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Page 10,11 | Section: SCIENCE

Former farmer Ramprasad Yadap's left foot had to be amputated after years of arsenic poisoning from the water he had been drinking in Nawalparasi district in Nepal's southern Terai region, a lowland area. ST PHOTOS: DESMOND FOO

How NTU is helping schools in Nepal to battle arsenic contamination

Cheryl Tan
In Nawalparasi (Nepal)

When Mr Ramprasad Yadap, who lives in rural Nepal, started developing skin lesions on his body some 17 years ago, he did not think much of the little pigmented spots.

But they were a tell-tale sign of arsenic poisoning – a condition which would become so severe that it turned his left foot gangrenous a few years later, leading to eventual amputation.

This was all because of the water that he had been drinking.

The lowland area Mr Yadap, 59, lives in – Nawalparasi district in Nepal's southern Terai region – has always been an arsenic hot spot.

Arsenic contamination is very much like "slow poison", said Dr Makhan Maharjan, a programme director of non-profit organisation Health and Environment Development, Nepal (Head-Nepal). He has spent more than 20 years working on arsenic-related projects in the area.

"For such chronic contamination, at the early stages, there are no symptoms, but prolonged exposure at high concentrations has fatal effects," he added.

"Arsenic is naturally found in rock and mineral formations; and as the water has been travelling from the Himalayan mountains to the lowlands over thousands of years, its layers of sand deposits are now rich in arsenic. This is where people are now extracting their water from," said Dr Maharjan.

Those living in the Nawalparasi area have been drawing from shallow aquifers, or rock formations underground, through the use of hand pumps. This is where the arsenic content tends to be elevated.

Now, a team from Singapore's Nanyang Technological University (NTU) is providing a solution. Dr Maharjan has been working with scientists from its Nanyang Environment and Water Research Institute (Newri) to install water filtration systems in schools in Nepal.

As part of a collaboration between Newri's philanthropic arm NewriComm and Head-Nepal, the first drinking water facility was installed at Saraswati Secondary School in 2020.

The project is supported by Lien Foundation Fellowship, a non-profit programme which empowers academics from Asean, South Asia and Central Asia to tackle water and sanitation problems in their home countries.

A second pump was commissioned in end 2020 at Shree Janta Secondary School, which is in the same district.

The completed water filtration system was officially handed over to the school management on June 15, at a ceremony attended by NTU and Head-Nepal representatives. This project will benefit more than 600 students and teachers – more than double the number in the inaugural project.

The system, which works primarily by leveraging the ability of iron nails to attract and absorb arsenic particles, is able to make the water clean by filtering about 85 to 95 per cent of arsenic in it.

Dr Maharjan, who was in charge of both projects, hopes the children and youth benefiting from these taps can become important environmental champions and changemakers.

"If we teach them, educate them in school about arsenic contamination and its health concerns, they can take this message back home and educate their families and their larger communities," he added.

But the task of getting clean water to everyone is a difficult one.

When 17-year-old Sandip Yadav from Saraswati Secondary School learnt about arsenic contamination, he felt compelled to convince his father to get a similar filter. But this was not a simple purchase for the family.

"My father, who is a labourer, had to save up for several months, and eventually we were able to purchase the water filter which cost about 6,500 Nepali rupees (S$72.50). I feel more relieved knowing that the water we consume is now a lot cleaner," he said.

Many others are unable to afford similar filters, and are still relying on untreated, contaminated water.

Ms Samjhana Chaudhary, deputy mayor of Ramgram Municipality in Nawalparasi, said foreign aid will be key if the district is to build piped water systems to serve households, as well as install more water filtration systems in public places.

Apart from NTU, there have been other institutions and non-governmental organisations (NGOs) in the region offering help.

For instance, some NGOs have provided household-level arsenic removal filters to Mr Yadap's village, and a deep tube well system was installed about two years ago, said Dr Maharjan.

Unlike the hand pumps, these deeper tube well systems – which are a lot costlier – can extract water from deeper aquifers underground which have cleaner water that is arsenic-free, he added.

Mr Yadap and his four children, who also suffered from arsenic poisoning in the past, now have access to clean water.

"Still, I worry a lot about their future. I hope clean water for them is here to stay," he said.

