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Water shortages and contamination threaten many Nepalis

Nepal may be one of the most mountainous countries on earth, but in many areas water shortages are acute

For most Nepalis obtaining enough water is a greater concern than obtaining safe water – even though more than 1000 Nepali children under five die each year from diarrhoea related to poor water and sanitation.

A fifth of the population is still collecting water from open sources or boreholes, which are considered unsafe, while half have piped water and 30% use a hand-pump. The government plans to convert unimproved sources to safe

water schemes by 2017. But it is a highly ambitious target.

The government estimates that about 30-40% of its completed 30 000 water schemes are ‘functioning well’ – but that does not mean those users can rely on a safe or regular supply. Lack of maintenance and investment means sources are exposed and pipes leaking, forcing Nepalis to treat water at home either by boiling, filtering or chlorinating. In fact only 12% of schemes are meeting the national water quality standard and even the capital’s supply is neither safe nor adequate.

The WHO/AUSAID funded water safety plan (WSP) programme is welcomed by the government because it trains and empowers communities to manage their own water systems from source to consumption. In areas such as the middle and high hills where spring sources are ‘fairly’ safe, simple community-run management systems can make a big difference. It is these poorer communities that are most often hit by diarrhoea and even cholera outbreaks during the monsoon. In areas of poor sanitation or open defecation even small leaks in the distribution system will allow contamination during flooding.

“We can save a lot of lives with minimum resources and simple techniques. With very effective water safety plans from source to tap we can achieve safe drinking water, probably with very little investment” Raj Kumar Malla, Joint Secretary, Ministry of Physical Planning and Works

Waiting for long periods at the tapstand takes up a big chunk of a woman's working day in Kathmandu



Not only do WSPs aim to ensure the safety of drinking water but they seek to minimise water wastage and empower communities to identify the hazards that lead to shortages so that action can be taken to mitigate the scarcities. Such hazards include water sources drying up and growing populations.

“We can save a lot of lives with minimum resources and simple techniques,” says Raj Kumar Malla, Joint Secretary at the Ministry of Physical Planning and Works (MPPW), which is responsible for providing basic water supply and sanitation systems throughout the country via its five regional offices. “Where spring sources are safe it’s only during distribution that water gets contaminated. With very effective water safety plans right from the source to the tap, we can achieve our requirements of safe drinking water probably with very little investment. Water safety plans

will reduce the burden of investment by the government.”

For this reason the Government has made it mandatory for all new water schemes to have a water safety plan.

WHO has invested a total of US\$ 300 000 for capacity building which includes pilot schemes in 20 urban projects and 20 rural. However the UN agency remains ‘pretty invisible’ with the MPPW/DWSS overseeing the WSP process. The government budget for each scheme amounts to NR 100 000 with 40% invested in capacity training and workshops and 60% in urgent corrections. “In Nepal people are more concerned with quantity of water than quality,” says MPPW Deputy Director General Vishwa Mani Gyawali. “WSPs are about raising awareness – people are not aware. With WSPs there has been a real reduction in the mortality/morbidity rates at health posts.”



Not everyone covers their vessels when transporting their drinking water from the public tapstand to home

Women are hard at work at the Siddiphur water treatment plant, cleaning the sand for the filtration unit, a task that was highlighted in the WSP.



In charge of change

Proactive users group is a model for the rest of Nepal

On a Saturday morning locals gather to bathe and do their weekly laundry in a pool of the Godavari Khola river in the Kathmandu Valley. The detergent, body soap and toothpaste form a scum. Cows graze nearby. It's common for people to defecate openly here and in the rainy season toilets from the communities above the source are liable to leak.

This is the source of drinking water for about 7000 people living in Siddiphur, a rapidly

urbanising, densely populated village development committee (VDC) just six kilometers south-east of Kathmandu.

Five years ago the proactive users group committee of Siddiphur VDC took action. Not only were many consumers getting sick with diarrhoea and other waterborne illnesses but the 30 year old piped water supply system was becoming increasingly unreliable in terms of quantity of water because of general poor maintenance and the growing pressure from the increased population.

