

FEATURE ARTICLE

Assessing China's Response to the Challenge of Environmental Health

By Xiaoqing Lu and Bates Gill

China is facing major environmental challenges and the government now is undertaking a significant reevaluation of its response. China's booming growth over the past two decades resulted in a wide range of devastating consequences for the environment that are having an increasingly adverse effect on the nation's economy, public health, and social stability. Escalating environmental threats to human health afflict many parts of China. However, the health impacts of environmental pollution may be most severe in southern China—a hotspot for poorly regulated but very high-paced industrial development—and among rural citizens throughout the country who lack resources and healthcare coverage to treat pollution-induced illnesses. As the Chinese leadership gradually awakens to the tension between economic growth and environmental protection, they must prioritize the human health impact of China's environmental crisis, which has been largely ignored. Major gaps include insufficient intergovernmental coordination on environmental health issues and a noted lack of nongovernmental organization and public involvement in addressing the issue. Some promising international research initiatives are being undertaken, which could address the severe lack of environmental health data. Ultimately what is needed is a comprehensive, interagency and collaborative strategy to stop China's environmental health crisis from getting worse.

CHINA'S WORSENING POLLUTION PROBLEM

The magnitude of the pollution problem in China is alarming. While rapid economic development and urbanization in the past 27 years have lifted hundreds of millions of Chinese out of poverty, it has also created tremendous pressures on the environment. According to the newly released report, *OECD Environmental Performance Review of China*, air pollution in some Chinese cities reaches levels that are among the worst in the world; energy intensity is about 20 percent higher than the OECD average; and about a third of the watersheds are severely polluted. Challenges with waste management, desertification, and protection of nature and biodiversity persist (OECD, 2007). In a stern statement in July 2007, the vice minister of China's State Environmental Protection Administration (SEPA) admitted that China's approach of growth through industrialization had pushed the environment "close to its breaking point" ("Taking the waters," 2007).

The deteriorating environment throughout the country has resulted in heavy economic

losses. China's first research report on a "green national economy," by the Chinese Academy for Environmental Planning and the National Bureau of Statistics, indicates China may have suffered a total loss of \$64 billion from environmental pollution in 2004, or more than 3.05 percent of the country's gross domestic product (GDP) ("Pollution costs," 2006). A study that would have presented a higher economic cost and a more detailed picture of pollution-induced GDP loss, or the so-called "green GDP," has been indefinitely postponed, reportedly due to pressure from local officials and fear of social backlash ("China postpones," 2007).

Chinese authorities are generally aware of the economic cost of environmental pollution, and have tried to initiate a shift towards a more sustainable development track. Beijing-endorsed concepts, such as "harmonious society" and "scientific development" are in part reflections of this new commitment. Concern for the environment is now incorporated into economic decision-making at the central level. For example, the Chinese government has made it a compulsory target to cut chemical oxygen demand (COD) and sulfur dioxide (SO₂) emissions

by 10 percent during the 11th Five-Year Program (2006-2010) (“Keep the green,” 2007). SEPA has recently unveiled a set of tough new rules to tackle worsening lake pollution while lambasting the country’s “bumpkin policies,” or sub-national government protectionist practices, which encourage local officials to turn a blind eye to the environment in order to pursue economic profits (“New rules,” 2007). Unfortunately, central mandates often go unmet or are simply ignored at provincial and local levels, where high-growth policies typically trump environmental concerns.

MOUNTING ENVIRONMENTAL HEALTH CONCERNS

To date, the impact of environmental degradation has been measured mostly in terms of economic losses, while the impact of pollution on human health has not received the attention it deserves. The nation’s health is clearly threatened by growing environmental risks. Yet, due to years of neglect, lack of political will, and an absence of resources for research, there are limited data and studies on the actual health impact of environmental pollution, as well as quantified links between environment and health.

Environmental pollution undermines the nation’s health by contributing to increases in cancer and birth defects, or by damaging the human body’s immune system, rendering citizens more vulnerable to various other health risks. Millions of people in rural and urban China suffer from health problems caused primarily by the deteriorating environment. Anecdotal evidence suggests pollution and environmental degradation have led to chronic health problems, such as gastric disorders, diarrhea, asthma, bronchitis, and conjunctivitis, as well as acute poisoning and death. A soon-to-be-published report by the World Bank indicates that approximately 500,000 people die each year as a result of air pollution in China (“China blames,” 2007).

Air Pollution-Caused Health Effects

Air pollution is a major hazard affecting the nation’s health, especially in urban areas. Due to massive and unclean use of coal as China’s primary energy source, air pollution has become one of the most visible and dangerous environmental problems in China, home to 16 of the world’s 20 most air polluted. Satellite data has revealed Beijing has the planet’s worst level of nitrogen dioxide (NO₂), which can cause

fatal damage to lungs. Recent air monitoring in 522 Chinese cities found 39.7 percent of them had either medium or serious air pollution (“39.7% of Chinese,” 2006). SEPA announced that China was the world’s largest source of sulfur dioxide in 2005 and a mere two years later the country overtook the United States as the world’s largest carbon dioxide emitter, with a recorded emission of 6,200 million tons of carbon dioxide—the main greenhouse gas (“China overtakes,” 2007).

China’s severe air pollution has undoubtedly contributed to a jump in chronic lung diseases—usually associated with the elderly—among young people. Other rising health problems associated with deteriorating air quality include respiratory inflammation, asthma, and chronic obstructive pulmonary disease. An estimated 200 Chinese cities fall short of the World Health Organization (WHO) standards for the airborne particulates responsible for respiratory diseases, which are becoming a leading cause of death in China (WWI, 2006).

Exposure to polluted air also has led to a stunning number of premature deaths. A recent study conducted by the Chinese Academy on Environmental Planning blamed air pollution for 411,000 premature deaths—mostly from lung and heart-related diseases—in 2003 (“Satellite data reveals,” 2005). Data from the Chinese Ministry of Science and Technology indicate that 50,000 infants may die as a result of air pollution every year (“Choking on Growth,” 2004).

Water-Associated Illness and Death

Illness and death caused by worsening water pollution is another major concern. Contamination is widespread in Chinese rivers, lakes and reservoirs, mainly in areas adjacent to industrially developed cities and towns in the southern part of the country. According to SEPA statistics, 70 percent of China’s rivers and lakes are polluted to some degree and 28 percent are too polluted even for irrigation or industrial use. Ninety percent of the water under Chinese cities is too polluted to drink. A Beijing-based environmental group, Friends of Nature, revealed that one-quarter of the Chinese population, or at least 320 million Chinese, are drinking unsafe water (“Unclean drinking water,” 2007). The majority of the affected population resides in rural China, where the environmental and public health infrastructures remain underdeveloped.

