PART E
SPECIAL REPORT
SCIENCE

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SPECIALREPORT

Trickle of hope

Unsafe water kills more people worldwide than war. The lucky ones – like this girl fighting diarrhoea in a Cambodian hospital – are surviving, thanks to Singapore's water diplomacy. As the world marks World Water Day this week, RADHA BASU and JOYCE FANG find out how the Lien Foundation is tackling the region's water woes, one village at a time

ST PHOTO: JOYCE FANG

Shopkeeper and fisherman Phearom Sok, 28, seen here with one of his five children, lives with his family on a boat house on the Tonle Sap lake in Cambodia. The family bathes and washes clothes in the lake, and even defecates in it. Sometimes, they scoop up bowls of lake water to drink. Because of the low level of hygiene, diarrhoea is a frequent killer; Mr Phearom Sok has lost a child to the scourge. A water treatment plant, however, has just opened in his floating village.

Extinction is their goal

For years, charitable foundations here were content to write ad-hoc cheques to disparate causes. But a new movement is gaining ground. Proponents of "effective philanthropy" seek to tackle the root cause of a problem, rather than just symptoms, and foster self-reliance. Our journalists travelled to Cambodia and Vietnam to see how this works on the ground.

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THE morning sun glints on the still waters of the Tonle Sap, South-east Asia's largest lake, which nestles in the sylvan heart of Cambodia.

Shopkeeper and fisherman Phearom Sok, 28, rests on his haunches. He is taking a breather from washing a tub full of dirty clothes in the turbid brown waters.

Like a million others, the lanky Cambodian and his family live in a boat on the lake, within bobbing ramshackle shelters tied together with wood, cardboard and tin sheets. They bathe and wash clothes in the lake, even defecate into it. Sometimes, they scoop up bowls of lake water to drink.

Life has been this way for Mr Phearom Sok and his community for as long as he can remember. But he knows that the water that has given them life – and sustains their livelihoods – also kills.

Poor hygiene and a lack of proper sanitation facilities have taken a heavy toll. Diarrhoea – especially among children – is a frequent killer. Mr Phearom Sok himself has lost a child to the scourge.

But he would rather forget all that right now. Hours ago, his wife Ean Sombath, 26, gave birth to their fifth child, he announces triumphantly.

A water treatment plant has also just opened in his floating village. It will purify lake water, bottle it, and sell it at lower than market prices to people like him.

"There is a lot of good news today," he says. Since he lost his child who was two years old, he has been setting aside up to US$8 (S$11.25) each month – roughly an eighth of his monthly earnings – to buy bottled water for the family.

"Clean water means good health," he says – a lesson he learnt the hard way. "The cheaper it is, the better for us."

'Radical' philanthropy

ALTHOUGH he does not know it, the source of his good fortune lies in distant Raffles Place in Singapore, where the Lien Foundation is headquartered.

The water treatment project is just one of 38 water- and sanitation-related initiatives begun in the past four years by the foundation, a privately funded, Singapore-based philanthropic organisation. During this period, the foundation gave $10.5 million to these projects, most of which are in Cambodia, Vietnam and China.

Yesterday, it announced fresh funds of $12 million to help one million of the region's poor get access to two basic needs by 2013: clean water and proper toilets.

The organisation's chairman Laurence Lien was on Forbes Asia's list of "philanthropic heroes" released earlier this month. This is a rare honour, as this is the second consecutive year the foundation has made the list: His grandmother Margaret Lien, who was chairman at the time, was honoured last year.

Mr Lien believes his foundation's determination to practise "radical philanthropy" is what sets it apart from the pack.

"We are moving beyond the traditional donor-sponsor role and tackling difficult social issues from the roots," he says. "It is more challenging, but ultimately, more effective."

Conventional "armchair philanthropy" or "passive grant-making", such as writing occasional cheques from a distance, he says, are not in his foundation's creed: "We want to roll up our sleeves and get our hands dirty by trying to plug critical gaps in society within our focus areas."

The foundation has identified three areas where it can make a concrete difference: water and sanitation, elder care and education.

In each of its projects, the long-term objective is to "foster self-reliance" rather than breed dependence, says the foundation's chief executive Lee Poh Wah: "We are, in effect, planning our own exit strategy."

The villagers' gratitude is the last thing on his mind. Hence, there are no emblazoned banners – "With love from Singapore" – claiming credit anywhere near the water treatment plant at Mr Phearom Sok's village, for instance.

