

COMMENTARY

Exploring a Forgotten River

By Baohua Yan

Decades ago, a river nourished Xindian village, a small peri-urban community in Daxing District in southern Beijing. The river water has dried up and today no one in Xindian can even recall the river's name. Since then, local villagers have deposited garbage and wastewater into the dry riverbed. Today the dump attracts swarms of mosquitoes, flies and other insects with a filthy summertime stench that the surrounding community tries to ignore.

The movement to restore Xindian's nameless riverbed dump began in 2004 when one of China's first officially sanctioned private schools for the children of migrant workers opened on adjacent land. The first step towards restoration was to give the river a name, so teachers and students dubbed it Xinzhi River in honor of Tao Xinzhi, often considered the most influential and renowned educator in modern China, after whom the nonprofit migrant children's school was also named.¹

Tao returned to China in 1917 after studying at Columbia University's Teachers College with John Dewey, and spent years evaluating the Chinese education system. He crafted an education philosophy based on the principle that education needs to integrate real-life experiences (Su, 1996; Yao, 2002). Xinzhi School uses Tao's educational theory to reform traditional Chinese approaches to schooling—which tend to stress rote memorization over student innovation—so as to focus on real-life issues and enable students to become active in their communities (Daniels, 2005). With the school's front door opening up to the stagnant wastewater riverbed, the teachers at Xinzhi Migrant School were inspired to design an environmental learning curriculum that integrates

the improvement of Xinzhi River into students' learning, based on Tao's philosophy.

Our *Xinzhi River: Designing of an Environmental Learning Curriculum*

The environmental learning curriculum, initiated in the spring of 2006, is based on three principles; (1) improve the local environment; (2) promote school-community relationship by having students participate in a community improvement project; and (3) engage students in solving real-life problems instead of merely learning from textbooks.

Since this curriculum is still at the early design stage, it is currently only being piloted in a fifth grade class. Three teachers of biology, computer science, and mathematics, respectively are leading the design and implementation of the curriculum. Every Monday afternoon, the class meets to learn basic environmental information, make research plans, and conduct related laboratory experiments. In addition, time has been allotted to conduct fieldwork, such as on-the-ground investigations of the river bed.

Students first collected information on the history of Xinzhi River from online resources and local libraries. Next, students conducted field investigations to determine the current situation of the river. With oversight from teachers, the students collected water samples to test for PH levels and major pollutants. They identified household wastewater and garbage as the two major sources of pollution. Within the village, the students found one wastewater disposal pipe almost every 10 meters along the river. In addition, the riverbank and riverbed were treated like a garbage station where local villagers dumped garbage without any treatment.



Xinzhi School students found one wastewater disposal pipe almost every ten meters along the river.
Photo Credit: Baohua Yan

Using their initial research, the students and teachers designed a survey to evaluate local villagers' knowledge and perceptions of water pollution in the Xinzhi River. Questions included:

- Where do you usually dispose of wastewater and garbage?
- What do you think about designating a special garbage disposal station for our village?
- If having a garbage station requires a certain amount of funding to cover staff salaries, who do you think should pay for it?

For the local village interviews, volunteers from China University of Geosciences were invited to pair with fifth graders in order to ensure the safety of students and improve the survey quality. Finally, based on the information gathered from the survey, students, teachers, and college volunteers designed an action plan. They carried out publicity activities to spread information about water pollution and related health problems, and wrote and performed an environmental play with the theme of water pollution. They also researched ways to involve villagers and government agencies in the treatment of the polluted water and in reduction of pollution sources.

The Xinzhi river restoration project continues, but the project has already positively impacted students. First of all, students learned how to work as a team with peers, teachers, and college students. Secondly, students developed inter-personal skills by interviewing local villagers. Thirdly, students learned research project skills, including problem identification, field studies, and report writing. Most importantly, students have gained a sense of ownership of the project. One teacher commented that although the Xinzhi River pollution is a very complicated issue and an immediate solution is difficult to find, the students still showed considerable enthusiasm for the project. The students came to see caring for this forgotten river as their responsibility.

CHALLENGES FACING MIGRANT CHILDREN IN EDUCATION

According to 2006 population statistics, there are about 120 million migrant workers in China, 2.8 million migrant workers in Beijing, and 370,000 migrant worker children in Beijing (*Xinhua News Agency*, 2006). According to China's education policy, nine years of compulsory education is free

to all children. However, educational funding is allocated on a geographical basis, and children are expected to receive this education in the place where their families legally reside. The social services registration (*hukou*) of migrant workers remains in their hometown and thus their children cannot enter Beijing public schools without paying extra fees to the municipal government. Many migrant families cannot afford such fees, so they send their children to one of the many for-profit private schools that quickly sprang up in the 1990s.

In 2006, the local educational authorities in Beijing approved 49 private schools for migrant children, but nearly 300 such schools operated without official approval (*Xinhua News Agency*, 2006; Zhou 2007). While both the official and unofficial migrant schools generally charge a much lower fee to migrant workers than that required by the local public schools, the quality of the education they offer is often far inferior. Many private school teachers possess neither teaching certificates nor educational training of any sort and some are only junior high school graduates. The inferior facilities of these schools—which are often located in areas of poor environmental quality—often present safety problems to students. In 2006, the Beijing municipal government passed legislation to increase funding to accommodate migrant children in local public schools, requiring private schools to undergo evaluation for official approval, and shutting down those private schools that did not meet basic safety and education standards. However, the issues surrounding schools for migrant worker children are still being resolved.

Migrant students face many specific social and academic challenges. One of the biggest hurdles for migrant children is social integration and self-identity because they are often marginalized by their rural background, different dialects, and poor economic status. Another major challenge for migrant children is adjusting to the class content, teaching styles, and learning patterns of new schools after frequent moves due to searches for new work or school closings. The Chinese education system's heavy emphasis on examination preparation for university also poses a major obstacle for migrant children, whose opportunities to attend college are limited by poor education and high costs.