Inadequate treatment of industrial, municipal and agricultural wastewater intensifies China’s

BOX 1. Cancer Villages in Southern China

By ELIZABETH VAN HEUVELEN

According to a Ministry of Health survey, cancer topped the list of the ten most lethal diseases for urban and rural residents in China last year.¹ This study follows on the tails of a report released last year by China's State Environmental Protection Administration (SEPA) which states that more than half of the country's 21,000 chemical plants are located along the Yangtze and Yellow Rivers near water supply sources.² Together, these reports partially explain the marked spike in the number of China's "cancer villages" located along some of China's biggest, and most polluted rivers.

One such "cancer village" is Shangba, a town of 3,000 along the Bai River in southern China's Guangdong Province. Between 1987 and 2005 more than 250 people died of cancer and many villagers and environmentalists blame the upstream Dabao Mountain Mine for the surge in cancer cases.³ The mining operation stripped the top of the Dabao Mountain bare, creating massive soil erosion and allowed the mine's wastewater to flow freely into the nearby Bai River, polluting it with heavy metals. The wastewater eventually passes through local farmland and villages, contaminating the soil and crops, posing a serious health threat, as well as destroying the livelihoods of the farmers, who can no longer sell contaminated crops at the markets.⁴

After much perseverance, the residents of Shangba were finally able to draw the attention of the news media and the Guangdong provincial government to their plight. Since 2003, Shangba's pollution problems have been raised at the annual provincial People's Congress, which finally sparked action in 2006.⁵ Under the supervision of the People's Congress, the province, the Shangba village government, and the responsible mining companies established a fund to construct a reservoir, which began construction in August of 2005.⁶

While the Shangba reservoir offers village residents hope they will finally have access to clean water, the toxicity of the Bai River still spreads. Experts estimate the toxins in the river spread 50 kilometers downstream, but with heavy rains, as far as 100 to 200 kilometers, thereby presenting a significant health threat to numerous villages and thousands of residents.⁷ Furthermore, experts at the Huanan Agricultural University conducted tests on the water, showing that even after the river water was diluted 10,000 times it still contained dangerously high levels of toxins.⁸

The town of Zhaiwan along another river, coincidentally also named Bai, in Hubei Province shares a

similar story. After much news media attention for its astronomical cancer rate (80 times the national average), the town, with the help of the city government and \$30,000 from the World Bank, drilled a 120-meter well, costing 1.3 million Yuan (\$169,000).⁹ Like the Shangba case, while Zhaiwan residents obtained safe water, the river remains very contaminated due to illegal paper mills and chemical factories in the basin and many other villages downriver still consume the contaminated water.¹⁰

The prospects for cleaning up Hubei's Bai River are further complicated by the fact much of the pollution originates in Henan Province, where officials are not as willing to crack down on toxic factory emissions.¹¹ The lack of a basin-wide strategy to protect the water means people both up and downstream face toxic water and elevated risk of pollution-induced cancer. Moreover, the upstream pollution ultimately undermines the efforts that towns like Zhaiwan have taken to ensure the safety of their citizens.¹²

A similar scenario has played out in the village of Huangmengying in Shenqiu county, Henan Province. In this town of only 2,400, 114 residents died of cancer between 1990 and 2004.¹³ The village is located along the Shaying River, the biggest tributary of the Huai River—China's most polluted river. Since the early 1990s, the water in the Shaying has begun to turn black from severe pollution, and in the village of Huangmengying there has been a dramatic increase in the instances of colitis, as well as rectal and esophageal cancer.¹⁴ According to the director of the Shenqiu county's Ecological and Environmental Scientific Research Center (under its Communist Party People's Consultative Committee), not only is there serious pollution along the Shaying River, but the groundwater also has been seriously contaminated by pollution. Moreover, the center's researchers have uncovered 20 other clear cases of cancer villages along the river, affecting nearly 50,000 people.¹⁵

In towns such as Shangba, Zhaiwan, and Huangmengying, the health care costs associated with cancer pose serious obstacles to effective treatment, with many citizens either foregoing medical care due to the high costs, or taking on enormous debts to obtain treatment. With the cost of cancer screening out of reach for many rural citizens, early detection is unlikely, and many cancer patients only learn of their conditions when there is little that can be done for them medically without incurring severe financial burdens.

BOX 2. Unrest Spurred by Environmental Health Concerns

By ELIZABETH VAN HEUVELEN

Over the past few years, lax enforcement of environmental pollution laws and the daunting health consequences resulting from unchecked pollution have catalyzed a growing number of incidents of social unrest in China. While a majority of the environmental protests have taken place in rural areas, there are signs urbanites also may be willing to stand up and forcefully demand improvements in the quality of their environment. As of May, the State Environmental Protection Administration (SEPA) had received 1,814 petitions from citizens "appealing for a better environment" since January, up 8 percent from the same time last year.¹⁶ And in 2006, SEPA's Minister Zhou Shengxian reported that in recent years the number of "mass incidents" stemming from pollution which is increasing by 29 percent per annum, thereby having a "serious affect on social stability," with statistics citing the occurrence of more than 50,000 disputes resulting from environmental pollution between mid-2005 and mid-2006.¹⁷

Such protests are occurring not only because of environmental degradation, but because citizens feel they have no other options to get government response and compensation for their pollution-related injuries. In August of 2005, violent protests broke out in Meishan in Zhejiang Province over high levels of lead emitting from a battery factory that poisoned local children.¹⁸ In November of 2006, mass riots broke out in a town in Sichuan after a three year-old boy ingested pesticides, was refused medical care and later died.¹⁹

With increasing environmental degradation and ensuing public health threats, such incidents in rural areas are likely to become more commonplace. Furthermore, with greater access to technology such as cell phones, SMS text messaging, and the Internet, it is likely that protests will become larger and better organized.

