people who currently rely on unsafe water sources and sanitation to the 2.4bn who have inadequate facilities. The Bank says raising annual spending by $75bn to $180bn (£110bn) will only be enough to halve the share of the world's population lacking clean water and sanitation over the next 10 years.

The bill includes investment not just in drinking water and sanitation but in water for irrigation and agriculture. But the cost for providing clean water and sanitation - $30bn of the total - would swallow up almost the entire amount the west spends on aid each year; some $53bn in 2002. The Bank argues that involving the private sector is essential.

For its critics, the hefty pricetag reflects the Bank's obsession with big projects and private companies. Projects profitable enough to attract the private sector will bypass billions of rural poor who have no money to pay for water. "The Bank seems to be biased towards top-down solutions," says Lyla Mehta, a research fellow at the Institute of Development Studies, at the University of Sussex. By going low-tech and local, the critics say, poor countries could achieve more at a fraction of the price.

"We are talking about very simple household level solutions which don't require massive sewerage schemes," says Ravi Narayanan, director of WaterAid. "Low-cost solutions are more appropriate as a first step."

Of course, reaching the 1.2 billion lacking safe water is more complicated than just digging wells and providing handpumps. But starting small and then thinking big is a better route than the massive projects the Bank prefers to fund, according to Mr Narayanan.

Part of the problem is that the Bank finds it easier to monitor loans for large constructions such as dams or sewerage treatment stations, rather than look after millions of cheap, low-tech solutions for the rural poor. This might be an appropriate way to build water and waste facilities for world's urban dwellers, but it doesn't help the 3 billion people who live outside cities.

"Later on, as economic conditions improve, you can bring in more sophisticated solutions," he says. In Nepal, WaterAid estimates just £3 can improve a family's health by providing a cover slab for a latrine. For £100 one handpump can bring water to 10 households.

In the west, the average toilet uses 10 litres of water every flush. But in Mozambique, WaterAid can build an ecological sanitation latrine which needs no water at all for just £15.

Neighbouring South Africa has shown what can be achieved using low-tech solutions. Under apartheid it was a starkly unequal country where the white minority enjoyed first world standards of water and sanitation while most of the black population were lucky if there was a standpipe within walking distance.

In the first seven years of democratic government it halved the numbers without access to water, connecting 7 million people to safe supplies - and aims to connect the rest by 2008 and to address the sanitation backlog by 2010.

South Africa's experience shows that with political will massive improvements in the most basic conditions are possible. While other sub-Saharan African governments lack Pretoria's resources, Mr Narayanan says they also fail to prioritise water.

"In Africa, governments don't seem to put water and sanitation high up their list of priorities," he says. "Where they consult with their population, they find that people clearly want clean water." In Uganda, when the government asked people what it should do with the savings from western debt relief, the overwhelming answer was to provide clean water. Kampala raised spending on water fivefold and provided clean water for an extra 2.2 million people between 1997 and 2001.

Mr Narayanan says he detects a change of heart among big donors. "There are signs that the Bank is beginning is realise that the private sector is not a magic bullet," he says.

But despite the shift in rhetoric, most funding still goes towards providing water and sanitation in urban areas where richer people live.

At present, just 5% of all aid goes to low-tech solutions, and in some countries less than 1% of government spending is allocated to providing water and sanitation to the rural poor. Yet, according to the Water Supply and Sanitation Collaborative Council, a UN-affiliated network of water experts, low-tech solutions to water and sanitation could be provided for everybody in the world at a 10th of the Bank's price tag.

One of the pricier low-tech solutions is rain harvesters - which filter rainwater and cost £10,000 in Nigeria, according to WaterAid. Rain harvesters reduce the need for dams and have a longer life span. In Tanzania £10,000 will pay for the salaries of two local engineers - cheaper than flying in an expert from abroad.

And the £56m cost of holding last year's earth summit in Johannesburg? In Ethiopia that would buy 121,000 public water points, at £470 each, says WaterAid, each providing enough water for 500 people. Enough water for Ethiopia's entire 67m population.

Private droughts

The poor are not profitable, and foreign firms are pulling the plug

Charlotte Denny

Where there's muck there's brass, and where there's water, there's profits, or at least that was the hope when western companies began providing water and sanitation services in the developing world in the early 1990s.

With billions of people in poor countries lacking access to water and sanitation, firms were convinced profits could be made. They had a willing ally in the World Bank, which believed privatisation was the only way of shaking up inefficient and sometimes corrupt public utilities.

Bank loans to cash-strapped governments came with strings forcing them to sell off water and sewerage companies to foreign investors.

In a twist to the usual story of aggressive US multinationals, the two water companies leading the expansion were French. Between them, Vivendi (renamed Veolia) and Suez now claim 135 million customers in Latin America, Asia and the US.