It was built in consultation with the villagers with funds from Lien, but will be owned by the local community.

A local entrepreneur will operate the plant, providing jobs for locals. That way, the project will not only help meet an urgent need – providing clean water – but also bolster the local economy.

All of the foundation's water and sanitation projects have the twin goals of fulfilling a pressing need and helping communities stand on their own two feet.

In commemorating World Water Day on Monday, the World Health Organisation said 2.2 million people die every year because of diarrhoea, which is largely caused by dirty water. Nearly a billion people do not have access to clean water worldwide, and 2.7 billion – or about four in every 10 people worldwide – do not have access to proper toilets.

"No other issue plays a more pivotal role in human development," says Mr Lee.

Because of its belief in not reinventing the wheel, Lien has roped in a stellar array of Singapore organisations as partners. Institutions like Nanyang Technological University have helped to research new technologies and deploy their applications overseas.

Ngee Ann Polytechnic, meanwhile, has been training sanitation experts flown in from the three countries. And multinational plastic pipe maker Borouge has chipped in with free pipes and installation services worth more than $100,000.

Mr Phearom Sok's wife Ean Sombath, 26, resting in the family's boat house on the Tonle Sap lake with her children, after giving birth to the couple's fifth child.

The latest partner in the Lien environment initiative is the National Kidney Foundation, which will work to improve water quality and patient care in the largest dialysis centre in Hanoi.

"Rather than hire external consultants or duplicate competencies of others, we rope in domain experts wherever we can," says Mr Lee.

Fishing lessons

UNLIKE traditional philanthropists who are content to dispense funds to a variety of causes, Lien is at the forefront of the second wave in philanthropy in Singapore, where donors do not just want to give, but want to make sure they give effectively.

The global movement was spearheaded by the pioneering philanthropic behemoth, the Bill and Melinda Gates Foundation, started by Microsoft founder Bill Gates.

It seeks to solve some of the world's biggest problems that even governments or private enterprises have been unable to solve, says industry watcher Willie Cheng, who wrote about the phenomenon in his 2008 book, Doing Good Well. At its simplest level, effective philanthropy "teaches a man to fish, rather than gives him the fish".

Says Mr Cheng: "It helps communities build livelihoods and be self-reliant, rather than rely on continual handouts."

At the next level, it tackles the problem on a more integrated or coordinated basis: "Instead of just teaching a man to fish, you look at what kind of fishing rods he needs, you advise him on where the good fishing spots are, you organise for groups to go fishing together, and you address the problem as a community."

Finally, a more evolved level of philanthropy would go beyond helping a man to fish to revolutionising the community's fishing industry, and consequently its economy. As Mr Cheng puts it: "That would be moving from fishing rods to nets and trawlers, creating dams, farmed fishing."

Underlying this movement is a mindset change from focusing on symptoms to root causes.

"This requires longer-term actions of building livelihoods, building communities, advocating for change in laws and policies," says Mr Cheng. "And that's far harder to do".

But not impossible.

The Gates Foundation's ambitious initiative to eradicate malaria is an example of how anyone interested in doing good can successfully work their way up the philanthropic value chain.

The foundation has moved from providing treatment for malaria to rolling out preventative education to minimising the spread of malaria. It is now at the highest level of sophistication, where it is working to eradicate the disease worldwide.

"That's an ambitious statement, but the Gates Foundation is backing it up with a lot of purpose and money," says Mr Cheng. "Their approach is funding research into affordable drugs and vaccines for the poor, finding new ways to control the mosquitoes, and advocating for policy change and financing for this."

Growing the giving community

TACKLING the large problems of the world – like poverty, climate change, and diseases such as malaria, Aids, and tuberculosis – requires big money, organisational expertise and innovation. This is where institutionalised giving comes in.

The traditional vehicles of philanthropy that have the financial muscle to solve large-scale problems have been charitable foundations. But although Singapore has one of the fastest-growing rates of millionaires in the Asia-Pacific region, it has comparatively few charitable foundations.

At last count, taken in 2003, there were about 80 charitable foundations and grantmakers here. Hong Kong, in comparison, had more than 1,000. Updated figures are not available.

Many of the major foundations in Singapore, like the Lee Foundation or the Shaw Foundation, were set up in the 1950s. Lien was set up in 1980.

"We need more of these entrepreneurs, who have wealth that can last several generations, to do their part to follow the example of our forefathers," says Mr Cheng.

