



ENVIRONMENTAL SCIENCE

China to Spend Billions Cleaning Up Groundwater

BEIJING—As Li Wenpeng traveled in rural China over the past decade to assess groundwater quality, he encountered a grim reality. In many villages he visited, locals were drawing water from contaminated wells and rivers. “It’s often the only water source available,” says Li, chief engineer with the China Institute of Geo-Environmental Monitoring in Beijing. “You have places where the entire village is sick” with diarrhea or cancers of the digestive tract, he says.

The Chinese government is about to throw these villages a lifeline. On 28 October, the State Council unveiled a \$5.5 billion initiative over 10 years to prevent and treat groundwater contamination. The plan will bolster monitoring and push development of groundwater cleanup technologies.

The project is long overdue, hydrologists say. Water is scarce in China, which ekes by with only one-quarter of the global average for water per capita. Roughly 70% of Chinese get their drinking water from underground—and the economic boom of the past few decades has tainted much of that supply, says Lin Xueyu, a hydrologist at Jilin University in Changchun. Disasters like the petrochemical plant explosions in 2005 that spilled 100 tons of benzene and other chemicals into the Songhua River near the Russian border have exacerbated China’s woes. “The situation is dire,” Lin says.

Fully 90% of China’s shallow groundwater is polluted, according to the Ministry of Land and Resources, and an alarming 37% is so foul that it cannot be treated for use as drinking water. Common pollutants include heavy metals, organic solvents, petrochemicals, pesticides, and nitrates. The toll is significant: Every year, an estimated 190 million Chinese fall ill and 60,000 die because of water pollution. According to the World Bank, such illnesses cost the government \$23 billion a year, or 1% of China’s gross domestic product. And that doesn’t factor in the impact on China’s ecosystems and food supply.

Water quality is particularly poor in China’s populous eastern plains. For instance, about 85% of groundwater in the Liao River Basin northeast of Beijing and 91% in the Taihu area west of Shanghai is severely polluted, according to a Ministry of Water Resources survey. And that was just chemical pollutants. “Many of the water samples were teeming with bacteria. The results would be much worse if they were taken in account,” says survey leader Tang Kewang, a hydrologist at the Chinese Institute of Water Resources and Hydropower Research in Beijing.

The State Council plan will fund a comprehensive national groundwater pollution survey starting this winter. Densely populated regions, areas with headwaters and spring waters, and contamination sources

Water woes. Surveys show that 90% of wells and other shallow groundwater sources in China are tainted, causing thousands of deaths.

like industrial waste sites, landfills, and mines will receive special scrutiny. “The most pressing task at the moment is to find out how bad the situation is,” says Shi Xiaojuan, director of the drinking water division at the Ministry of Environmental Protection in Beijing.

Once the results are in, the government will determine where to focus cleanup efforts. Broad goals include installing a national groundwater monitoring system, bringing pollution sources under control, and restoring the quality of drinking-water aquifers by 2020.

The plan is “an important first step,” says Zheng Chunmiao, a hydrologist at Peking University in Beijing. He worries though that “some important pieces of the puzzle are missing.” For instance, he says, the plan lacks provisions for a legal or regulatory framework. Because “China does not have laws on groundwater contamination,” Zheng says, many industries and individuals pollute with impunity. Another lacuna is basic research. The plan pays short shrift to elucidating the science of groundwater pollution, experts say.

A final bone of contention is the plan’s emphasis on remediation. Cleaning up a contaminated site could cost anywhere from \$10 million to \$10 billion, researchers say. Cleanup can be stymied by a poor understanding of issues like fluctuating water-table levels and the interaction of contaminants with sediments and rocks. “The single most important decision is whether China wants to be in the game [of groundwater remediation],” says John Zachara, a geochemist at the U.S. Department of Energy’s Pacific Northwest National Laboratory in Richland, Washington. He feels that China’s money would be better spent safeguarding clean water sources.

But Chinese hydrologists say that any reduction in contamination would be worthwhile, even if particular projects fail to meet stringent Western standards. “The U.S. may have set the bar too high for remediation efforts to be considered successful,” says Zhao Yongsheng, a hydrologist at Jilin University who leads the team trying to clean up groundwater polluted by the 2005 Songhua spill. “We can do things differently here.”

Even incremental improvements could save many lives. For that reason, Lin stresses, “doing nothing is not an option.”

—JANE QIU

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