A decade on the strategy is looking as tarnished as Vivendi and Suez's share prices. Water may be the commodity of the 21st century, as one chief executive used to gush, but some companies have decided the risks outweigh the rewards.

A string of high-profile disasters has shaken the consensus that private companies are better than public ones at providing water and sewerage. In Latin America privatised water services have pushed up prices to some of poorest inhabitants of big cities, sparking protests.

Bechtel, the US construction giant, pulled out of Bolivia after mass demonstrations in 2000 over its decision to double water tariffs. It is now suing the Bolivian government.

In Argentina Suez found itself in hot water after its joint venture to provide water in Buenos Aires became a loss maker overnight with the collapse of the peso in 2001. It is also suing.

To their critics they have become vampires who suck water and profits out of developing countries. For the companies, however, the reality has been far from profitable. Suez announced this year that it was reducing its activities in the developing world by a third.

What went wrong? In Latin America, private companies proved no better than the public utilities they replaced at getting water to the poorest consumers, who simply weren't an attractive market. David Hall of the University of Greenwich says there was a basic flaw in the World Bank's assumption that private companies would step into the breach to provide water for the world's poor.

"The fundamental issue is that the poor are not profitable, because they cannot afford to pay for the connection or to consume enough water to cover operating costs," he says.

The companies themselves appear to agree. Suez has said it will walk away from unprofitable ventures in the developing world and has pulled the plug on a concession in the Philippines.

The head of SAUR, the world's fourth largest private water company, told the World Bank's water division that the private sector could not deliver for the poor. "The scale of the need far outreaches the financial and risk-taking capacities of the private sector," he concluded.

Bank staffers say they have learnt their lessons. "We are not religious zealots when it comes to privatisation," Ian Johnson, the Bank's president for sustainable development, said recently.

For some, the profit motive sits uncomfortably with provision of water, one of the necessities of life, even though the prices private companies charge urban dwellers are usually far lower than the alternative of buying water from a vendor.

Ravi Narayanan of WaterAid says a combination of private investment and public subsidies for the poorest is the only way to tackle the finance gap. For the poorest countries with no resources to spare, that will require greater support from western donors.

Narayanan acknowledges a role for the private sector but cautions that private provision is unlikely to work in the poorest countries - the poorest countries of Africa got 0.001% of international private sector investments in water between 1990 and 1997: "South Asia and sub-Saharan Africa haven't had much by way of private-sector investment in water because most of the need is in rural areas, which are hard to reach."

He points out that public utilities can be reformed with the right incentives. Uganda's public sector water provider has connected more than 2 million people to clean water since 1997.

While higher user charges have been one of the most unpopular aspects of privatisation, even progressive critics of the Bank acknowledge that they may help ration water more sensibly.

Without user charges, middle class urban dwellers with mains supplies paid for by taxpayers are effectively being subsidised by the rural poor, who lack even standpipes.

If water is free, says the Bank, scarce supplies can be monopolised by industry to the detriment of poor households and farmers. India's big farmers get a vast subsidy from the government in the form of free water provision while millions of rural dwellers lack drinking water.

Nick Stern, the Bank's chief economist, believes the solution is a combination of minimal or free provision of a basic daily supply to the poorest households, along with steeper charges for bigger users.

South Africa, which introduced a stepped system of charging, is now considering abolishing user fees for the poorest households after discovering that some women would rather walk miles to the nearest free standpipe than pay a tiny daily charge.

Narayanan is encouraged by signs that the Bank and other donors are abandoning their obsession with privatisation as one-size-fits-all solutions.

"We've got a big mountain to climb but overall I don't think we should despair," he says. "There are pointers that we are going in the right direction."

Priming the public pump

Charities don't have the clout to tackle the world's biggest problem

Priming the public pump

Charities don't have the clout to tackle the world's biggest problem

Clare Short

One in five people in the world don't have access to clean water. Half of us have no sanitation. This leads to constant ill health - millions of children still die from diarrhoea. It means hours of toil for women and girls who are constantly weary, walking miles to fetch water. Girls miss out on school and lack of sanitation leads to humiliation and ill health.

The answer is not more charity or NGO projects. Water and sanitation are not a matter for charity. They are essential for human health and development. If we look back to Birmingham in the 1820s, in the early days of industrialisation, we find child labour, illiteracy, disease and low life expectancy. The big uplift in health and survival came as engineers built systems that provided water and sanitation. This was even more important than improvements in healthcare.

The developing world needs the same. Thousands of water pumps have been provided without the spares or expertise for maintenance. Inevitably they break down and fall into disuse, thus generating cynicism about the usefulness of aid. Hundreds of miles of pipes have been laid without systems to pay people to maintain them and such systems fail and crumble. Well-intentioned projects funded by short-term aid are recipes for constant failure.