A peaceful protest of between 7,000 and 20,000 people in the city of Xiamen in Fujian Province in early June 2007 attests to the power of technol-

ogy to organize such protests. The incident was sparked in response to the proposed construction of a chemical plant charged with manufacturing paraxylene and teraphalic acid, two chemicals linked to birth defects and cancer.²⁰ The plant, in violation of a national law that stipulates no chemical plant shall be built within ten kilometers of urban areas, received permission in spring of 2007 from the State Development and Reform Commission to be constructed immediately adjacent to a neighborhood of 100,000 people, and a mere 14 kilometers from the city center.²¹ The required environmental impact assessment (EIA) of the plant was not made public and was even unavailable to members of the Xiamen Chinese People's Political Consultative Conference (CPPCC). Community members near the planned site and 105 members of the CPPCC expressed outrage in March 2007 by sending a letter to the city government urging them to relocate the project due to the potential health hazard.²²

Beginning in late March, a text message was circulated to residents of Xiamen describing the potential health threats the chemical plant posed, some versions of which included a message encouraging participation in a protest in front of the municipal government building on June 1. In anticipation of a large protest, the local government announced on May 30 that it would postpone the project pending further environmental review, but this did little to quell the citizen's demand for the project to be cancelled altogether.²³ The text message, eventually reaching more than one million people, led to a mass gathering in front of the municipal building.²⁴ Video of the nonviolent protest was broadcast in real time on the Internet and clips became available later on YouTube. While the environmental review of the chemical plant in Xiamen is still pending, the incident demonstrates the potential for combining the powers of technology and citizen discontent, a model that will surely be duplicated and will pose serious challenges to the Party's promotion of a "harmonious society."

mounting water quality crisis. There are approximately 21,000 chemical factories located along China's rivers and coastline. More than half of them are located along the two most important rivers—the Yangtze and Yellow—upon which tens of millions of Chinese depend for their drinking supplies and livelihood (“Chinese chemical threats,” 2006). Contaminants from upstream facilities pose health threats to many locals along the rivers, who rely on the polluted water for drinking and irrigation. As a result, China now is home to a growing number of what have been called “cancer villages.” (“China's ‘cancer villages,’” 2007). (See Box 1).

One of China's worst cases of river pollution was the November 2005 explosion at a state-owned petrochemical plant in the northeastern province of Jilin that spilled over a hundred tons of carcinogenic chemicals, including benzene and nitrobenzene, into the Songhua River. The river flows from Jilin to neighboring Heilongjiang Province, where it supplies drinking water for the provincial capital city of Harbin. After several days of cover-up and denial, the city had to shut down its water system for four days to prevent benzene exposure to its 3.8 million residents. The Songhua spill is not an isolated incident. Less than a week later, officials in southern China's Guangdong Province announced a major toxic spill from a smelter into the Bei River, threatening water supplies in the provincial capital city, Guangzhou.

Severe water pollution also aggravates China's natural water scarcity. China has the second lowest per capita water resources in the world, less than one-third of the global average. Lack of sufficient and clean water has exacted a costly toll on the nation's public health, particularly due to polluted water contaminating soil and food. In communities along China's major rivers—the Huai, Hai and Yellow—there appears to be a higher than normal rate of cancer, tumors, spontaneous abortions and diminished IQs (Economy, 2004). The OECD (2007) estimates 30,000 Chinese children, mainly in rural areas, die from illnesses linked to consuming dirty water.

In addition to air and water pollution, health hazards caused by other pollutants in the environment have increasingly been reported in recent years. According to China's Ministry of Land and Resources, more than 10 percent of China's arable land, or about 12.3 million hectares, is contaminated by pollution due to excessive fertilizer use, polluted water, heavy metals and solid waste (“10%

of arable,” 2007). And the situation is worsening. Compounded by shrinking agricultural acreage, arable land pollution poses a severe threat to the nation's food production, food security, and human health.

An Issue of Domestic and Global Concern

Despite the lack of official data on the exact health impact of pollution, it is virtually certain that China's deteriorating environment has led to life-threatening conditions for many of its residents. Environmental health hazards are especially acute in rural China, where 90 percent of the population does not have any medical insurance. The Chinese leadership has begun to take health care insurance reform more seriously, but continues to grapple with government- versus market-based solutions for the effective delivery of health care.

In China's rural areas, individuals are far less likely to see healthcare workers who might be able to identify environmentally induced health problems. Pollution-caused illness affects the nation's public health record, damages workforce productivity, and drives up healthcare costs. The 2007 OECD report, citing earlier statistics from the World Bank, predicted by 2020 China will have 600,000 premature deaths per year in urban areas and 20 million cases of respiratory illness each year due to pollution. The overall cost of health damage from air pollution will equal 13 percent of the country's GDP (OECD, 2007).

Environmental health hazards also spur social discontent in China. The Chinese Ministry of Public Security announced in 2006 that public order disturbances rose by 6.6 percent during 2005 to 87,000 separate incidents (CECC, 2006). Many of these social disturbances can be attributed to public anger at worsening pollution and intensifying health threats posed by pollution. As Beijing places a greater priority on reducing the number of “mass incidents”—an official euphemism for riots, protests and collective petitions—the pressing challenge of environmental health needs to be urgently and effectively addressed. (See Box 2).

Mounting environmental health concerns are not just China's problem. As China aspires to become a responsible and more prominent global player, its growth and stability, in part based on the nation's public health conditions, are important to the world. Moreover, some of China's pollution-related health hazards have begun to spread into other countries. For example, in recent years, Chinese sandstorms—

caused by worsening desertification in northern and western China—have blown particulates over to Japan, Korea, and even the west coast of the United States. Also, poor environmental health records exacerbate the spread of infectious diseases worldwide. According to the World Bank, the outbreak of severe acute respiratory syndrome (SARS) in 2003 was most potent in areas where levels of air pollution were the highest (Economy, 2004). Other water-borne diseases and illness caused by soil deterioration and erosion in China inevitably affect neighboring countries through transboundary rivers. Thus, emerging, complex environmental health problems in China are of significant interest to the international community.

CHINA'S RESPONSE

While Chinese leaders and policymaking community appear to understand the deleterious economic impact of pollution, few seem to have grasped the grim picture of pollution's toll on human health. For example, though the Chinese government has passed numerous resource protection and pollution control laws and regulations, few have a clear action plan in response to the challenge of environmental health. Overall, awareness and understanding of the health impact of pollution remains low within the Chinese government at both central and local levels.

Uncoordinated Bureaucratic Response

Two of China's agencies—SEPA and Ministry of Health (MOH)—and their provincial and local branches bear the main responsibility for enhancing environmental health conditions. Although China has improved its use of pollution control technologies and policies, the response from SEPA and MOH, along with local bureaus, to emerging environmental health threats has been extremely limited and uncoordinated.

SEPA—China's Weak Environmental Watchdog

SEPA is the chief government agency responsible for environmental protection. It has corresponding bureaus at the provincial, prefecture, and county levels. SEPA takes charge of environmental protection work nationwide, which mainly includes pollution control, protection of natural ecology, and environmental monitoring. However, due to SEPA's low political standing and small staff, it is difficult for the agency alone to bring adequate

political and scientific attention to environmental health problems.