But the good news is that doing good sustainably is gaining ground among the mega-rich here, says Ms Jenny Santi, who heads UBS's philanthropy services in South-east Asia.

She advises the bank's high-net-worth clients on how to be more effective in their giving. This includes helping them set up their charitable foundations and organising site visits for them to explore first-hand the potential project

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opportunities in far-flung areas.

Five years ago, her bank did not have a dedicated philanthropy services unit in Asia. Now, it has four – in Singapore, Hong Kong, Japan and Australia. And business is booming.

Aside from its advisory and consultancy services, one of the biggest ways UBS helps grow philanthropy in the region is by holding regular forums which serve as "platforms for knowledge exchange". Philanthropists from across the region gather at these forums to exchange tips and tricks on how to do good well.

"Social change and empowered communities are easier to envisage than to implement," says Ms Santi. "Our forums are thus meant to help donors overcome problems and catalyse development."

The bank's latest such initiative, the UBS Philanthropy Forum, will be held here next month, with more than 200 private philanthropists attending.

"Wealth creation in Asia has been massive in recent years," says Ms Santi. "While there has been a time lag, institutionalised giving is finally gaining momentum here."

A PricewaterhouseCoopers survey last year showed that "philanthropy services" took the top spot as the "key emerging service offering" among private banks in Asia, in response to growing demand.

Prominent Singaporeans who have set up charitable foundations in recent years include private education entrepreneur Chew Hua Seng, who committed $100 million to setting up a foundation to focus on education issues in 2007.

Building people

IN RECENT years, Singapore has also seen a spurt in the number of big corporations setting up foundations to better channel their giving. While some such as NTUC FairPrice Foundation fund charitable causes within Singapore, others, such as Temasek Foundation, have a more regional vision.

The philanthropic arm of Temasek Holdings was set up in 2007 to develop "social and human capital" in the region, says its chief executive Benedict Cheong. Since many organisations were already providing "direct assistance" to needy communities, Temasek decided to focus on building "soft infrastructure", largely through training educators, future leaders and policymakers from developing countries.

Many of the training programmes are conducted in Singapore. Ngee Ann and Nanyang polytechnics have been roped in to train senior nurses and polytechnic teachers, while the National Institute of Education helps conduct courses for school principals.

So far, the foundation has committed $53 million to 81 programmes, which train close to 13,000 people from 13 Asian countries.

The idea, says Mr Cheong, is to empower "change agents" to pass on the knowledge and skills learnt in Singapore to their respective countries, and eventually help build durable institutions.

But compared with the tricky task of building hard infrastructure such as badly needed bridges and roads, isn't investing in education a relatively easy thing to do?

Not at all, says Mr Cheong: "It may be difficult for some Asian communities to rise out of dependency despite receiving aid, largely because there has been very little investment in training their people and in building up their institutions."

Asian tigers like Singapore, Hong Kong, Taiwan and South Korea have prospered largely by investing in people. Furthermore, investing in people has been crucial to the success so far of the Singapore story. "Now we want to share the experiences elsewhere," he says.

Training courses last between two weeks and six months, and the foundation follows up by dispatching experts to the beneficiary communities to ensure the training is effective.

Together with 23 compatriots, Mr Chen Ruzheng, 47, who teaches at a vocational institute in Liaoning province in China, is currently in Singapore for a six-week course at Nanyang Polytechnic. He teaches mechatronics, which involves building and operating automatic assembly equipment in electronics factories.

Just two weeks into the course, Mr Chen is already full of ideas he wants to implement back home. "I want my students to get hands-on experience in solving real-life problems by working at actual industry projects while still at school," he says. "That's something that's still not happening there."

Instead of just teaching a man to fish, you look at what kind of fishing rods he needs, you advise him on where the good fishing spots are, you organise for groups to go fishing together and you address the problem as a community.

Such "train the trainer" programmes have already yielded some tangible results, says Mr Cheong. Thai teachers trained here, for instance, returned to re-engineer the English curriculum, incorporating more student-friendly teaching materials in accordance with what they observed in Singapore. Storytelling sessions rather than rote learning, for instance, are used to teach children vocabulary and grammar.

Similarly, government officials from Laos were able to reorganise their tax structures based on what they learnt during their training by the Singapore Cooperation Enterprise.

"We are looking for actual change and a cascading effect," says Mr Cheong, "so that ultimately these communities are able to build capacity on their own."