IMPLICATIONS FOR EDUCATION OF MIGRANT CHILDREN IN CHINA

Xinzhi School is a unique migrant school in Beijing. Not only has the school maintained its registration to operate because of its high-quality education, but the faculty also created the Xinzhi River Environmental Learning Curriculum, which enabled the school to address many of the above-mentioned challenges.

Community Connection

Taking community environment and health issues as the context for students' learning and active engagement improves the school-community relationship. As schools for migrant children are often located in places of inferior environmental quality, issues of pollution and health are generally highly important for both the community and the school. River restoration is only one practical topic that migrant students can address to better connect with their community.

Student Empowerment

The focus on community environment and health issues embodies the core educational philosophy of life education advocated by Tao Xinzhi. Students are learning by dealing with real-life problems, and they can see the impact of using their new knowledge. Schools that engage and empower students can increase their interest in learning, and improve their academic performance. Such schools could also become powerful grassroots agents to initiate solutions to pollution issues threatening the health of local people and the environment.

Xinzhi school's river restoration project underscores a valuable model for China to better address the challenges of providing quality education to marginalized children while also imbuing them with a valuable environmental education.

Future research and pilot projects are needed in China to improve curriculum design to connect real-world experiences with academic studies and student development. Moreover, appropriate evaluation approaches should be employed to document the effects of this kind of curriculum on students' academic performance and personality development, as well as school-community relationship. Ultimately such programs could be employed in all schools in China to strengthen environmental education among all Chinese children.



Xinzhi school students investigating the pollution sources along the Xinzhi River. Photo Credit: Baohua Yan

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NOTES

1. The school's full name is Beijing Daxing District Xinzhi School.

FEATURE BOX

Chang Lin Migrants' School Program

By Steve Kloos and Qing Zhao

2006 was a year of evolution for GE Volunteers in Greater China, with a total of 74 projects carried out, benefiting 18 GE communities, compared to only 7 in 2005. The number of volunteers engaged nearly doubled to 2,988 people, contributing a total of 20,859 volunteer hours, a 140 percent year-on-year increase. Speaking as GE volunteers in China, we must confess that these numbers do not begin to reveal the joy and satisfaction that these activities bring to all those involved.

Although China has experienced astounding economic growth in recent decades, more than 100 million Chinese continue to live below the international standard of absolute poverty (\$1/person/day), many of whom are among the floating population of migrants in cities. In Shanghai, where we are based, there are more than 400,000 migrant students; they come from families with an average household income of \$100-200 per month. Because they lack a proper resident permit, their children are not eligible to attend local public schools and must then enroll in the generally under-equipped migrant schools.

Recognizing a need to do more to reach low-income migrant workers and their children, GE Water & Process Technologies (GEWPT) team based at the China Technology Center (CTC) in the Pudong district of Shanghai, launched the Chang Lin Migrants' School Volunteering Program in 2006. The aim is to provide needy children with a variety of age-appropriate, fun and practical education programs to widen their horizon, cultivate their interest in science, and train their teamwork spirit.

The first event with Chang Lin Migrants' School started with a charity sale by the GEWPT team at the CTC that collected more than 4,000 Yuan

// In Shanghai there are more than 400,000 migrant students...from families with an average income of \$100-200 per month.

(\$571) to be used at the school. After the fundraiser, our volunteering at the school started appropriately on the 1 June 2006, International Children's Day. On that day, 37 volunteers were divided into seven teams to host different eye-opening activities in separate classrooms, which children could participate in freely. There was an activity where volunteers gave a fundamental yet engaging introduction into water and water scarcity. In another room, students were grouped and had a drawing competition. We were exhilarated that more than 1,000 students and their teachers participated in this initial activity!

On 20 April 2007, 80 GEWPT volunteers from China and members of our Asia/Pacific team held another event with 192 fifth and sixth grade students and nine teachers from Chang Lin Migrants' School in Shanghai's Century Park to celebrate the 38th "World Earth Day." In this event, the students and volunteers were divided into eight groups with each group holding an environmental protection knowledge contest. Besides learning about environmental preservation through contests, the students also learned English songs, played games, and did crafts with the GE volunteers.

As a regular program, GE volunteers go to the school once a month on a weekend afternoon to



Steve Kloos and kids from the Chang Lin migrant school.

hold experiment-oriented science projects, as well as team-building and personal development activities with a different theme each time. The participants are students from the first to sixth grade, and topics include film clubs, a national geography class, and courses on wind energy. In addition, at the school GE volunteers hold regular weekend workshops for the parents and teachers focusing on a variety of topics and share practical information on early education, with about 50 participants each time. There are many interesting discussions about how to communicate with children, how to get children interested

in learning, and how to help children understand parents. Notably, while the volunteer work at Chang Lin School started as a small weekend activity for the GEWPT team, volunteers from other GE now have joined to help with the expanded program with the migrant children.

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SPOTLIGHT ON NGO ACTIVISM IN CHINA

A Child's Right: Bringing Water Purification Systems to China's Orphanages

By Eric Stowe

SWEET WATER

In every orphanage we have worked around the world, children regard us with great hesitation or skittishness when we first arrive. In June 2007 at the orphanage Chongqing Children's Welfare Institute, our team from A Child's Right was amused at how the children warmed to us. Once we had worked for several hours and enough of the older children cleared us through their own personal vetting processes, the room became rather lively as the once shy toddlers and big kids started congregating en masse to watch us work—sometimes heckling us lightheartedly—but mostly to see how we planned to clean their drinking water.