Over the past years, SEPA has participated in many environmental assistance programs with bilateral and multilateral aid agencies and international NGOs. But environmental health threats have rarely been the focus of environmental assistance to China. One notable exception includes the studies undertaken by the U.S. Environmental Protection Agency's (EPA) Integrated Environmental Strategies (IES) initiative, which began work in China in 1999. Under IES, the EPA, SEPA and various research centers have worked to estimate how the implementation of clean energy and transport technologies and policies could benefit local air pollution and related human health problems, as well as lower greenhouse gases (Green, Hildebrandt, & Turner, 2002). The first two studies focused on Shanghai and Beijing and a broader national study is currently underway. The results of the Shanghai study prompted the municipal government to strengthen energy efficiency and air pollution measures in the Tenth Five-Year Plan, which underscores the value of generating more environmental health studies for policymakers. One goal of the ongoing national study is to examine policies and measures that will help China simultaneously meet the Eleventh Five-Year Program's 20 percent energy intensity reduction target and 10 percent SO₂ reduction goal.

In addition to the IES work, SEPA and EPA began a collaborative project on hazardous waste management in 2006, and in 2007 the two countries agreed to cooperate on farm chemical pollution control ("China, U.S. ink," 2007). Yet, SEPA's work with international partners is far behind the curve of widespread and worsening environmental health threats across the country. Chinese universities in China have also been undertaking environmental health research with some U.S. counterparts, which may mark an important turning point in the generation of crucial data on pollution-health linkages. (See Box 3).

SEPA has ongoing consulting and training activities with other international partners. For example, SEPA, under the auspices of the Forum on China-Africa Cooperation (FOCAC) and with guidance from the Chinese Ministry of Commerce, has convened four training meetings for some 150 African officials and experts, providing information and generating exchanges on such topics as environmental management, environmental law, and environmental impact assessments. In another example, SEPA holds an annual consultation meeting on

BOX 3. Environmental Health Research Initiatives

Western Kentucky University's China Environmental Health Project (CEHP). The purpose of CEHP is to develop U.S.-Chinese partnerships to build the capacity of Chinese scientists, university students, local governments, civil society organizations, and citizens to understand and find solutions to two pressing environmental health threats: (1) coal emissions on the eastern coast, and (2) degraded water in the karst regions of southwest China. For 15 years, scientists at Western Kentucky University (WKU)—together with Chinese university counterparts—have been undertaking applied research and training projects focused on enhancing Chinese infrastructure and technical capacity to find solutions to safe drinking water challenges in southwest China's limestone karst regions and to monitor emissions from coal burning on the urbanized east coast. (*Editor's Note: See the special report in this issue of the China Environment Series for more information on CEHP.*)

The Social Science Research Council's (SSRC's) China Environmental Health Initiative (CEHI). Under this initiative, which was launched in 2007, SSRC is conducting a review of current knowledge on the relationship between environment and health in China, and of responses by government agencies at various levels, as well as nongovernmental and international organizations and the news media. The goals are to identify ways in which existing research can better inform policy and practice, to identify areas in which multi and interdisciplinary research is needed, and to develop ways to build research capacity in this area. This review process will result in an international conference and a series of workshops to be held in spring 2008. Other activities under the initiative include:

- Building an international network of scholars, policymakers and practitioners working on environment and health within and outside China and to facilitate the exchange of information among them.
- Creating the Resource Hub—a comprehensive web-based database that will house informa-

tion on individuals and institutions working on environment and health in China, as well as include bibliographic resources. The hub is scheduled to launch by the end of 2007.

- In collaboration with the Yunnan Health and Development Research Association, CEHI is developing a bilingual website to introduce international experience and research on environment and health, including: (1) articles on conceptual, methodological and data issues; (2) insights from different disciplinary and geographical perspectives; and (3) links to relevant international agreements, national laws and policies. It will also feature articles on various aspects of environment and health in China, including air and water pollution, food and drug safety, and other issues. The website is under construction and scheduled to launch in fall 2007.
- CEHI will also collaborate with the Yunnan Health and Development Research Association to produce a series of special issues of the association's journal focusing on environment and health.

Harvard University's China Project. This project is an interdisciplinary research program crossing the schools of Harvard University and collaborating with Chinese universities and research institutes to build fundamental scholarship and research capacities relating to atmospheric environment. An ongoing initiative of the China Project, coordinated with Tsinghua University, focuses on the case city of Chengdu to explore confluences of urban transportation, land use planning, vehicle emissions, and effects of mobile-source air pollution on human health and the economy.

Cornell University and Beijing University's Beijing Olympics Transportation and Human Health Study. Cornell and Beijing universities have already carried out one study of air quality and human health in Beijing prior to the Olympic games. They will carry out similar studies during and after the Olympics. This study is part of a Beijing EPB's Regional Air Pollution Control research efforts linked to the Olympics.

regional environmental concerns with counterparts from Japan and South Korea. Nevertheless, these international exchanges do not yet appear to focus with any specificity on pollution-induced health problems in China, which could be a fruitful area of exchange for all countries involved.

China's Ministry of Health

MOH is the highest administrative entity in charge of health-related matters in China primarily through its Center for Disease Control and Prevention (CDC), which does focus on illness associated with pollution. MOH Vice Minister Chen Xiaohong includes environmental health issues within his portfolio, but his ministry and China's CDC tend to deal primarily with the consequences of environmental pollution on health, rather than taking a more proactive and preventative position.

Environmental health hazards are especially acute in rural China, where 90 percent of the population does not have any medical insurance.

Competition or Collaboration?

In February 2007, MOH and SEPA jointly issued a document to establish a mechanism for collaboration on environment and health (Zhao, 2007). In August 2007, the two agencies announced planned actions under this agreement, including: (1) creating a leadership group with a joint secretariat chaired by MOH and SEPA ministers; (2) establishing an expert advisory committee to help guide the creation of thematic working groups; (3) conducting joint environmental health monitoring, surveying and research; and (4) handling public environmental emergencies jointly. The creation of such an inter-agency mechanism holds promise of promoting better data generation, education, and training. Nonetheless, due to the complexity of engaging two separate bureaucracies to cooperate, translating the new plan into real action, particularly at local levels, remains challenging.

SEPA and MOH are not alone in regulating environmental health issues. For example, they must share responsibilities with several other government units for waste management, an environmental problem receiving much less attention than air and water pollution.²⁵ The main agency responsible for municipal waste—perhaps China's largest waste challenge—is the Ministry of Construction, which supervises and administers the collection, storage, transport, cleaning, and disposal of solid waste generated by cities. The Ministry of Commerce oversees the recycling of paper and cans, while the Ministry of Water Resources handles the treatment and disposal of contaminated bottom sediment dredged from rivers.