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PROFILE LIEN FOUNDATION

Chair-ity is not for us

A villager in Tonle Sap getting a cup of water at the launch of a water treatment plant built with Lien Foundation funds.

The Lien Foundation turns up its nose at armchair giving – and it's a move that has put it at the forefront of the effective philanthropy movement. Having received the rare honour of being featured on the Forbes list of Philanthropic Heroes two years in a row, it yesterday announced a $12 million push to further its work of building self-reliance in water and sanitation.

THE CAUSE

ACCORDING to the United Nations Environment Programme, close to 900 million people do not have access to clean water, while 2.7 billion lack sanitation facilities.

In a message to mark World Water Day on Monday, UN Secretary-General Ban Ki Moon noted that more people die from drinking unsafe water than from all forms of violence, including war. He called the deaths an "affront to our common humanity".

Other startling facts:

- Nearly 3.6 million people die yearly from water-related diseases. More than four in 10 of these are due to diarrhoea; and out of that, nearly nine in 10 are children.
- Almost all water-related deaths occur in the developing world.
- At any given time, half of the world's hospital beds are occupied by patients suffering from a water-related disease.
- Less than 1 per cent of the world's fresh water (or about 0.007 per cent of all water on earth) is accessible for direct human use.
- An American taking a shower for five minutes uses more water than a person living in a slum in a developing country would use in a day.
- Without food, a person can live for weeks, but without water one can expect to live only a few days.
- The daily requirement for sanitation, bathing, and cooking needs, as well as for assuring survival, is about 13.2 US gallons (50 litres) per person.

A woman, bleeding from a miscarriage, is rushed to Kampong Speu Referral Hospital in Southern Cambodia on a cardboard box.

THE RESULTS

Water woes make hospital hell

- **Problem:** Clogged toilets and no clean water for cleaning and drinking
- **Solution:** Overhaul sanitation and sewerage facilities, set up water filtration plant

A NAVY blue van screeches to a halt in front of the Kampong Speu Referral Hospital in southern Cambodia, shattering the late afternoon languor.

Three attendants hurry inside, carting a young woman on a cardboard sheet. She is bleeding from a miscarriage.

She needs to be bathed, but water here is a luxury. Most of the hospital's toilets are clogged and overflowing.

Worse, the hospital is in the midst of a diarrhoea epidemic.

"Sometimes, we get water from home to wash ourselves," says housewife Khen Khorn, 40, who watches the scene unfolding outside the window near her hospital bed. She has just given birth to her fourth child.

About a dozen women – some pregnant, others new mothers – lie listlessly on metal beds around her. Some doze, but Ms Khen Khorn says the heat is keeping her awake. The fans do not work. And the long grey windows at the other end of the ward are tightly shut.

"We have no choice," says Ms Khen Khorn, cradling her newborn daughter. "The smell from the toilets is unbearable."

Pregnant women need to go to the toilet often. "But we try to go as seldom as we can."

The hospital sees 650 inpatients and 2,000 outpatients every month.

The current sanitation crisis, explains its director, Dr Tim Tany, has been caused by tree roots that have pushed one side of the sewer pipe deeper into the soft earth, obstructing the flow of waste water and clogging up many of the hospital's 19 latrines.

"We're lucky the toilets near the diar-

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rhoea ward are working," says Dr Tim Tany. The hospital has had 90 diarrhoea patients in the past three days.

It needs clean water, clean toilets and a sewerage system that works, he says, reeling off his wish list for the benefit of visitors from Singapore.

Dr Tim Tany's wishes will soon come true as the hospital undergoes a radical overhaul of its sewerage and sanitation systems. The funds – totalling nearly $170,000 – will come from Lien Aid, the overseas development arm of Singapore-based Lien Foundation.

"Immuno-compromised patients are at far higher risk of being infected by water-borne diseases," says the foundation's chief executive Lee Poh Wah. "Which is why, if we need to save lives and prevent water-borne infections, a hospital is a good place to start."

According to data from the World Health Organisation, 50 children under five years old die every hour in South-east Asia due to diarrhoea. It is a leading cause of child mortality in the region, second only to pneumonia.

Since 2006, Lien Aid has worked to beef up sanitation and sewerage facilities in 10 hospitals in Vietnam and Cambodia.

While the Kampong Speu project is just getting off the ground, others in neighbouring Vietnam have already borne fruit.

At the National Hospital of Paediatrics in Hanoi, the foundation has helped set up a water filtration plant and drinking water systems.