Since they were able to walk and talk these children have been told “never drink from the tap.” By the time we are done working and the staff and children gather to watch how our water purification system functions, it becomes quite a celebratory atmosphere. Nothing lights the spark better than our team's ritual of being the first people to drink the water directly from the newly installed taps. Every time we take huge sips of the newly cleaned water, the children's response is one of outright incredulity and shock. By the time we have sufficiently proven the water is clean, the children quickly queue up to sample the water firsthand and offer their critique to any listening ear.

At the Chongqing Children's Welfare Institute the children and staff lined up for thirty minutes to sample the water. Water that was previously latte colored and visibly filthy was now crystal clear, odorless and relatively tasteless. Several of the children commented that the water was “sweet” compared to traditional boiled water, which retains the “flavor” of the grime and grit from the tap. Our team laughed when several children expressed frustration that the water tasted like nothing at all! The end result, unrestricted access to clean and safe drinking water will assuredly change the lives of these children who have so little.

NGOS DIP THEIR TOES IN

The vocabulary of the global water crisis, once so rarified and isolated to academics, a handful of non-governmental organizations (NGOs), and water specialists, has disseminated rapidly in the last few years and the majority of those living in more developed countries do comprehend the basic plight currently affecting more than a billion people on a daily basis. Many understand the global statistics of childhood illness and mortality rates due to, or in direct correlation with, the lack of clean and safe drinking water. This understanding has provided the basis for some amazing work done by many international organizations to help people living without access to water.

Today there are more than 20 fairly large and well-established NGOs within Europe and North America devoted solely to providing clean and safe drinking water to communities in need around the world, in addition to some of the larger global development organizations (UNICEF, CARE, Save the Children, World Vision, and PATH) that have distinct clean water departments and staff devoted to water problems in the developing world. Although critiques are aplenty about how some of the organizations operate or how they select their targets and implement their projects, their collective work has unquestionably been a force for positive change for millions of people, primarily in the rural environs, in desperate need of clean water. However, these organizations work across a vast number of countries and cannot focus their work exclusively on China, despite the great need.

WATER NEEDS OF CHINA'S ORPHANAGES

Our Tacoma, Washington-based agency was established to provide charitable relief for children living in orphanages and street shelters as well as those attending schools and visiting children's

hospitals in the impoverished urban and peri-urban areas of underdeveloped countries. This target population remains severely underserved by international charities and clean water organizations and as such our mission revolves solely around these children and improving their lives through relatively simple provisions and education. Since 2004, China has become an annual project for us and with every trip we are able to directly impact the lives of 2,000 to 3,000 children by providing immediate, unfettered, and sustained access to clean and safe drinking water.

It is hard to select a demographic more at risk than the thousands of children abandoned and orphaned every year and living in China's social welfare institutions. Although the majority of Chinese orphans are abandoned in rural areas, like virtually every other country in which we work, orphaned children will invariably make their way to the urban and peri-urban sphere as the basic social welfare and orphan care infrastructure remains fractured or nonexistent in the countryside. The primary facilities that provide for orphaned children lie tucked away in the heart of hundreds of Chinese cities across the country. With more than 500,000 documented orphans in China, of which a significant portion reside in the country's 300+ orphanages, there is considerable work needed to ensure their basic needs are met for healthy development. A Child's Right therefore focuses on providing these children with clean and safe drinking water to alleviate many of the severe health and developmental issues they would likely otherwise face.

HEALTH IMPROVEMENTS

In the orphanages we have worked, all the water for cooking, drinking, and infant bottles now comes from our water systems. We have seen in the last three years of working in China's orphanages, as well as orphanages around the world, that a dramatic reduction in stomach maladies and diarrhea has occurred after the orphanages switched over to our water systems. At all of the orphanages in China where we have worked, staff members tell us they see a rapid decrease in "the number of times children go to the potty." For example, in one orphanage in Guangdong Province, the staff noted that they typically had to deal with 10 to 12 outbreaks of diarrheal



The children are always excited at having their first cup of truly clean tap water. Photo Credit: Eric Stowe

illness every year; however, in the year following our equipment installation, the outbreaks were reduced to 1 or 2.

In June 2007, we brought several engineers with us to work in 8 orphanages in Chongqing municipality and Jiangxi Province. Most of the water we tested came up positive on our total coliform tests. Although two of the orphanages we tested were in close proximity to newly constructed, state-of-the-art water treatment plants, the water quality was still quite unsafe for human consumption. Urban water quality remains questionable because of the antiquated plumbing and the often poor distribution methods. These infrastructure problems mean that water can even be contaminated in facilities with new plumbing and high-end water treatment facilities nearby due to backflow and back-siphonage.

We cannot change or cure every environmental and human contaminant found in China's waters. But we can ensure a dramatic reduction in the life threatening illnesses that are directly caused by the bacteria, viruses and pathogens overloading the water systems where we work. We can assure that high-quality water is reaching some of the most vulnerable children in China.

For more information on A Child's Right's work in China and other countries see: <http://www.a-childs-right.org>.

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COMMENTARY

A Call for Transparency: China's Emerging Anti-Nuclear Movement

By Wen Bo

On 18 August 2007, China kicked off a new round of nuclear power plant construction by breaking ground on the Hongheyan Nuclear Power Plant, which is located on a coastal flatland 110 kilometers north of Dalian city in Liaoning Province. Using China's own nuclear technology, the Hongheyan Nuclear Power Plant will have six generators, each with a capacity of 1 million kilowatts.

Though Chinese news media reported assurances from government officials on the safety of Hongheyan's nuclear reactors, the *China Daily* took a rare stance and publicized the concerns of residents in nearby Changxing Island. The third largest island in China, Changxing Island was designated a national spotted seal nature reserve in 1997. Each spring, spotted seals and their pups stop along the western shore of Changxing Island before continuing their migration into the open seas of the Pacific.