Due to bureaucratic stovepiping and turf battles, environmental and health officials, as well as officials from other agencies, rarely work together. The bureaucratic disconnect is also reflected at local levels. Both a lack of awareness and unclear bureaucratic lines of authority regarding the nexus between environment and health have meant an ineffective government response in tackling the health challenge posed by pollution. China lacks a powerful national body capable of enforcing, coordinating and monitoring efforts to enhance environmental health conditions at central and local levels.

Discussions in Beijing in August 2007 suggest that efforts are underway to establish a larger inter-agency process to address environmental health problems, drawing in other agencies in addition to MOH/CDC and SEPA, including the Ministry of Water Resources and Ministry of Construction. This more ambitious process of collaboration, before the State Council in the fall of 2007, would lay out a 10-year plan focusing on environmental health, which would include research and regulatory responses in such areas as: (1) air pollution and health, (2) water pollution and health, (3) the impact of climate change on health, and (4) health problems associated with inadequate solid waste treatment.²⁶ It remains to be seen whether this initiative is approved, and whether it can overcome the typical challenges plaguing inter-agency processes in China.

The main research arm within MOH tasked with environmental health research is the Institute for Environmental Health and Related Product Safety (IEHS) of the Chinese CDC. IEHS provides scientific evidence and technical support for formulating policies and regulations on environmental health, conducting environmental health-related studies

and surveys, and implementing international cooperation programs. Notably, as China's national professional entity for environmental health and related matters, IEHS operates under two different bureaucracies—MOH and SEPA. With their separate mandate on environmental health, MOH and SEPA might exert uncoordinated control over the work of IEHS. This reflects the still low understanding among environmental and health officials of their responsibilities and effective ways to collaborate. In addition, while funding currently is sufficient to support IEHS staff and initiate new projects, officials there are concerned that they lack proper skills and technologies to carry out advanced research, monitoring, and assessments of environmental health risks.

IEHS is involved in a number of collaborations with foreign partners. For example, IEHS has been working with the Partnership for Clean Indoor Air (PCIA) on indoor air pollution issues. Under the umbrella of PCIA, IEHS is working on an EPA-funded project to promote efficient coal and biomass usage throughout rural Guizhou and Gansu provinces. The goal of this joint project is to reduce the health impacts of indoor air pollutants in poor rural areas of China. The IEHS has also successfully applied jointly with Yale University to the U.S. National Institutes of Health to establish a five-year, \$1 million program of training and exchanges between IEHS and Yale University environmental health experts. In another example, IEHS is working with the Global Environment Fund to carry out research in seven Chinese counties to assess the impact of climate change on the health of vulnerable populations such as children and the elderly. IEHS has also collaborated with Indiana University to assess the environmental presence of heavy metals on the health of senior citizens in China. In November 2007, IEHS will serve as host for an international conference on environmental health co-sponsored by MOH and SEPA.

At the local level, since 2001, the Shanghai CDC has been partnering with the one of the largest state environmental health programs in the United States—the Environmental Health Investigations Branch of the California Department of Public Health—to carry out the Shanghai-California Environmental Health Training Program. Through training, research collaborations, and capacity building activities this program has promoted public health action in Shanghai. (*Editor's Note: See Feature Box on this initiative in this CES issue*). This highly

successful program underscores a promising area of international collaboration to build up the capacity of local-level health agencies to address environmental health challenges in China.

Disconnect Between Central and Local Levels

The responsibility for implementing central mandates on the environment and environmental health falls largely on local officials, and there exists a substantial disconnect between central and local officials in terms of awareness and policy implementation.

Beijing has passed a series of tough measures and standards, and pledged significant amounts of funding in order to curb pollution. For example, new standards were issued, effective July 1, 2007, for drinking water—the first new standards for drinking water issued since 1985—which raised the number of indicators measuring the safety of drinking water from 35 to 106. In principle, local officials are informed of new mandates and are often required to attend workshops and other training sessions to learn about them and their proper implementation. Yet, while local environmental agencies may be willing and able to implement stricter rules, their political leaders are often reluctant to invest in environmental protection, preferring instead the political and financial rewards inherent in stoking economic and industrial growth. Local offices of SEPA have particular problems owing to lack of adequate resources and bureaucratic influence, due to interests from powerful sources, such as local developers, businesses, and senior local officials who have far greater standing and political clout. Due to such disconnects between central mandates and local implementation, Beijing's clean-up initiatives often leave pollution and pollution-related health threats unabated.

Lack of Effective Public Participation

Another missing factor in China's response to the challenge of environmental health is public participation. Although environment-related citizen groups form the largest sector of civil society organizations (CSOs) in China today, the government's wary attitude toward CSOs and onerous registration requirements for such groups cause CSOs pursue relatively safe areas of work (e.g., environmental education and recycling). There are few grassroots groups working on environmental health-related issues, for such work generally puts the CSOs in opposition to local government-owned industries. For example, over the past two years, two Chinese

environmental activists have been arrested for seeking greater transparency on water pollution issues that were causing severe ecological and human health problems (Oster, 2007; Buckley, 2005). Some Chinese CSOs engaged in environmental health include: (1) the Green Volunteers League of Chongqing, which investigated pollution and health problems in a rural community in Sichuan Province; and (2) the Huai River Defenders, which conducted a survey in China's most polluted river basin, the Huai, and found elevated levels of tumors, cancers and skin problems. Also notable is the Pesticide Eco-Alternatives Center, an environmental CSO carrying out research and outreach projects on pesticide problems and advocating alternative pest control methods with the goal of protecting human and ecological health threats from farm chemicals. The overall number of these groups remains very small. Additionally, their capacity is limited due to lack of funding, government support, and interest from the donor community.

Notably, one Hong Kong CSO, Civic Exchange, has been active in carrying out research and surveys on air pollution and environmental health in the Pearl River Delta Region. Civic Exchange has served as a catalyst for Hong Kong scientists to push stricter emission standards and more cross-border collaboration (Turner & Ellis, 2007). This CSO offers an intriguing model for how some mainland green groups could undertake environmental health work.

In recent months, Chinese authorities have tightened controls on CSOs in environment, health and other sectors, due to its suspicion that some groups might act as a proxy for western foreign policy. The mistrust has largely stemmed from the "color revolutions" in such places as Georgia, Ukraine and Kyrgyzstan. The combination of tight government control and low CSO capacity makes it extremely difficult for such groups to become effective watchdogs vis-à-vis local governments, or key actors for tackling environmental health threats. Without such groups, the Chinese public, as the primary victim of environmental health hazards and one of the most interested parties to see a greater focus on cleaning up environmental health threats, has yet to gain a greater voice in environmental decision-making.