Previously, nurses had to boil drinking water for the 40,000 inpatients who throng the hospital every year. And there was no service at night, says the hospital's vice-director Duong Mac Tuan.

At Vietnam's biggest cancer hospital, also in Hanoi, children are provided drinking water, but other patients sometimes had to suffer parched throats.

The hospital had no drinking water facilities and a day's supply of bottled water cost US$2 (S$2.80), about a 10th of the monthly wage of many patients.

A slew of projects by the Lien Foundation has changed all that.

The National Cancer Hospital, which extends across two complexes in different parts of Hanoi, sees around 30,000 patients every year. Half of these are inpatients.

The main complex, built 40 years ago, still has no municipal water supply. The second complex, built in 2000, gets only three hours of water every day.

With technical help from an engineering professor at the Nanyang Technological University, Lien Aid built an automatic water pumping system, provided extra rooftop tanks for the hospital to store water, and bought nearly 70 wash basins and drinking fountains for the wards and outpatient departments.

The water fountains in particular are a boon to patients, says the head of the hospital's technical and administration department Do Duc Minh, especially as chemotherapy patients need to drink plenty of water to "rid their systems of toxins".

Paddy farmer Doan Van Phan, 45, was diagnosed with throat cancer a month ago. Unable to get a bed – the hospital sees three times the number of patients it has beds for – the farmer and his wife have been sleeping on the yellow-tiled floor of the surgical ward for nearly a month now.

Just a month's treatment at the hospital has cost him the equivalent of four years' wages, he says. With his hard-earned money flowing like water, he is eager to save all he can.

"The water cooler saves me from buying water," he says.

"And I feel thirsty all the time."

A woman feeding her son at the National Hospital of Paediatrics in Hanoi, where Lien Aid has helped to set up a water filtration plant and drinking water systems.

Rice farmer Doan Van Phan (second from left) is one of a few who have been sleeping on the floor of the surgical ward in Hanoi's overcrowded National Cancer Hospital. This choice spot – next to the drinking fountain – ensures their thirst is easily quenched.

Toiling for toilets of a different kind

- **Problem:** Lack of education and hygiene
- **Solution:** Get foot soldiers to spread the word, one by one

ACRES of barren rice fields bake in the summer heat. Skinny cows graze on tufts of withered grass. Spindly palm trees dot the flat landscape.

As a car approaches the sleepy hamlet of Thlok Andas, groups of scrawny, squealing children appear from nowhere and race alongside, oblivious to the heat and clouds of red dust.

This village of 520 is indistinguishable from dozens of others in Kampong Speu province in southern Cambodia, a three-hour drive west of Phnom Penh. But there is one key difference.

Unlike most villages in the country, every home here has access to proper hygienic toilets. And no one defecates in the open.

This was not always the case. But one man's commitment has changed the village landscape.

Shy and soft-spoken, paddy farmer Nguon Kong, 50, is an unlikely revolutionary. Three years ago, the gaunt and greying father of four volunteered to attend a community training programme to make villagers aware of the benefits of toilets.

The programme focuses on changing behaviour through talks that allow villagers to discover for themselves the benefits of hygiene and draw up sanitation action plans themselves.

The three-day course was organised in his village by Lien Aid, the international development arm of Singapore's Lien Foundation, in partnership with the local government.

What he learnt there startled him.

A family of four, for instance, can produce 1,000kg of faeces in a year. If you defecate in the open, the virus-laden muck could pollute water sources. Thousands in his country still die from contaminated water.

When Mr Nguon Kong attended the course, hardly anyone in his village had a toilet. It was viewed as an unnecessary urban indulgence.

Instead, everyone headed to wooded areas to relieve themselves. Children often played in the muck and fell ill with diarrhoea. Some even died. And the smell of festering faeces hung over the village, night and day.

"When I returned from the course, I was convinced that we needed to clean up," Mr Nguon Kong tells The Straits Times, sitting outside the wooden home he shares with his mother, wife, two children and one grandchild.

So every day, after working in the fields for eight hours, he trudged from home to home to convince villagers of the advantages of toilets.

He single-handedly covered the 100 homes in the village.

He also roped in others in the village to attend community talks to learn about waste disposal and how the problem could be curbed.

Pit-based latrines, they soon realised, were the best answer.

In just eight months, all 100 families in the village had dry pit latrines constructed outside their homes.