In many very poor countries, the slum dwellers pay large sums for water delivered by the bucket and the elite receive water at subsidised rates provided by publicly owned companies. And yet, when the World Bank tries to support - say, Ghana - in working out how it might provide and fund water and sanitation services for all of its people, some NGOs raise bitter campaigns about the immorality of reform which they denounce, inaccurately, as privatisation.

Most of those who join these arguments mean well, but there is a deep paternalism in the attitudes they bring. If we examine our own history or that of the countries which have succeeded in bringing development and improved services to their people, they would adjust their outlook. Developing countries need sustainable systems that can provide and maintain services for their people. Water is needed for human consumption and also for agriculture. Sanitation requires major investment.

We need therefore to concentrate on sharing expertise, using aid to speed up investment in sustainable systems, and encouraging regulatory arrangements that deliver equitable services which make reasonable charges and ensure services are provided to the poor.

There are very rich elites in developing countries. They tend to control the state and bend the public services to their advantage. Defending inefficient and inequitable public services does not help the poor. In fact, water-related diseases are the single largest source of sickness and death in the world and disproportionately affect poor people.

Improved water and sanitation services are crucial to improved health. Research also shows a strong interaction between health and development. The poor are not a constant group of people.

The poor of the world work enormously hard. They constantly improve their lives through their own creativity and hard work. But ill health is a major barrier to the improvement of their lives. Easily preventable and curable illnesses including malaria, TB and diarrhoea cause enormous burdens. A breadwinner who falls ill throws a whole family into poverty. The ill health of children leads to the spending of savings and the sale of animals and tools, thus reducing

families to penury. Investment in sustainable systems to provide water and sanitation to all enhances human dignity and economic development.

There has been an important advance in the way support for development is organised. In the past large numbers of donors funded a proliferation of projects - large and small. The consequence of this was often a hollowing out of state capacity, as finance ministries spent their time dealing with aid missions, aid accounts and evaluations and educated staff were poached from government service for better-paid jobs working for aid agencies. Thus useful projects were provided but they tended to collapse when aid funds ceased to flow. The new development framework requires countries to put in place strategies for managing the economy and funding public services in a way that will measurably reduce poverty. Significant progress has been made in many countries in improving economic growth and the provision of health and education. Few of these strategies have, up until now, made provision for a systematic expansion of water and sanitation services. An effort is needed to explicitly include plans for expanding water and sanitation services in all poverty reduction strategies and identifying funds for investment and training so that services are systematically expanded and are sustainable. This approach does not mean that it is desirable that all services should be provided by the state. On the contrary, the investment required means that partnerships with the private sector, aid agencies, and NGOs are highly desirable, but the partnerships must be coordinated so the expansion of services can provide for all and give the poor a chance to lift themselves out of poverty.

Current projections are that two-thirds of countries will face severe water strain by 2025. This will lead to considerable suffering and ill health and an increasing risk of conflict over water both within and between states. At the Johannesburg UN summit on sustainable development last September, strong commitments were made to expand provision of water and sanitation services to the poor. Now is the time to deliver on that promise.

· *Clare Short MP is the former international development secretary.*

At mercy of tides in village of the dammed

A Dhaka slum perches precariously below a flood bank. There is too much water - but far too little is safe to drink

John Vidal in Dhaka, Bangladesh

Mukta lives in an area of Dhaka called Bari Badh and her family's house looks over the great river Buri Ganga. Behind it are fancy blocks of new flats, and a busy main road has been built on a high embankment to stop them and the city being flooded. In front of Mukta's house stretches a 10-acre lagoon where men bathe and kids fish with bamboo rods.

But do not imagine that Bari Badh is a Bangladeshi urban idyll, even though it has a peculiar beauty. The 12-year-old shares her house with five others. It is a windowless, 6ft-square shelter built of old bamboo, plastic, rotting corrugated iron and soggy cardboard, accessed by a wobbly 2ft-wide walkway which stretches 30 metres on stilts over the lake. The monsoon-laden water swirls just 2ft below the bed she shares with her family. The latrine at the end of the walkway serves more than 100 people in her "street", and is just a hole screened by old hessian bags dropping into the water.

Bari Badh is just one of dozens of wretched slum districts in Dhaka. It would be better to call it the village of the dammed. This shantytown of roughly 5,000 people is on the wrong side of

the embankment and takes the brunt of the four-metre tidal surges and floods that sweep up the Buri Ganga from the Bay of Bengal and down the Ganges and Brahmaputra rivers.

The monsoon rains raise the lagoon more than 2in a day and, in less than a fortnight, Mukta, her family and neighbours will all have to move out - to live on the embankment, or, if they are lucky, in a temporary shelter. They will lose all their possessions, and perhaps their homes, but they will have to keep paying the slum landlords if they want to return.