Future Challenges and Opportunities

The disparity between China's intensifying challenge of environmental health on the one hand, and the inadequacy of the governmental and non-

governmental programs on the other, is alarmingly large and may be growing wider. Several important changes in direction will be needed to improve the country's meager record in addressing its environmental health challenges.

// In communities along China's rivers...there appears to be a higher than normal rate of cancer, tumors, spontaneous abortions, and diminished IQs.

Increasing Transparency and Accountability

As the impact of pollution on human health becomes more obvious and widespread in China, more effort should be undertaken to collect and analyze accurate data in order to determine the real impact of environmental conditions on human health as well as to assess the effectiveness of various government programs. The Chinese government should allow increased transparency regarding the health impacts of pollution. Local officials should be held accountable for the environmental record in their jurisdiction. Efforts to make environmental improvement a greater part of local officials' performance reviews and promotion prospects must be strengthened and enforced.

Interagency Collaboration and Better Environmental Governance Mechanism

Confronted with rising incidents of environmental health cases, China needs a comprehensive, inter-agency and collaborative strategy to stop the situation from getting worse. SEPA and MOH, as well as their local branches, need to work closely together to formulate joint and comprehensive strategies in order to enhance the country's environmental health conditions. This collaboration mechanism should also include other relevant government agencies, such as Ministry of Agriculture, Ministry of Construction, Ministry of Land and Resources, and others. Ultimately, a supra-ministerial body or working group—led at the vice-premier level—will

be needed to bring greater political clout to the interagency effort and insure well-coordinated and effective policies are put in place and enforced.

Expanded Public Participation in Decision-making

Local government pressure—ranging from harassment to arrests—on CSOs working on anti-pollution or anti-dam campaigns underscores how such groups are not yet partners for solving the country's growing pollution and health woes. Civil society groups should be encouraged to participate in environmental health-related programs and decision-making. In China, CSO experience in addressing public health challenges such as HIV/AIDS has demonstrated that Chinese civil society groups can be highly effective in mobilizing communities, increasing awareness, developing solutions, and implementing programs—acting essentially as service providers, rather than strictly as advocacy groups (Thompson & Lu, 2006). The central government has become progressive over the past few years in advocating public participation in environmental policy decision-making and these policies need to be better promoted at the local level.

Stepping Up International Cooperation

As China's environmental health threats have significant international implications, the international community should step up its cooperation with China to address the challenge. One highly promising WHO/UNEP effort is the Regional Initiative on Environment and Health in Southeast and East Asian Countries.²⁷ This forum has been planned since 2004 and began to actively bring environmental and health ministers from Asia together in 2006. The objective of this regional forum is to strengthen the cooperation of the ministries responsible for environment and health within countries and across the region by providing a mechanism for sharing information, improving policy and regulatory frameworks, and promoting the implementation of integrated environmental health strategies and regulations. China's MOH and SEPA are participating in this initiative and evidently working on a national environmental health action plan. This forum could provide an important catalyst for MOH and SEPA to become better integrated on environmental health issues if Beijing is serious about enhancing inter-agency collaboration in its response to this emerging challenge.

A handful of U.S. universities are undertaking work on environmental health with Chinese

counterparts, which represents a promising trend for generating crucial data for better policymaking. In terms of the United States, besides the few EPA projects, environmental health has not featured prominently in Sino-U.S. environmental collaboration. The EPA projects, like all U.S. government environmental initiatives in China suffer from little funding and low prioritization. The new U.S.-China Strategic Economic Dialogue presents an opportunity to reinvigorate bilateral energy and environmental collaboration. Any new collaboration in these areas should endeavor to include the component of environmentally induced health problems. Addressing China's growing environmental health challenges calls for an increase in collaboration between China and its international partners, including the United States.

The authors would like to thank Natalie Chang, research intern with the Freeman Chair in China Studies, for providing research assistance with this report.

Xiaoqing Lu is research associate at the Freeman Chair in China Studies at the Center for Strategic and International Studies (CSIS). She can be reached at xlu@csis.org. Bates Gill is the former holder of the Freeman Chair in China Studies at CSIS, and the new director of the Stockholm International Peace Research Institute (SIPRI). He can be reached at director@sipri.org. Elizabeth Van Heuvelen is currently a Master's candidate at the Johns Hopkins School of Advanced International Studies where she is concentrating in China Studies and International Economics. She can be reached at: evanheuvelen@gmail.com.

REFERENCES

- "Analysis: Stability concerns drive China's environmental initiatives." (2006, June 28). *Open Source Center*.
- Ang, Audra. (2005, August 22). "Chinese clash with police in protest over pollution." *The Washington Post*.
- Buckley, Lila. (2005, November 23). "Environmental activist arrested in Hangzhou: Movement still hampered by legal and financial restrictions." [Online]. Available: <http://www.worldwatch.org/node/134>.
- "China blames growing social unrest on anger over pollution." (2007, July 6). *The Guardian*. [Online]. Accessible: <http://www.guardian.co.uk/china/story/0,,2120044,00.html>.
- "China overtakes U.S. as world's biggest carbon dioxide emitter." (2007, June 19). *The Guardian*.
- "China calls on Xiamen to rethink chemical plant." (2007, June 7). *Reuters*.