Although these latrines can be built for free – by digging a hole in the ground and using discarded canvas sheets or bamboo thatch to create a shelter – many of the villagers paid around S$10 to fortify their pits with a concrete ring, to make their toilets more durable. Lien Aid helped pay for the transport costs of the concrete rings.

The "100 per cent success" – for which he was commended by the government – was not difficult to achieve, says Mr Nguon Kong. "Once mothers knew it would keep their children safe from disease, it was not hard to sell."

But his village is clearly an exception.

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Paddy farmer Nguon Kong showing off his dry pit latrine in the Community Led Total Sanitation village of Kampong Speu. The latrine, which is essentially a hole in the ground reinforced with a concrete ring, does not give off a foul odour. Users add ash after each use to keep the smell at bay.

BETTER THAN A TOILET

"We'd rather spend the US$35 on a motorcycle or a cow – or better still, gold."

Rice farmer Tob Nong (above), on why she and her husband don't have a toilet despite owning a DVD player, TV set and mobile phone

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Close to 80 per cent of Cambodian villagers still do not have access to clean toilets. In the past 15 years, despite efforts of the Cambodian government and thousands of NGOs, rural sanitation rates – which indicate how many have access to proper toilets – have moved from 8 per cent to about 22 per cent, which remains among the lowest in the region.

In Laos, 30 per cent of villages have toilets, in Vietnam, 50 per cent, and in Thailand, the rural sanitation rate is nearly 100 per cent.

A 2007 World Bank study found that poor sanitation led to economic losses of US$448 million (S$630 million) per year, largely because of burgeoning health-care and water-purification costs. This is equivalent to 7 per cent of Cambodia's gross domestic product.

The author of the World Bank study, Mr Jan Rosenboom, who heads the Cambodia office of the bank's Water and Sanitation Programme, pointed out that what went wrong was that many organisations gave away the toilets free to villagers. "This is expensive – and does not always work."

Lien Aid avoided doing that, says the organisation's programme manager in Cambodia, Ms Lyn McLennan. Instead, it followed what industry practitioners refer to as a community-led total sanitation, or CLTS, programme.

"CLTS recognises that providing toilets does not guarantee their use," says Ms McLennan.

"So it focuses on changing behaviour through talks that allow villagers to discover for themselves the benefits of hygiene and draw up sanitation action plans."

Together with local government partners, Lien Aid rolled out its CLTS programme in five villages in Kampong Speu, reaching 1,800 people through community talks held in the village. Commune leaders were roped in to encourage people to come.

Before the initiative, about 3 per cent to 5 per cent of the population in the five villages used toilets. After the programme, 90 per cent of the people had built their own latrines.

An hour's drive from Thlok Andas, in Chas village, another kind of toilet ambassador is doing her rounds in yet another programme by Lien Aid.

This time the organisation has roped in Singapore's World Toilet Association to start an ambitious US$400,000 "water and sanitation marketing" programme, where a group of trained "sanitation sales agents" trudge from village to village selling the benefits of toilets and clean water to rural folk. The project hopes to reach 290,000 Cambodians in more than 530 villages.

At the same time, local masons are being trained to build toilets, to ensure a steady supply. Half the funds was raised from United States Agency for International Development, which is also working in the region.

In Chas village, ringed by paddy fields and banana plantations, fewer than 30 of the 128 families have latrines in their homes. Cambodian Sok Leng, 30, a former housewife, is among a team of 21 sales agents trained to sell toilets and the promise of better health to the rest of the villagers.

In six days, she has "sold" 28 toilets to surrounding villages. The tools of her trade? Photographs of happy families posing with their toilets and detailed diagrams of how the toilets work and their benefits.

Another 120 families have shown interest, but at Chas, response has been lukewarm.

Rice farmer Eang Lang, 48, pleads that she has no money to spend on buying a latrine. She lives off the 200kg of rice she and her husband farm every year. After feeding the family – including three children – they sell the rest, earning barely US$50 a year. When told that she could build a pit latrine virtually for nothing, she says that she has no time.

Yet others, like rice farmers Doc Cheam, 42, and his wife, Tob Nong, 40, own a mobile phone, bicycle, TV set, even a DVD player. But asked why they have no toilet at home, they say they can't afford one. Probed further, they lament that the toilets Ms Sok Leng peddles cost around US$35. They are more expensive than the pit latrines, which can be built free, as they are more durable, hygienic and easier to use.

They may be richer than most people in their village, concedes Ms Tob Nong, but there are so many things they still want to buy.