Bangladesh has too much water, and too little. It is situated on the floodplains of both the Ganges and Brahmaputra, and just about all life revolves around the rivers, the tides, the annual floods and the rains. But water is also a curse, and the country of 112 million is at the forefront of the world water crisis.

The poorest are the most vulnerable. Storms, floods, erosion, waterlogging and even lack of water have forced most of the families now in Bari Badh to move there, and waterborne diseases, lack of sanitation, and polluted water may determine how long they live. Bari Badh illustrates problems found around the world, but seldom in such concentration:

"We came here about a year ago from the west of the country but we were made homeless when our land was waterlogged because of flood defences," says Mukta. "My family lost its land and could not earn a living. To start with we had a rented house in Dhaka, but my father left to live with his second wife in Khulna and we had nowhere else to go but here. I have only gone to school for two years. I look after my niece while my sister breaks bricks [for 30p a day].

"I know that it is a risky place to live. There is a high risk of disease here, but we have no money. Many times I think of leaving, but where can I go?"

Her neighbour Firuza earns a pittance running a tea stall. "We came from Bhola, but the land became saline, making it impossible to farm. We had no option but to come here. Our children got dysentery. Once they had typhoid, and cholera. Many people here have jaundice. Everyone here has health problems. We used to beg clean water from the flats on the other side of the embankment. But people locked their doors and harassed us. So we took river water for boiling."

Honufa, who lives nearby, came to Dhaka 20 years ago, after losing her land on an island in the mouth of the Ganges to erosion. "We lost our house and everything. We tried to settle elsewhere, but we could get no work. I am a floating person now. I have nothing to show for a lifetime. We cannot even dream of educating our children. Hundreds of people from our area came here. Hundreds more want to, but some are so poor that they cannot pay to get here.

"When they built the embankment we lived on the other side for a year or two. But the government evicted us to make way for the road and housing. We built our house ourselves. There is so much uncertainty living here. We know we will be flooded soon. We won't be able to take our possessions".

Not all of Dhaka is as squalid as Bari Badh, but more than 3 million people live in the city without the simplest drainage or sanitation. Just 30 years ago Dhaka was a city of 250,000 but it has mushroomed to 12 million and is growing by more than 1 million a year. Built on great mounds of rubbish, it expands ever outwards and within 10 years is expected to have 23 million people, at least half of whom will be without basic services. Its infrastructure has not remotely kept up with the population pressure or the rapid industrialisation.

It is a miracle of daily life that the city doesn't pack up completely. It needs a minimum of 1.6bn litres of fresh water a day to provide basic needs, but because only 60% of the wells work, only 1.26bn litres can be drawn. The result is that more than 1 million people drink unsafe water every day. Meanwhile, some 400 miles of municipal water pipes need replacing urgently, because many are made of lethal asbestos cement, and only 30% of the city has

any sewerage. What drains do exist are shared by industry and feed into lagoons which are used by people to cultivate fish. The fish are now so toxic that the city authorities will have to kill them. And residents store water in rooftop reservoirs which are mostly contaminated.

The city authorities and the government know of the millennium development goals and shrug. Fine, they say, but where will the money come from? Bangladesh is desperately poor and hardly at the top of the list for the giant water companies. They say $500m (£315m) would repair the water and drainage systems. Twice that would cope with the expansion of the city by 2015.

"The infrastructure almost doesn't exist for the middle class or the elite, let alone the poorest," said Timothy Claydon, the head of WaterAid in Bangladesh. "Millions of people are living in utterly appalling conditions."

WaterAid, working with local non-government groups, is in the slums installing latrines, fresh water pipes and sewerage, but their work is a drop in the ocean of needs that cannot be met just by throwing money at the problem. Water schemes take time to prepare and frequently fail because there is no money or organisation to maintain them, or because the communities are not properly consulted, or because they are overloaded.

In Dhaka there are other problems, too. The city's slums are mostly illegal and often situated on valuable land. The authorities frequently bulldoze them aside and residents are liable to be evicted at any point by developers. This makes it difficult to do long-term work, but WaterAid and its local partners have won permission to establish hundreds of communal waterpoints and latrines.

It has installed a standpipe in Bari Badh and built a few latrines, but acknowledges this is emergency work. "There is no long-term solution for these people if the government does not do anything," Claydon says. "All we can do is provide humanity and support, and lobby for their resettlement."

They do not have much time. Just 100 metres from Mukta's shelter developers have started tipping rubbish into the lagoon. In a year's time it will be full, a new embankment will have been built, and more high-rise blocks will have pushed the settlement out. "We will just go further towards the river," she says. "God will give us a solution."

[End]