Overview of the Siddiphur WSP

- Voluntary implementation by Siddiphur water supply and users committee
- Financed by Siddiphur water tariff
- 7000 population (1308 households)
- 1100 taps
- Stream source
- WSP covers catchment, water intake, treatment, distribution, storage, consumer point of use
- Implemented hazard identification and risk assessment. Now making urgent corrective actions
- Daily labourers hired to make changes
- 11 member WSP team includes users, local NGO members, VDC and health post representatives, water users committee members, a plumber/operator and a representative of the Nepal Red Cross Society.
- A chlorination dosing system is being installed



There simply wasn't enough water and people were getting sick. With technical support from UN-Habitat, Water Aid, the Environment and Public Health Organization (ENPHO) and Centre for Integrated Urban Development (CIUD) the community constructed a water treatment plant without any financial assistance from the government. Within four years they repaid the loans thanks to the monthly tariff charges (minimum Rs 50 (US\$ 0.7) per household) and Rs 7000 (US\$ 97) installation fees.

But as urbanization continues apace demand for drinking water is increasing. While the system is designed to discharge 10 l/s, most of the time the rate is less than half of that. And the system is far from safe. At the end of last year the total coliform in the tap water and the turbidity were both much higher than the acceptable level.

The users committee, which collects a monthly tariff for water management, understands the importance of pure drinking water and takes its responsibility towards the users very seriously. It found out about the benefits of following a WSP

and is taking action in an attempt to ensure a 24 hour supply that is safe.

"(Before we had a treatment plant) we used to drink dirty, contaminated water directly taken from the river without even getting it filtered," says water users committee chairman and WSP team member Balram Maharjan. "Now although we have a treatment plant the water still contains germs and is contaminated and at times becomes undrinkable. Compared with the past, the community has become very much more aware about the importance of safe drinking water."

Under the guidance of urban WSP engineer Kabindra Pudasaini and local engineer Amrita Gaudam the team has visited and analysed the water system, identified the hazards and conducted a risk analysis to determine the order in which various problems need to be rectified. The committee's financial status (it makes an

Locals bathe and do their laundry in the Ghodavari Kola river outside Kathmandu, just next to the intake of water for 7000 people



annual profit of around Rs 100 000) means it can hire waged labourers to make the urgent corrections.

The water treatment plant area is now a hive of activity. Women labourers are hard at work cleaning the top layer of sand for the filtration unit, a task that will be carried out every two to three years. Men are busily making repairs to the vault chamber. Henceforth the tube settler system, which helps control turbidity, is to be cleaned every two days, rather than once in every two months, and hopefully daily during the monsoon.

But the installation of a tube settler and slow sand filter are not enough to bring bacteriological contamination to zero, so the team has decided to install a chlorination dosing system too. They are now calculating the dose of bleaching power required to bring the chlorine residuals at the tap

within an acceptable limit of 0.1-0.2 mg/l. The committee has also negotiated with the building contractor to install a high voltage electricity line so that water can be pumped to the overhead tank, something that is currently impossible during the dry period when power cuts often reach 16 hours a day.

At the source the bouldering pack will be moved to prevent water entering the collection chamber from upstream and extensive work will be carried out to repair the leaking pipeline.

“Self help is the best help,” says engineer Kiran Daral. “Ninety percent of the problems can be solved at community level. Government agencies are just the facilitators and communities are the implementers. When this happens the operation and management of the system is robust. But if their efforts aren’t enough then the government has to step in.”



Water shortages are severe in Khavre Pani Tanki forcing locals to store supplies as they can only collect water from the tapstand for three hours a day.



More than a day's work

Rural village outside Kathmandu shows that WSP is an ongoing process

The village of Khavre Pani Tanki – which literally means Khavre Water Tank – was so named 18 years ago when water supply was already insufficient and the village was supplied with a water scheme and reservoir.

It's a farming community in the Kathmandu Valley but like so many villages in the district is growing rapidly in size, with new constructions continuing apace, placing even more pressure on the water supply system. It now has 99 households sharing 20 taps. But water sources are drying up and supply is irregular – just three hours in every 24 hour period – forcing householders to store water.