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A FATHER'S CONCERN

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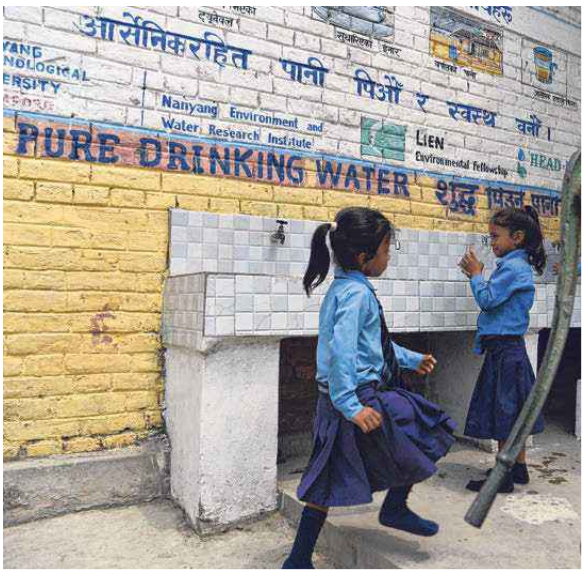
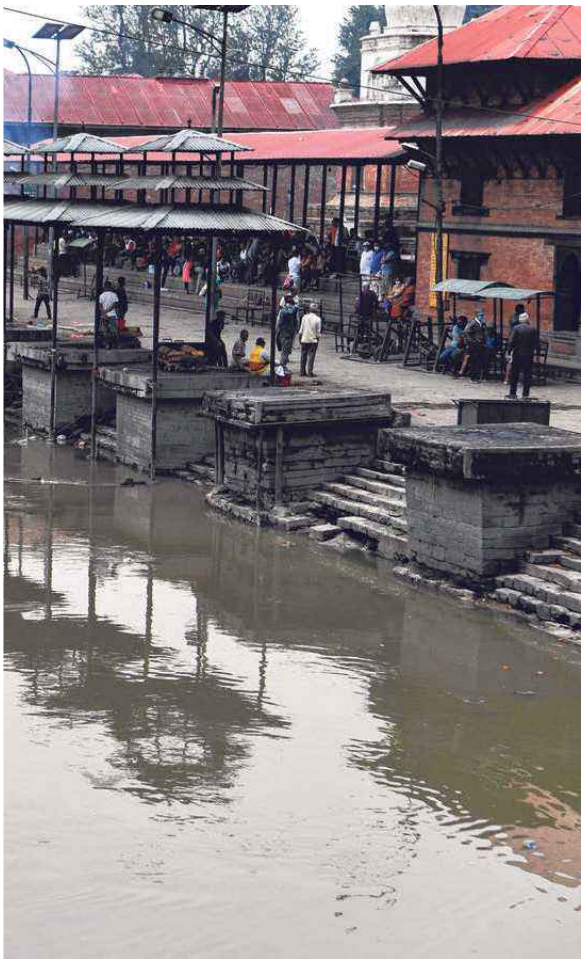
MR RAMPRASAD YADAP, on his four children, who also suffered from arsenic poisoning in the past but now have access to clean water.



Right: Students of Saraswati Secondary School drinking safely from a pure drinking water point. The school got a water filtration system with help from the philanthropic arm of NTU's Nanyang Environment and Water Research Institute (Newri).

Far right: Students at the Shree Janta Secondary School, which also got a water filtration system. Here, a student is using one of the old water hand pumps, which can now be used only for washing due to arsenic contamination.



Left: The Pashupatinath Temple, a Unesco World Heritage site in Kathmandu, on the banks of the highly polluted Bagmati River.

Above: A cremation ceremony taking place at the temple by the water's edge. The famed river which runs through Kathmandu Valley is revered by Hindus and Buddhists as its water is thought to be holy.

Right: Children at a popular stone water spout in Patan. Such spouts are part of an ancient water distribution system that uses gravity to channel rainwater to residents in Kathmandu Valley.

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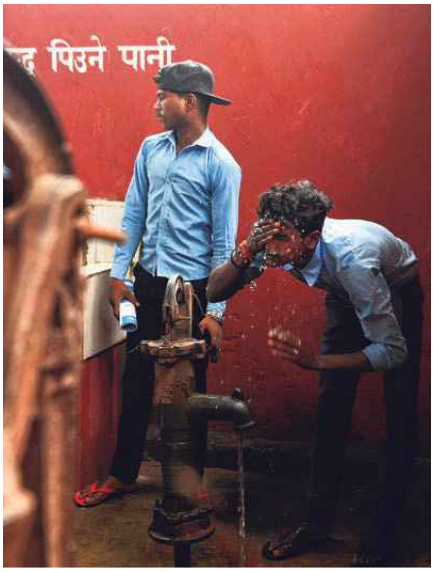

Dr Makhan Maharjan, a programme director of non-profit organisation Health and Environment Development, Nepal (Head-Nepal) and a research assistant collecting samples near the Pashupatinath Temple to assess the physical and chemical characteristics, and the microbiological quality of the Bagmati River water.