The coastal area surrounding the Hongheyan Nuclear Power Plant had been a breeding ground for spotted seals and a stopover of migratory birds traveling between the Russian Far East and Australia. Being a coastal flat with sparsely populated villages, this area was chosen as a potential site of nuclear power plant as early as 1978. However, the Chernobyl nuclear power plant accident in 1985 put the plans on hold. Even in 1995 when the construction plan was revisited, a senior official in the government opposed building a nuclear power plant so close to the tourist city of Dalian. The construction was subsequently postponed for another ten years.

Wang Zhifeng, a retired Dalian factory worker who has long been an individual advocate for protecting Liaoning's coastal areas, expressed outrage during his conversation with Pacific Environment on the proposed nuclear plant, saying it would mark

the end of China's spotted seal and endanger the entire Bohai Sea ecosystem. Wang Zhifeng is a veteran activist trying to rescue wild birds and publicize the plight of endangered spotted seal.

In spring of 2006, Wang learned about the nuclear power plan and impending construction activity from the Dalian Environment Protection Bureau. According to Wang, the government of Dalian was not even invited into the decision-making process for Hongheyan Nuclear Power Plant and no adequate environmental impact assessment (EIA) had been conducted, much less disclosed, as is required by law. It appears while some local environmental officials leaked information on the tensions between the Dalian government and the advocates for the Hongheyan nuclear power plant, no city officials seem to possess enough political clout to stop the construction project.

Concerns about China's rapidly approaching new nuclear era have triggered concerns beyond Dalian, among citizens and environmentalists across China who are not involved in the decision-making process.

GOING NUCLEAR

China's energy shortages and rising demand for electricity have pushed the government to consider nuclear as another source for future power supply. The Nuclear Power Institute of China submitted a letter to the Chinese leadership in 2003 urging them to prioritize nuclear power production. In March 2005, Premier Wen Jiabao publicly announced his support for rapid development of the nuclear power sector. China plans to build 40 new nuclear reactors by 2020 with a capacity of 40 million kilowatts as part of a major effort to diversify the country's energy development.



Popularity of spotted seal has led to increased catching from the wild to supply zoo and aquariums. A spotted seal pup at Dalian SunAsia Ocean World. Photo Credit: Wen Bo

Nuclear power currently supplies only 2 percent of total electricity output. Notably, while the planned nuclear plant construction is faster than any other country in the world, China's energy demand is growing so rapidly that in 2020 coal will still supply nearly 70 percent of the energy and nuclear power would make up only 5 percent of the total.

Eighteen Chinese provinces are actively designing blueprints and bidding to host nuclear power plants. Besides the real shortage of power, economic incentives in the form of government subsidies and tax breaks, have prompted local officials to actively lobby to have nuclear power in their province. International business interest also is helping to promote the growth of this industry, with U.S., European and Russian nuclear power companies cultivating good relationships with the Chinese government to highlight their equipment.

While the enthusiasm of the government and investors is great, China is ill prepared on several fronts for the impending nuclear power boom. Besides the astronomical financial investment required, lack of nuclear technical personnel could pose long-term challenges. Currently only three Chinese universities supply nuclear-related

scientists. A lack of training and experience, as well as lax quality management and insufficiently transparent EIA processes, could make China's nuclear power facilities vulnerable to various structural and environmental problems already widely occurring in other infrastructure projects (e.g., collapsing bridges and polluting chemical plants near drinking water sources).

A CONCERNED CITIZENRY

Like many in the world, most Chinese citizens became aware of the dangers of nuclear power from news of the Chernobyl accident, which the Chinese news media covered extensively without any censorship. Similarly, news about nuclear accidents in Japan's nuclear power plants has been reported openly in China. The Chinese news media also has been open in publicizing anti-nuclear rallies in Taiwan, as well as the international criticism of Taiwan's planned nuclear waste shipment to North Korea. Even the yearly Stop Castor campaign, in which German citizens protest the transport of nuclear waste from France into Germany, is broadcast on Chinese TV news.

The openness in international reporting of nuclear issues stands in stark contrast to the lack of news on environmental impacts of nuclear power and nuclear wastes within China. While there has been considerable coverage of the transformation of a previous nuclear testing site in Qinghai into a radiation-free tourist site, the Chinese news media has only moderately covered uranium mining radiation accidents. Therefore, Chinese people in general are less aware of nuclear threats that exist domestically or their rights to voice concern over such issues.

Over the past few years the Chinese government has pushed for more citizens' rights to participate in environmental policy decision-making, most strikingly in the EIA processes. Channels for complaints are growing, such as government hotlines and websites. Pollution victims—often with assistance from Chinese legal NGOs or pro bono lawyers—are turning to the courts to demand compensation for damages. Despite a somewhat arduous registration process, Chinese civil society has grown phenomenally over the past 15 years, with green groups being the largest. The expansion of political space for bottom-up involvement in policy has catalyzed Chinese citizens and NGOs to become more active in expressing concerns about planned infrastructure projects, even nuclear power plants.

For example in 2006, a well organized anti-nuclear petition campaign against three proposed nuclear plants on the Shandong Peninsula—two near the famous Silver Beach resort and another a mere 6 kilometers away—was started by Dahai (“Ocean”) Commune. The founder of the Dahai Commune, who goes by the nickname Yi Wuchen (literally “Wearing-No-Dust”), walked along China’s coastlines in the year 2000 and witnessed first hand how China’s coastal seas were under serious ecological threat. Yi Wuchen subsequently established the Dahai Commune to bring together volunteers and unite an online community of ocean lovers who wanted to learn about China’s coastal ecosystems and the threats they face. Through this online community, in 2006, the Dahai Commune sent a petition letter opposing the three planned nuclear power plants with hundreds of signatures to Premier Wen Jiabao. The petition letter also was delivered to the State Environment Protection Administration to voice their environmental concerns over the nuclear power plants.