Users committee chairman and member of the WSP team Keshab Raj Giri says the committee collects NR 100 (US\$ 1.40) per tap a month giving an income of NR 2000 (US\$ 28). This allows them to pay maintenance worker Chuda Bahadur KC a monthly wage of NR 1500 (US\$ 21).

Overview of the Khavre Pani Tanki WSP

- The WSP was launched in 2009
- Since then the number of households has increased from 53 to 99 and the number of taps has increased from 13 to 20
- There is one stream intake at Dhobi Khola, a densely forested area, and another nearby source from a small spring has been added
- The transmission pipeline is about 1.1 kms and the distribution line about 1.23 kms.
- The project is operated and maintained by the 11 member users committee. There are five members on the WSP team
- The intake weir was rebuilt and a collection tank built. A valve chamber was reconstructed at the reservoir, where fencing was erected.
- The team has prepared the improvement and monitoring plan. A system of recording and verification of the necessary parameters and information have been developed and water quality monitoring and observations are conducted from time to time.
- An awareness raising programme among beneficiaries was carried out.
- The source still needs fencing. At the reservoir the wash out valve needs replacing and the side drain needs to be constructed and fenced. In the pipeline leakages still need to be properly joined and exposed pipes covered. The platforms surrounding tapstands need to be better maintained and cleaned.

Although other chores tend to dominate their lives during planting and harvesting seasons, villagers sometimes help Bahadur on his daily visit to the source in the forested area of Dhobi Khola, to keep it clear and clean. “I am local and a consumer and I see this as a big responsibility, a duty. I clear away debris, remove crabs and divert water from the source to the collection intake.” He also makes regular repairs to the 2.3 km of transmission and distribution pipes. With the help of volunteers he is currently working on repairing leakages and raising the level of the collection chamber to prevent leakages and contamination.

In the two years since the ten step WSP process was launched in the village consumer awareness regarding water safety has transformed. “We learned that the jar of drinking water should always be covered with a lid and kept above ground level to keep insects and dirt out. We learned that it wasn’t

In spite of their tough conditions and water shortages children as young as three understand the importance of hand-washing





enough to clean the water pot just once at home, that it must be rinsed inside and out at the tap too. And if we are at all unsure about the water quality, we should filter it or boil it before drinking it,” says Man Kumari Shrestha, a member of the local user group.

“We have a problem with water shortages but our children don’t get ill as often as they used to,” adds another user Ram Hari Bajgain. “Many people used to die of diarrhoea but we don’t have this sort of problem any more in the village. Even two and three year olds now ask for soap and water to wash their hands. In the village, we don’t have medicines so we have to be careful. About 90% of the people are now aware of hygiene and maybe only 10% are still ignorant, especially the older generation.”

“Via the WSP training we learned that good water quality is the result of the process,” continues Giri. “If the source is protected and the distribution system is good you don’t have to test it every day. Otherwise you have to test every day to ensure it’s safe. This saves money so it’s very necessary for a rural community.”

But the village exemplifies the importance of the verification step in the WSP process - in spite of their efforts several hazards remain, compelling the community to spend their scarce resources on fuel to boil the drinking water. “The source is open – it is very dirty and gets turbid during the rains,” adds Giri. “We have asked the Drinking Water Supply and Sewerage department (DWSS) to help supply us with a sedimentation tank but it hasn’t happened yet.” The committee is pressing for a chlorination unit too because chlorine tablets are either unavailable in the local market or out of date. It’s also calling for a larger distribution pipe to cope with the increased demand.

During last year’s verification by a WHO officer along with users committee members and engineers from the water quality section of DWSS and WSSDO Kavre, it was pointed out that the source still needs fencing and leakages in the collection chamber are likely to lead to contamination. At the reservoir the wash out valve needs replacing and the side drain has to be constructed and fenced. In the pipeline leakages still must be properly joined and exposed pipes covered. Meanwhile the platforms surrounding tapstands should be better maintained and cleaned.



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