- "China postpones pollution report." (2007, July 23). *BBC*. [Online]. Accessible: <http://news.bbc.co.uk/go/pr/ft/-/2/hi/asia-pacific/6911784.stm>.
- "China, U.S. ink document to facilitate cooperation on farm chemical pollution control." (2007, April 20). *Xinhua*.
- "China's 'cancer villages' pay prices." (2007, January 17). *BBC*.
- "Chinese chemical threats to rivers." (2006, January 24). *BBC*.
- "Choking on growth." (2004, December 6). *Time*. [Online]. Accessible: <http://www.time.com/time/magazine/article/0,9171,880308,00.html>.
- Collen, Green, Timothy Hildebrandt, & Jennifer L. Turner. (2002). "The integrated energy options and health benefits study for Shanghai, China." *China Environment Series*, Issue 5, 124-129.
- Congressional-Executive Commission on China (CECC). (2006, February). "Ministry of Public Security Report Rise in Public Order Disturbances in 2005."
- Economy, Elizabeth. (2004, September 22). "China's environmental challenges." Congressional testimony before the House International Affairs Committee, Subcommittee on Asia and the Pacific. [Online]. Accessible: http://www.cfr.org/publication/7391/congressional_testimony.html?breadcrumb=%2Fbios%2F21%2FElizabeth_c_economy.
- Kahn, Joseph. (2006, November 12). "Crowd protests health care in China." *New York Times*.
- "Keep the green alert on." (2007, August 7). *China Daily*. [Online]. Accessible: http://www.chinadaily.com.cn/bizchina/2006-08i/07/content_658476.htm.
- Landsberg, Mitchell. (2007, June 2). "Chinese eco-protest takes high-tech path." *Los Angeles Times*.
- Li, Fangchao. (2006, May 4) "Environment issues addressed more urgently." *China Daily*.
- "New rules to curb 'rampant' violations of pollution laws." (2007, July 12). *Xinhua*. [Online]. Accessible: http://news.xinhuanet.com/english/2007-07/12/content_6366544.htm.
- Organization for Economic Cooperation and Development (OECD). (2007). *Environmental Performance Review of China*. Paris, France: OECD.
- Oster, Shai. (2007, September 28). "In China, activism is risky pursuit: Groups proliferate but remain vulnerable to wrath of local officials." *Wall Street Journal*. [Online]. Available: http://online.wsj.com/article/SB119093280547941815.html?mod=googlenews_wsj.
- "Pollution costs China 511.8 billion Yuan in 2004." (2006, September 7). *Xinhua*.
- Quek, Tracy. (2007, July 6). "Chinese fuming over pollution: Officials worry about social stability as protests grow over deteriorating environment." *The Straits Times*.
- "Satellite data reveals Beijing as air pollution capital of world" (2005, October 31). *The Guardian*.
- "Taking the waters." (2007, July 24). *Financial Times*, [Online]. Available: <http://www.ft.com/cms/s/8f48afe8-397d-11dc-ab48-0000779fd2ac.html>.
- "SEPA to conduct environmental impact assessment on Xiamen's City Planning." (2007, June 8). *Xinhua*.
- "SMS texts energize a Chinese protest," (2007, June 1). *Asia Sentinel*.
- "10% of arable land contaminated with pollutants: Situation worsening." (2007, April 22). *Xinhua*.
- "39.7% of Chinese cities suffer from medium or serious air pollution." (2006, May 31). *China Environment News*.
- Thompson, Drew & Xiaoqing Lu. (2006). "China's evolving civil society: From environment to health." *China Environment Series*, Issue 8, 27-39.
- Turner, Jennifer & Linden Ellis. (2007). "Air pollution and environmental health threats in southern China." Summary of a China Environment Forum Meeting, February 13. [Online]. Available: http://www.wilsoncenter.org/index.cfm?topic_id=1421&fuseaction=topics.event_summary&event_id=215891.
- "Unclean drinking water threatens health of 320 million Chinese." (2007, March 13). *Xinhua*.
- Worldwatch Institute (WWI). (2006, February 14). "Filthy Air Choking China's Growth, Olympics Goals." [Online]. Accessible: <http://www.worldwatch.org/node/3881>.
- Zhao, Yuechao. (2007, August 8-9). "National actions in China." Presentation at the Third Ministerial Regional Forum on Environment and Health in Southeast and East Asian Countries. Bangkok, Thailand. [Online]. Available: http://64.233.169.104/search?q=cache:7yNXXdAtYpYJ:www.rrcap.unep.org/envhealth/event/HL/03_China.ppt+Chinese+Ministry+of+Health+SEPA&hl=en&ct=clnk&cd=6&gl=us&client=safari.

NOTES

1. "Pollution makes cancer a top killer." (2007, May 22). *China Daily*.
2. Li, Zijun. "China's rivers: Frontlines for chemical wastes." (2006, February 23). *WorldWatch Institute*.
3. "Citizen's environmental power: Shangba town's pollution turns it into a 'cancer village.'" (2007, July 4). *Gansu Economic Daily (Gongmin Huanjing weiquan - Shangbacun wuran biancheng aizheng zhicun)*
4. "Guangdong cancer village: The flow of poisoned river water - diluted, but still dangerous." (2005, November 19). *Boxun*. (*Guangdong aizhengcun liu jing du*)

heshui xishi wanbei reng judu)

5. "Citizen's environmental power: Shangba town's pollution turns it into a 'cancer village.'" (2007, July 4). *Gansu Economic Daily (Gongmin Huanjing weiquan – Shangbacun wuran biancheng aizheng zhibun)*
6. Ibid. Griffiths, Dan. "China's 'cancer villages' pay price." (2007, January 17). *BBC*.
7. "Guangdong Cancer Village (2005, November 19).
8. Ibid.
9. "A drop of clean water in the ocean of toxic waste." (2007, August 2007). *South China Morning Post*.
10. "Factory pollutes upper reaches of the river in Henan, cancer villages in Hubei spring up." (2005, August 20). *Xinhua*. (Shangyou Henan qiye dasi paiwu xiayou Hubei chuxian aizhengcun)
11. "A drop of clean water in the ocean of toxic waste." (2007, August 2007).
12. "Factory pollutes upper reaches of the river in Henan, cancer villages in Hubei spring up." (2005, August 20).
13. "Pollution makes cancer a top killer." (2007, May 22). *China Daily*.
14. "More than 20 'cancer villages' have sprung up along the Huai River." (2004, September 29). *Shanghai Youth Daily*. (*Huaihean jingxian 20 yu aizhengcun*)
15. Ibid.
16. Quek, Tracy. (2007, July 6). "Chinese fuming over pollution: Officials worry about social stability as protests grow over deteriorating environment." *The Straits Times*.
17. "Analysis: Stability concerns drive China's environmental initiatives." (2006, June 28). *Open Source Center*; Fangchao, Li. (2006, May 4) "Environment issues addressed more urgently." *China Daily*.
18. Ang, Audra. (2005, August 22). "Chinese clash with police in protest over pollution." *The Washington Post*.
19. Kahn, Joseph. (2006, November 12). "Crowd protests health care in China." *New York Times*.
20. "SMS texts energize a Chinese protest," (2007, June 1). *Asia Sentinel*.
21. Landsberg, Mitchell. (2007, June 2). "Chinese eco-protest takes high-tech path." *Los Angeles Times*.
22. "SMS texts energize a Chinese protest," (2007, June 1).
23. "SEPA to conduct environmental impact assessment on Xiamen's City Planning." (2007, June 8). *Xinhua*.
24. "SMS texts energize a Chinese protest," (2007, June 1); Landsberg, Mitchell. (2007, June 2). "Chinese eco-protest takes high-tech path." *Los Angeles Times*; "China calls on Xiamen to rethink chemical plant." (2007, June 7). *Reuters*.
25. For more information on the magnitude of waste problems and their impact on health in China see a collection of research briefs on the China Environment Forum's website, which were produced under the China Environmental Health Project: http://www.wilsoncenter.org/index.cfm?topic_id=1421&fuseaction=topics.item&news_id=224052.
26. Authors interview with Jin Yinlong, Director of Institute of Environmental Health and Related Product Safety (IEHS) at Chinese Center for Disease Control, Beijing, China, August 2007.
27. For more information on this forum see: <http://www.rrcap.un.p.eorg/envhealth/index.cfm>.