Concerned local citizens in Weihai also formed a network called the “Silver Beach Environmental Initiators,” which has been actively appealing to various government agencies in Beijing to reconsider the need to protect Silver Beach. The group maintained that a public hearing to review the EIA should have been organized before the nuclear project plan was approved. The group also demanded the government first promote more renewable energy and conservation efforts to meet the province’s energy need.

Another predominantly online anti-nuclear campaign also emerged in Hainan Province, where on 25 July 2007 the China National Nuclear Corporation signed an agreement with the Hainan provincial government to build the Taohuajiang Nuclear Power Station. This would be the first nuclear power plant on this island province. Similar online anti-nuclear debates have emerged over nuclear power plans in Fujian and Jiangsu provinces.

NORTHWEST CHINA—A LEGACY OF NUCLEAR WASTELAND

Northwestern China, particularly Xinjiang and Qinghai, has for decades been the site of nuclear weapon testing and uranium mining, which even government documents have identified as the source of higher cancer rates and other illnesses among people living close to the sites.¹ Such testing also has



Yoon Sanghoon, coordinator of the Eco-system Conservation team of Green Korea, looking for spotted seal along Dalian’s coast. Photo Credit: Wen Bo

taken an ecological toll; for example, in Xinjiang, Lake Lop Nor was wiped off the map due to nuclear testing and related human activities.

In Gansu Province, uranium mining and corruption within military mining companies have produced grave human and ecological tragedies. According to Sun, a former miner at Gansu’s most important uranium mine Project 792, improper handling of radioactive material from the mine has led to contamination of water and soil and a sharp rise in incidences of cancerous tumors, leukemia, birth defects, and miscarriages in the surrounding communities (HRIC, 2005). The surrounding area has become devoid of wildlife, and livestock suffer from high death rates, most likely linked to contaminated water. Since 1988, Sun has repeatedly traveled to Beijing to report on corrupt officials stealing government funding meant to clean up the mines and relocate uranium miners and their families away from the mines. He also brought evidence of frequent discharges of radioactive waste into Gansu waterways. Sun lost his job in 1994, but kept advocating on behalf of sick miners and an endangered environment, which led him to be subjected to numerous arrests, including being detained by security forces for 8 months in 2005. In 2006, the German group Nuclear-Free Future Resistance Award recognized Sun for his extensive advocacy work.²

FUTURE TRENDS

Although environmental groups make up the largest sector of China’s civil society, no Chinese (or international) NGOs focus work on nuclear power

plants or hazardous waste issues. Strikingly few Chinese NGOs work on clean energy initiatives. Political sensitivity and lack of capacity explain this gap in NGO activism. Current anti-nuclear efforts in China have been predominantly online “not-in-my-backyard” (NIMBY) campaigns. However, the spontaneous emergence of such grassroots campaigns highlights that the foundation for such NGOs is emerging. The small NIMBY campaigns are not yet capable of forming an inter-regional alliance for joint advocacy; however, possibilities could develop in the future.

In Asia, the most well connected anti-nuclear network is The No Nuke Asia Forum, which has organized forums in various East Asian countries. Though the member groups in South Korea, Japan and Taiwan have been active nuclear watchdogs, the decentralized network does not have much capacity to function as a facilitator of anti-nuclear movement in mainland China. However, it does offer a model for Chinese anti-nuclear advocates.

By comparison in Australia, the primary concern over exporting uranium to China revolves around whether it will be used to expand Chinese nuclear weaponry. Environmental organizations, such as Friends of the Earth-Australia, also have expressed concerns about the environmental impact of uranium mining domestically. Notably, the Anti Nuclear Alliance of West Australia has been working with Chinese groups and citizens to raise awareness on uranium mining and its negative impacts.

As was the case with the recent hydropower development boom, Chinese companies are rapidly investing in nuclear power projects to address China’s very serious energy shortage. However, as many petitioners opposing some of these infrastructure projects have highlighted, the huge financial investment in these projects can become a hotbed for government corruption. Moreover, the social and environmental impacts of poorly run nuclear power plants could be enormous. It is unlikely the current building boom of nuclear power plants can be stopped; however, pressure from citizens and anti-nuclear campaigners could help increase transparency and safety of such projects. With

today’s Internet-savvy grassroots watchdogs, international investment in new nuclear power plants, and citizens increasingly aware of their rights to participate in infrastructure decision-making, it is less likely any radiation accidents or illegal dumping could be as easily covered up as what occurred at the Gansu Uranium Mine 792. Moreover, with increased knowledge and capacity Chinese environmental groups, as well as growth of sophisticated anti-nuclear campaign organizers, a full-fledged anti-nuclear movement could soon be in the making.

Wen Bo is Pacific Environment’s Beijing-based consultant, where he is working to develop the organization’s China project. He is a founder of the China Green Student Forum, which is now a network of more than 100 student environmental groups. Wen Bo also is currently on the China Advisory Board of Global Greengrants Fund to facilitate the growth of environmental communities in China. He can be reached at: wenbo2@yahoo.com.

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NOTES

1. Five Chinese ministries, including Ministry of Health and Ministry of Civil Affairs, issued a notice on 6 July 6 2007 to handle health compensation and pension increase for retired troop members who participated in China’s nuclear testing. Other information health impact of Chinese nuclear testing can be found *Zhou Wenliang & Zhang Zhijing*, Citizens’ health impact around nuclear testing site in Xinjiang, *Research of Environmental Sciences*, 1989 Volume II, Issue 1.

