

Science Journals

Nepal rich in water resources, but facing water stress today

Organisations there working with partners including S'pore researchers to tackle woes

Cheryl Tan
In Kathmandu

Nepal, like Singapore, is one of the most water-stressed countries in the world.

But where Singapore lacks ac-

cess to natural water resources, Nepal has plenty – rivers fed by meltwater from the glaciers in the Himalayas and groundwater aquifers charged up by rain.

But as I recently discovered during a trip to Kathmandu, water resources in Nepal are coming under threat from rapid urbanisation, pol-

lution and climate change – issues that also plague many other cities.

The Intergovernmental Panel on Climate Change (IPCC) had in February warned that water shortages, which already plague half the world's population at some point in a year, could become worse due to erratic rainfall patterns or extreme events such as floods or droughts.

Such dry conditions could negatively affect agriculture and energy production from hydroelectric power plants, said the report.

Now, organisations in Nepal are working with various partners, including researchers from Singapore, to help the country safeguard its water resources.

THREATS TO WATER SECURITY

The famed Bagmati River, which runs through Kathmandu Valley, is revered by Hindus and Buddhists as its water is thought to be holy.

Several Hindu temples are located on its banks, and Hindus are

cremated on the banks as well.

But the state of the river now is a far cry from what it was in the 1970s.

A visit to the river earlier this month reveals stagnant, murky brown water instead, chock-full of litter like plastic waste and bits of cloth.

The cause of the pollution?

Concrete, carpet and other industries are dumping their waste in the river, with households doing the same with their sewage, said

freelance climate change and senior watershed expert Madhukar Upadhyaya.

Recounted the 68-year-old: "Back then, there were no rules governing waste disposal and people thought we had enough water, so we could just wash everything away – which was true back then, as the population was not as large."

Mr Upadhyaya, who used to do his laundry and take baths in the river, said that as Kathmandu Valley did not have a good municipal water supply back in the 1960s and 1970s, the river was an important part of people's lives.

The 1990s heralded the age of rapid urbanisation in Nepal, but it was not until 2011 that rules forbidding the dumping of solid and industrial waste were introduced.

Even then, this was largely ignored. Stricter rules now are helping to change people's mindsets, said Mr Upadhyaya, who still lives in Kathmandu.

River sampling efforts by the Nanyang Technological Univer-

city's Nanyang Environment and Water Research Institute (Newri) have found that in certain sections of the river, the water is highly toxic to human cells, and that there is an unusual amount of pharmaceutical discharge, including antibiotics, which could lead to antibiotic resistance, said its executive director Shane Snyder.

But the source of this pharmaceutical discharge remains unknown, he noted.

Mr Upadhy said: "The problem that the Bagmati River is facing is that it has lost its ability to flush out these pollutants and clean itself naturally."

For one, the Bagmati River now has a decreasing watershed.

This refers to the parcel of land that channels rainwater to groundwater beneath the earth's surface, which in turn feeds rivers like the Bagmati. "The greater the amount of rainwater that is stored as groundwater, the richer the watershed becomes, because it can continue to feed rivers like the Bagmati during the drier seasons," said Mr Upadhy.

However, rapid urbanisation in the valley has seen 80 per cent of the valley floor being sealed by roads and buildings in the past 40 years, which makes it impossible for rainwater to seep into the

ground, he added.

"Many traditional ponds that collected rainwater and contributed to groundwater recharge have also been lost to other structures due to unplanned urbanisation," he said.

At the same time, the amount of rain falling over Nepal is also becoming increasingly erratic due to climate change.

Climate change expert Raju Pandit Chhetri, executive director of Prakriti Resources Centre, a non-governmental organisation working on sustainable development

and environmental justice in Nepal, said that rainfall during the monsoon season is becoming more erratic.

The season usually begins in the first week of June and lasts for around three months, till early September.

"What's happening nowadays is that you often get a very heavy downpour in a single day, but dry weather during the rest of the week," said Mr Chhetri. This is opposed to rainfall being more consistently spread out over the week.

PLAGUED BY POLLUTION

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MR MADHUKAR UPADHYA, a freelance climate change and senior watershed expert, on the famed river.

ERRATIC RAINFALL PATTERNS

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MR RAJU PANDIT CHHETRI, a climate change expert, on how rainfall during the monsoon season is becoming more erratic.

Another IPCC report published in August last year warned that the water cycle has been intensifying and will continue to do so as the planet warms.

This means more wet and dry extremes that will increase with future warming.

Heavy rainfall could also have more disastrous effects, such as crop losses for farmers and landslides and flooding in various areas around the country.

And while there is a shortfall of rain during some periods, too much rain at other times has also led to disastrous consequences.

SOLUTIONS

Singapore has been able to overcome its water scarcity through building expansive infrastructure, such as used-water treatment plants and desalination facilities that purify sea water.

But experts say such interventions may not be as suitable for Nepal, especially if these are not adapted to climate change.

For instance, the Melamchi Water Supply Project, an initiative of the Nepalese government that took over two decades to build, was designed to divert about 170 million litres of fresh water daily from the Melamchi River through

a 26km tunnel to Kathmandu. This accounted for less than half of Kathmandu's daily water demand.

But unexpectedly heavy rainfall followed by a landslide caused significant damage to the tunnel on June 15 last year, just months after it began operations.

The tunnel was also closed this year ahead of the monsoon season to prevent a similar occurrence.

The project worth 35 billion Nepali rupees (\$388 million) now faces a lot of uncertainty, including being not well-adapted to the changing climate, said Mr Upadhy.

"Now, with there being more extreme weather events occurring due to climate change, we don't know what the future will hold for this project, and whether it is still viable in the long term," he added.

Instead, Mr Upadhy proposes simple, small-scale solutions that work as closely with nature as possible.

For instance, creating small ponds by trapping rainwater in certain areas of the watershed can allow water to re-enter the earth, and recharge groundwater reserves.

This has been trialled by the International Centre for Integrated Mountain Development in several villages in Kavre – a district east of Kathmandu – after an earthquake there caused some

springs to run dry.

In Nawalparasi district in the southern lowlands of Nepal, Singapore's Newri team partnered local organisations there to install water filtration systems in two secondary schools, which helped remove arsenic from drinking water.

More importantly, Mr Upadhy hopes for more to be done to conserve and restore the rivers and tributaries in the Kathmandu Valley, so that they do not suffer the same fate as the Bagmati.

"We still need our rivers and to tap our own groundwater resources to keep us alive. And if all that is gone, then where do we get our water from?" he said.

"When responding to climate change and our rapidly depleting resources, our approach tends to often be short term and political in nature, involving large projects which fail to recognise the way in which different natural resources are linked and the complex processes involved.

"(This) can be expensive, and could inadvertently lead to maladaptation."

He added: "More long-term solutions and climate adaptation options must be considered for us to safeguard our water security."

tansuwen@sph.com.sg