"We'd rather spend the US$35 on a motorcycle or a cow – or better still, gold," she says.

Ms Sok Leng leaves empty-handed, but vows to return. She's not giving up.

"The greatest challenge we face is to make a toilet an aspiration," says Ms McLennan. "And that's really hard to do."

Cambodian farmer Soei Srorn spent a full year's savings – US$160 (S$224) – on a rainwater harvesting system in May 2008. He feels the expense was worth it, to avoid consuming the arsenic found in groundwater in his province.

Rice farmer Seng Phai (above left) has lived with the crippling effects of arsenic poisoning for the past two years. She has lesions on her feet (above right) which make it difficult for her to walk.

When all's not well...

- **Problem:** When the ground spews poison
- **Solution:** Fostering innovation and self-reliance

LARGE concrete cylinders hold pride of place in the backyard of farmer Soei Srorn's timber-and-thatch home.

They are part of a sophisticated rainwater harvesting system that the 55-year-old widower built in May 2008. To install it, he invested days of hard labour and US$160 (S$224) – a full year's savings.

But that, he says, is a small price to pay for health.

Like thousands of families living in Kandal province in southern Cambodia, Mr Soei Srorn's friends and neighbours are at risk of drinking poison along with their water.

In a naturally occurring phenomenon that has affected millions in more than 20 countries, the level of arsenic in their groundwater is 25 times the permissible level stipulated by the World Health Organisation.

This usually occurs in communities that depend on tube wells, which can tap into groundwater that lies more than 200m below the earth's surface.

About 320,000 people are at risk of arsenic contamination in Cambodia. Kandal is among the worst-affected provinces, with 70 people receiving treatment for arsenic poisoning in recent years.

Mr Soei Srorn was galvanised into action after looking at photographs of the effects of arsenic poisoning flashed by aid workers from the Singapore-based Lien Foundation during talks held at his village in early 2008.

The graphic images of people with ugly skin lesions and calloused, blotchy hands and feet were difficult to ignore.

"They were scary," he remembers with a shudder. So the father of three grown-up children learnt how to build his own rainwater collection and purification cylinders by watching trained masons construct a similar system funded by the Lien Foundation.

Between January 2008 and February last year, the Foundation collaborated with Cambodian NGO Rainwater Harvesting to provide made-in-Singapore rainwater harvesting systems for 24 of the poorest families in the village as well as a school and health centre.

The Foundation hopes that richer families will pay to install their own systems once they see the value in them.

Those who are still saving up the money, meanwhile, have been given US$10 ceramic filters to fight the scourge.

Rice farmer Seng Phai, 38, who lives a couple of houses away from Mr Soei Srorn, has been living with the crippling pain of arsenic poisoning for the past two years.

She has lesions on her feet which make it difficult for her to walk. "Yesterday, they were bleeding and the skin creams the doctor gives do not always help," she says.

Her condition is a result of chronic exposure to arsenic. She used to draw water from a tube well located outside her house.

She now uses the filter provided by Lien Aid and boils her drinking water. She knows the rainwater harvesting systems are the safest way to get clean water in her village. "Hopefully, one day I will be able to afford one of those," she says.

Across the border, in Ha Tay province in northern Vietnam, scores of villages are facing an even grimmer crisis. Aside from the tell-tale lesions and blotchy skin of arsenic poisoning, cancer rates in the villages are also on the rise.

"My father and father-in-law both died of cancer, but I thought nothing of it," says vice-chair of the 9,500-strong Trung Chau commune Thieu Van Dau.

But government officials tested the village tube wells and found the water to contain 30 to 50 times the acceptable levels of arsenic.

"The whole commune became very very worried," says Mr Dau. "The water does not smell, it tastes normal, but it is poison."

As in Cambodia, Lien Aid began working with the Vietnamese government to mitigate the risks in 2008. Together with a local NGO, the Centre for Water Resources, Conversation and Development, it deployed arsenic treatment units in 75 of the commune's poorest homes.

Schools such as Trung Chau Kindergarten have also received filtration systems for free. The kindergarten gives its 210 pupils two meals a day.

Principal Nguyen Thi Minh Que, 46, says: "We were lucky to get such an advanced system. Now I know the children will be safe."

The filters make use of a naturally occurring substance – laterite – and were devised by engineers from Nanyang Technological University (NTU).

Lien Aid also trained local stone masons to set up systems in homes. But with each unit costing between US$170 and US$300, depending on how sophisticated it is, take-up rates have been slow.