2. For information on the award see: <http://www.nuclear-free.com/english/sun.htm>.

COMMENTARY

An Olympian Task: Alleviating Health Threats From Beijing's Polluted Groundwater

By Laurel Meng Lelan Miller and Samantha L. Jones

饮水思源

"When you drink the water, think of its source."— Chinese proverb

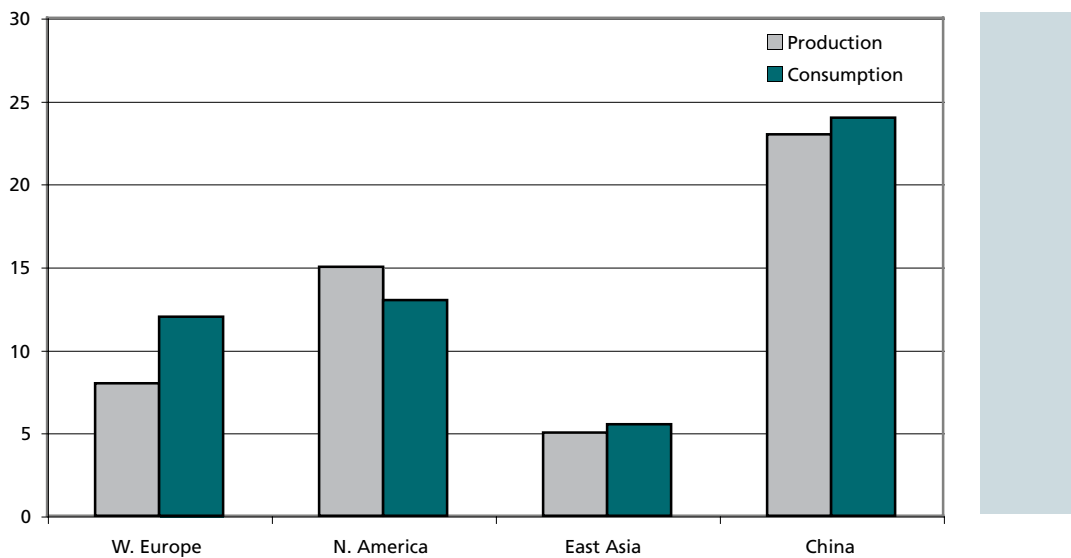
Within a week of winning the Olympic bid in 2001, the Chinese central government approved the long-debated South Waters Northward Transfer Project (*nanshui beidiao*), which will ultimately create three canals (each approximately 1,200 kilometers long) that divert water from the Yangtze River to the parched north where water per capita is one-tenth the world average. The eastern canal that utilizes the ancient Grand Canal will be operational in time for the 2008 Olympics, providing Beijing 400 million cubic meters of water. This amount is, however, 1 billion m² less than what the pipeline was supposed to deliver. Moreover, much of the water will be heavily polluted and require clean up—a cost northern provinces are at loathe to take (Liang, 2004). The central canal will come online within two years, but the third canal poses considerably more engineering and political challenges, which underscore the difficulty of over-reliance on supply-side water management in Beijing.

Beijing's thirst has grown increasingly severe over the past half century, leading it to rely on water transfers and more groundwater pumping. For over 2000 years, much of Beijing's water needs have been supplied by groundwater, today making up over 70 percent of the city's total water supply (Beijing Water Authority, 2005). In ancient times, it was forbidden to dig wells at random near the Imperial Palace in Beijing, so as not to disturb the fortunes of the emperor. Thus, the earliest groundwater wells were carefully placed according to *fengshui* principles and mainly served the elite.

Wangfujing, literally "the well of the princes' mansions," is an example of groundwater's historical presence in the capital. Now a major shopping district, Wangfujing was originally a groundwater well that served imperial estates and residences close to city center during the Ming Dynasty. Another royal well was the Jade Spring in the Western Hills (2.5 kilometers west of the Summer Palace) that produced high quality groundwater that was conferred the title "Spring of the First Order Under Heaven" and was a source of drinking water reserved for the imperial family during the Qing Dynasty. The first groundwater plant that served the city residents was a surface water treatment plant at Dongzhimen, which during the Japanese occupation of Beijing was modernized and the first groundwater wells were built in 1940 (*Beijing Zilaishui*, 1986). Today's groundwater is pumped and distributed by the Beijing Waterworks Group, which operates over 250 wells in ten municipal water supply plants throughout the city. In addition, a 70-kilometer pipeline transports groundwater from Pinggu County into Beijing's No. 10 Waterworks.

Since the mid-1980s, Beijing municipality has consumed an average of 3.7 billion m³ of water each year, nearly two-thirds of which is from groundwater (Beijing Water Authority, 2005). Such unsustainable groundwater abstraction is practiced throughout northern China, where over the past ten years groundwater tables have fallen by 10 to 50 meters (at an average of 0.5 meter/year) (OECD, 2007). Groundwater overexploitation in the northern regions of China has been a major contributor to desertification, forest loss, saline intrusion into aquifers, land subsidence, and river drying (OECD, 2007). A striking example of subsidence problems has occurred in the eastern plain in north China's

FIGURE 1. Production and Consumption of Nitrogen Fertilizers in China (1999 and 2000)



Source: Adapted from International Fertilizer Industry Association (2006).

Hebei Province, where groundwater overuse endangers the Beijing–Shanghai railway (“Groundwater overuse,” 2004). Another major issue is anthropogenic contamination that in recent decades severely degraded groundwater quality. In 2006, Deputy Director of the State Environmental Protection Administration, Zhang Lijun, stated that groundwater was contaminated in about 90 percent of Chinese cities (“China: ground water,” 2005).

Between 1991 and 2001, approximately 740 million m² of agricultural land in Beijing was reclaimed for urban development (Beijing Municipal Statistical Bureau, 2002). Whereas farmland once provided pervious surfaces through which precipitation and irrigation water entered the groundwater table, an increasing proportion of groundwater recharge is being “supplied” by urban sewage, septic tanks, surface runoff, and leaking water networks. In 2001, the World Bank reported that nearly half of the groundwater in Beijing municipality alone was severely contaminated. Groundwater contaminants that pose serious environmental health risks in Beijing include polycyclic aromatic hydrocarbons (PAHs), nitrates, and heavy metals, which are present at levels far exceeding World Health

Organization (WHO) and U.S. Environmental Protection Agency (EPA) recommendations.