FEATURE BOX

Rapid Translation of Environmental Health Research Into Policy and Action

THE SHANGHAI-CALIFORNIA ENVIRONMENTAL HEALTH TRAINING PROGRAM

By Rick Kreutzer

Over the past six years, the Shanghai-California Environmental Health Training Program has accelerated public health action in Shanghai, China through training, research collaboration, and capacity building activities. The program has resulted in better public health surveillance, more research opportunities and new policy initiatives to improve the Shanghai municipal region and national health.

China's economic reforms have sparked rapid growth that has brought millions out of poverty, but have also created major environmental degradation and growing social inequities. Growing health problems stemming from pollution, infectious diseases, and lack of access to health care are major challenges facing China's public health agencies, even those in wealthy Shanghai. To address the growing health challenges in the Shanghai region, the Shanghai Center for Disease Control and Prevention (CDC) was created in 1998. Three years later (2001), with support from the Fogarty International Center of the U.S. National Institutes of Health (NIH), the inter-governmental Shanghai-California Environmental Health Training Program was formed as an innovative partnership between the Shanghai CDC and one of the largest state environmental health programs in the United States, the Environmental Health Investigations Branch (EHIB) of the California Department of Public Health (DPH).

This inter-governmental agency relationship is unique in supporting sustained long-term institutional collaboration that can achieve more rapid translation of research into policy and action than inter-academic center collaborations. The Shanghai CDC, with a similar-sized population base and technical responsibilities, shares much in common with the California DPH. Both agencies must address

many of the same kinds of environmental concerns and threats, and thus benefit from the unique perspective each brings to the environmental health training collaboration.

Recent renewal of the program for another five years will allow it to build upon its recent successes. During the first funding cycle, the program had three components: (1) U.S.-based training for selected representatives of the Shanghai CDC; (2) conferences on environmental and occupational health issues, mainly China-based; and (3) enhancements to Shanghai CDC institutional capacity.

TRAINING

Although this program offered participants academic training opportunities at the University of California, Berkeley, it focused primarily on government-to-government training and research collaboration. Trainees with backgrounds in epidemiology, toxicology, and laboratory sciences came to the United States for six months to observe and to participate in EHIB's large-scale epidemiological studies and learn about its approach to planning, implementing, and evaluating environmental health programs. Efforts were made to offer trainees on-the-job technical, regulatory, and policy experience of direct value to China in its effort to address increasing environmental health threats.

Ten trainees—scientists and mid-level managers in the Shanghai CDC—have participated in the program to date. All have returned home to implement new programs or assume additional leadership responsibilities. They have conducted individual projects that build understanding and foundations for collaboration, such as:

- Reviewing human subjects rules and procedures for research in Shanghai;
- Comparing applications of the precautionary principle in U.S. and Chinese environmental health policies;
- Comparing laboratory safety protocols and standard operating procedures as well as quality assurance and control procedures between California DPH and Shanghai CDC laboratories;
- Studying environmental quality and health indicators and identifying data sources, data characteristics, accessibility, and utility of selected indicators for Shanghai;
- Studying the World Health Organization's "Healthy City" Program approaches and methods in support of Shanghai's efforts to become the largest Healthy City project in the world;
- Assessing the quality and availability of clinic records, diagnostic procedures and biomarkers to support a collaborative study on autism;
- Developing methods to measure algal toxins in environmental media;
- Evaluating options for distance learning/training hardware and web services at Shanghai CDC; and,
- Planning interagency training for emergency preparedness and response in anticipation of the 2008 Olympics and 2010 World Expo.

In addition to generally enhancing research capacity, these training activities have resulted in the Shanghai CDC strengthening its cancer registry, creating a food-borne surveillance system, publishing six journal articles, and improving English language skills among trainees.

ENHANCEMENTS TO CAPACITY

Through the training, research collaborations, and conferences, the program has identified priority needs of the Shanghai CDC and resources have been directed to enhance its capacity. For example, a website has been constructed to serve as both an

aid to trainees and as a public overview to the project (www.cal-china.org). In an effort to increase international access to Chinese public health scholarship and to enhance the quality of that scholarship, the program supports translating all abstracts of the *Chinese Journal of Environmental and Occupational Medicine* into English. In addition, the journal, with support from the program, will resubmit an application for indexing in the PubMed research database, which was rejected in May, 2006.

/// Growing health problems stemming from pollution, infectious diseases, and lack of access to health care are major challenges facing China's public health agencies, even those in wealthy Shanghai.

During the Severe Acute Respiratory Syndrome epidemic, the program's U.S. sponsors coordinated discussions between the Shanghai CDC management and U.S. experts about Shanghai clinic and hospital reporting systems, data management, and training to improve the Shanghai CDC's capacity to respond to future disease outbreaks. As a result, the Shanghai CDC created protocols to direct staff in dealing with large acute outbreaks and has established an Infectious Disease Prevention and Control Management Office that coordinates activities at community clinics, district CDCs, and the Shanghai CDC.

Another important initiative of the program has been to examine the utility and feasibility of integrating Shanghai municipal clinical services systems and Shanghai CDC research and data collection systems with a carefully designed biological specimen bank. The proposed integrated clinical services-research system would link detailed individual and family health data and clinical specimens with additional biological specimens (e.g., blood, urine, and sputum) collected and stored for purposes of genomic, proteomic, metabolomic, and environmental health analysis. The result will be one of the world's largest biomonitoring programs.

FUTURE PROJECTS

During the next project period, existing program components will be maintained. In addition, the program will develop a series of seminars to be held in Shanghai to increase interaction on focused topics among California and Shanghai health researchers. The program also will create a separate grant-making infrastructure to award start-up grants for selected Shanghai CDC research proposals that address important environmental and occupational health issues and build stronger research collaboration with California researchers. Finally, the program will support Shanghai CDC's effort to become a center for web-based distance training, offering a broad training curriculum and

virtual meeting forum to district and local CDCs in Shanghai as well as to other adjoining Chinese provinces.

The Shanghai-California Research Training Program provides an opportunity for scientists and policymakers to share experience and information with colleagues around the world and to build new institutional capacity to address the formidable problems facing them. The program has become a vehicle to translate environmental and occupational health research more rapidly into public health policy and action.

For more information please see www.cal-china.org, or contact Rick Kreutzer (rick.kreutzer@cdph.ca.gov) or John Petterson (iai@san.rr.com).