Still, necessity being the mother of invention, villagers have made their own much cheaper version of the NTU system using plastic buckets and laterite chips.

Lien Aid chief executive Sahari Ani is heartened by the innovation.

"We don't want to give away money, but solutions," he says, dubbing the trend a "positive outcome".

The organisation is working with Vietnamese researchers to look for different, possibly lower-cost, alternatives.

Lien Aid, says Mr Sahari, used two different methods to treat the same problem in Cambodia and Vietnam, in accordance with the wishes of their local people and governments.

While the Cambodians were more interested in solutions incorporating alternative water sources such as rainwater, the Vietnamese wanted a variety of filtration options for treating the arsenic-contaminated water.

"Rather than impose our solutions from above, we learn about local sentiments first," says Mr Sahari. "And tailor our solutions accordingly."

Keeping village economy afloat

- **Problem:** Impoverished communities stuck in poverty trap
- **Solution:** Start water treatment plant and bottled water business

THERE are red roses. Blue, green, purple, pink and yellow balloons. Even red carpets and a VIP guest of honour.

It's an important day for the boat people of Chhnouk Trou, a cluster of villages made up of people who live on boats on the Tonle Sap, South-east Asia's largest freshwater lake. During the monsoon season, the lake swells to about 24 times the size of Singapore.

A new water treatment plant, built with Singapore funds and technology, is being launched by Cambodian Minister for Rural Development Chea Sophara.

The plant will produce drinking water to meet the needs of up to 1,000 families a day.

Instead of being given away for free, the Lotus brand water will be sold to the villagers at about 700 riel (25 Singapore cents) for 20 litres. Sales will be done door-to-door by villagers, creating jobs and revving up the village economy.

The $72,000 cost of setting up the plant was borne by Singapore-based Lien Foundation.

The residents of the floating villages of Tonle Sap are too poor to live on land. The lake is their lifeline as most of them are fisherfolk. But its foul-smelling, festering water, full of human waste, has also killed many of them.

An estimated nine million people are affected by diarrhoea in Cambodia each year. Of these, about 6,000 die. The vast majority are children.

As about 300 villagers listen with rapt attention, Mr Chea Sophara points out that the Lotus brand water that the plant will sell will cost much less than the 1,500 riel that the villagers currently pay for a similar-sized bottle of water.

"You must find the money to spend on clean water to avoid spending to treat illnesses like diarrhoea later," he says.

"Sometimes, even if you have money for medicine, people can still die. But there should be no loss of life if you drink clean water."

The chief executive of the Lien Foundation, Mr Lee Poh Wah, says in his speech that the most remarkable thing about the project is that it is "owned, operated and co-developed by the people of Chhnouk Trou".

"The lotus is a beautiful flower that rises from muddy waters. Let's hope that the pure waters produced by the Lotus will continue the friendship of our two countries."

Speaking to The Straits Times later, Mr Chea Sophara says NGOs like the Lien Foundation are key partners in the race for Cambodia to meet its Millennium Development Goal of providing at least half of its people with safe drinking water by 2015. Currently, the access rate is about 40 per cent.

"People need to be in good health first to participate in economic development. Collaborators like Lien could help the government overcome such challenges," he adds.

Fisherwoman Chhai Khon, 53, who was born and raised in the floating village, has been buying Lotus water for her three children, aged 13 to 23, as part of a soft launch.

Besides being cheaper, she says, unlike some other brands of bottled water that become muddy when left unused for a few days, Lotus water remains "pure".

The plant will be jointly owned by the community and a private operator. The operator – local entrepreneur Chor Lim – will be responsible for the maintenance and repair of the plant.

The commune council, the unit of self-government at the village level, will be responsible for the maintenance of the plant premises, which is built on a barge.

Mr Chor Lim, 53, who runs an ice factory in the village, says the water treatment plant is a "logical extension" of his business and a chance to "give back to the community".

"A couple of other water treatment plants in the area were donated to the village," he says. "But this one will help make us independent."

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The new water treatment plant will not only ensure that villagers of Chhnouk Trou have safe drinking water, it will also give the small fishing community an economic boost as the project is owned, operated and co-developed by the villagers.

(Left) Cambodian Rural Development Minister Chea Sophara drinking water from the new plant at its opening. Lien Foundation CEO Lee Poh Wah (third from left) says he hopes the plant's Lotus brand bottled water (above) will help strengthen ties between the people of Singapore and Cambodia.