POLYCYCLIC AROMATIC HYDROCARBONS

A study of the Tonghui River in Beijing concluded that total PAH concentrations ranged between 0.1929 to 2.651 micrograms/liter, which is significantly above the EPA limit of 0.0002 micrograms/liter for PAH content in safe drinking water (Zhang et al., 2004). The main concern surrounding PAHs is that some are suspected carcinogens. Zhang et al. (2004) observed that in addition to coal and heavy industry fuel combustion, another major anthropogenic source of the growing PAH groundwater contamination levels in Beijing is rising vehicle ownership. Vehicle exhaust, tire degradation, industrial emissions, asphalt particles, petroleum residues, and tar all release PAHs, which then contaminate groundwater (Nikolaou et al., 1984; Baek et al., 1991; Manoli et al., 2000; Mahler et al., 2005).¹

PAHs also directly enter groundwater from underground petroleum storage tanks. In 2006, *Xinhua News Agency* (“Beijing to keep,” 2006)

reported that improperly constructed gas stations have caused numerous groundwater pollution accidents in the Chinese capital. Lin (2006) reported that Beijing has plans to investigate groundwater contamination associated with gas stations during a Geologic Investigation Development Plan authorized by the Beijing Municipal Bureau of State Land and Resources for the period of 2006-2010.

NITRATES FROM AGRICULTURAL RUNOFF

China is the world's largest producer and consumer of nitrogen-based fertilizers (see Figure 1) and, correspondingly, nitrates are Beijing's major groundwater contaminant (Wolf, 2003). The Chinese Research Academy of Environmental Sciences reported in 2006 that the average application of nitrogen fertilizers is 400 kg/hectare in China, significantly above the 225 kg/hectare limit that most developed countries consider safe ("China's agriculture," 2006).

The rising urban population in Beijing requires increased food supply, resulting in greater production of nitrate-rich runoff from crops grown in the peri-urban areas surrounding the capital. Nearly 50 percent of nitrogen fertilizers leach into the soil and groundwater instead of being utilized by crops. In Beijing, nitrogen fertilizer use has been steadily increasing from 263 kg/hectare in 1991 to 344 kg/hectare in 2001 (Beijing Municipal Statistics Bureau, 2002). In addition, the booming population creates an increasing amount of nitrate-rich sewage effluent, and the rising standards of urban living bring more parks, lawns, sporting complexes, and upscale residential areas that require increased herbicide and pesticide use, leaching more nitrates into groundwater.

In Beijing municipality, the land area with excessive concentration of nitrates increased from 72 km² in 1980 to 169 km² in 2000. Moreover, in 2005, one study found that nitrates were present at depths up to 80 meters in concentrations of 150 mg/L in the Beijing area, well in excess of World Health Organization drinking water standards of 45 mg/L (Wolf, 2003; Chen et al., 2005).

HEAVY METALS

The Beijing Geological Exploration Bureau reported in 2005 that 95 percent of Beijing municipality's refuse is dumped in landfills that do not comply with groundwater pollution prevention regulations

(Nan, 2005). One report examining water quality in Beijing cited landfills, fossil fuel combustion, coal mining effluents, and agricultural wastes and fertilizers as the sources of the arsenic, mercury, cadmium, phenol, and cyanide that were detected in 36 percent of Beijing's groundwater (Wolf et al., 2003). Although the city of Beijing has proposed closing 70 percent of the local mines in order to address water supply contamination issues, to date strong economic interests have prevented further action on this proposal (Zhu, 2006).

// In ancient times, it was forbidden to dig wells at random near the Imperial Palace in Beijing, so as not to disturb the fortunes of the emperor.

Arsenic

Organic arsenic compounds used as feed additives—a practice banned in the European Union, but still common in China—are released through animal manure and convert to an inorganic form in soil, thereby becoming water soluble and seeping into the groundwater table. Elevated levels of arsenic have been found in groundwater sampling surveys from fourteen sites in northern Beijing. Groundwater from all fourteen of these sampling sites exceeded WHO maximum levels (0.01 mg/L) and two of these samples exceeded Chinese national arsenic standards (0.05 mg/L) (Dou et al., 2006). Moreover, Gao et al. (2004) reported that with arsenic levels between 0.20 – 3.00 mg/L, Beijing drinking water contains almost four times WHO limits.

Mercury

Mercury in landfills leaches from fluorescent lights, batteries, thermometers, electrical switches, and circuit boards into the groundwater, where it dissolves in acidic leachate. Levels of mercury in Beijing's drinking water are between 0.10 and 0.74 mg/L, considerably higher than the WHO and Chinese standards of 0.001 mg/L (Gao, 2004). Compared to Tianjin, Lanzhou, Dalian, Xian, and Shenyang,

// ...95 percent of Beijing municipality's refuse is dumped into landfills that do not comply with groundwater pollution protection regulations.

Beijing has the highest level of mercury in groundwater (Han, 1998).

FUTURE CHALLENGES

Groundwater pollution is an especially vital issue to modern-day China considering the huge time period required for groundwater to be naturally filtered clean. Without significant improvements in regulating groundwater protection, contamination from PAHs, nitrates, and heavy metals will only increase with the booming economy.

In 2001, the Municipal Bureau of Water Conservation set up an official program to promote sustainable application of water resources, which includes the hefty goal of recovering currently polluted water to meet acceptable standards by 2030 (Wolf, 2003). Effective groundwater management in Beijing and other urban—particularly northern—areas in China must focus on advancing hydrogeological research, sound urban planning for aquifer zones, improved groundwater data collection and monitoring, and last but not least, public environmental education. Because groundwater seems an “invisible” source of water owing to its underground location, environmental education in schools and the news media would do well to increase awareness about PAH, nitrate, and heavy metal contamination, as well as how water excessive withdrawals exacerbate the contamination.

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NOTES

1. Impervious road surface area increased 160 percent between 2000 and 2004 in Beijing municipality (*National Bureau of Statistics of China*, 2001, 2005).

SPOTLIGHT ON NGO ACTIVISM IN CHINA

A Community of Grassroots NGOs Protecting China's Rivers and Lakes

By Daniela Salaverry

It is mid-March in western China's Gansu Province and despite the wet snow covering roads and the dry and dusty landscape, we drive our minivan hundreds of kilometers from the capital Lanzhou into the rural countryside. As we leave Lanzhou on a new super-highway, we found our landscape shifting quickly from modern skyscrapers and department stores to farm fields dotted with mud houses. I felt as if I had gone back in time. Zhao Zhong, the volunteer leader of Green Camel Bell—Gansu's first environmental NGO—has done environmental education work in the province for many years, so he knew the practicality of living in these traditional mud houses, which have sharp angled roofs that help keep the indoors cool in the summer and warm in the winter.

I am traveling with Green Camel Bell to visit Huining county, where tributaries of the Yellow River run murkier than the “mother river” itself. This northwestern province is essentially a desert that supplies much of the silt that gives the Yellow River its name. However, it is more than just silt that causes the tributaries in Huining to turn a dirty shade of brown. Like most of rural China, Gansu's rural areas lack basic waste disposal infrastructure. It is on the banks of the tributaries we visit, as well as all the other local waterways, that people deposit their trash, waiting for the river's meander to bury or wash it away.

Zhao Zhong and Green Camel Bell represent a growing and critical part of China's environmental movement. These young, energetic groups are popping up across China to act as community leaders on environmental issues. Often times, such groups emerge out of student organizations, but then develop into professional NGOs. Groups like Green Camel Bell are seizing the opportunity to take action, from launching public education and outreach programs, to aggressive campaigning to shut down polluting enterprises.

The young leaders of such green groups represent the generation in China that grew up during the country's opening and reform. The fact they



Many of China's grassroots groups conduct surveys of river basins, sometimes bringing volunteers to educate them on the overall health of the river on which they depend. Photo Credit: Pacific Environment

have seen their childhood swimming holes turn into polluted wastelands is often the motivation to help improve their communities and country.

This increasing citizen concern for the environment and social wellbeing is welcomed, to some extent, by the central government both in new laws permitting public involvement in environmental decision-making and in official pronouncements. For example, in a recent article, the State Environmental Protection Administration called the public “the biggest party that has interests in the environment...[and] a driving force for the government's self reform in environmental protection.”¹

In Huining County, Green Camel Bell is establishing a relationship with a local primary school to launch an environmental education curriculum that the NGO created to target rural populations. Zhao Zhong and his colleagues will conduct week-long programs educating students and their families on ecology, environmental protection, water conservation, and garbage reduction. Green Camel Bell also has a strong presence in Lanzhou, where it has organized several river walks, not only as outreach tools, but also to collect and map the environmental quality of the Yellow River in Lanzhou.



Green Hanjiang acts as a liaison between local communities, government and businesses. For example, this photo shows the head of Green Hanjiang calling the environmental protection bureau about a new waste pipe the community had discovered flowing into the river. The EPB was also investigating it and she was able to inform the community when the pipe was to be removed. Photo Credit: Pacific Environment

Hundreds of miles away in Anhui, Zhao Zhong's home province, another community-based group, Green Anhui, is working to protect the Huai River. Green Anhui staff and volunteers have hiked huge stretches of the notoriously polluted Huai River, meeting with communities, learning their concerns, and educating them about water conservation practices.

In the sleepy rural town of Bengbu next to the Huai, Green Anhui has even set up a small office. Having Green Anhui in town was fortuitous for Bengbu residents when in the winter of 2006, thousands of batteries were surreptitiously dumped onto the river's banks. Green Anhui was able to quickly mobilize the local media to cover this "midnight dumping" incident, as well as start organizing clean-up efforts. Their action sparked the local government to assist in the proper disposal of tons of batteries.

Groups like Green Anhui and Green Camel Bell also are reaching beyond their communities to increase the impact of their work. Through a larger coalition of environmental groups working on issues like water pollution, they are meeting with and learning from veteran activists and established groups like Green Hanjiang and Tai Lake Defenders.

Since 2001, Green Hanjiang has organized citizen walks of the local waterways and launched a citizen monitoring program, which provides water quality training to empower community members to identify and address water pollution. Green Hanjiang's efforts have been successful, and their work prompted a national-level investigation that shut down polluting enterprises and supported the digging of a new well for their community.

Equally successful, Wu Lihong of Tai Lake Defenders has independently led an effort to close down over 200 factories in his home region. Wu's aggressive and effective strategy involved tarnishing the reputations of local government officials by linking them to polluting enterprises. In April 2007, a few days before Wu planned to travel to Beijing to raise a case against another local polluter, he was arrested.

Ironically, a mere six weeks following his arrest, Tai Lake erupted with a toxic blue-green algae bloom that resulted in water being shut-off to two million people in the city of Wuxi. Following this incident—which not only made international headlines, but also raised concerns from within China's central government—all the officials Wu had targeted were demoted for negligence. Despite his vindicated whistle blowing and regular coverage in the *Wall Street Journal*, *Associated Press*, and other international news media, in August 2007, Wu was sentenced 3 years in prison for extortion.

Thwarted or not, the strong response of China's grassroots activists to address water pollution is proving that citizen-led efforts are having positive impacts within and beyond their local communities. There is a growing national movement within China to address water pollution, and each small victory is fuel for a successful national coalition.

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1. *China Daily*. (2007, July 4) "The public is the biggest environment group." [Online]. Available: http://www.chinadaily.com.cn/china/2007-07/04/content_909242.htm.