



Woodrow Wilson
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China Environment Forum

Issue 7, 2005

CHINA ENVIRONMENT SERIES

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*The Challenge of Positive Influence:
Managing Sustainable Development
on the West-East Pipeline Project*
Mike Seymour, Marilyn Beach, and Steve Laister

*China's Ecological Rehabilitation: The Unprecedented
Efforts and Dramatic Impacts of Reforestation
and Slope Protection in Western China*
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*Quenching Beijing's Thirst:
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*A Different Growing Season South of the Mountains:
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Peter Riggs

Commentaries/Notes from the Field

China Environment Forum Special Initiatives

Feature Boxes

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The Woodrow Wilson International Center for Scholars, located in the Ronald Reagan Building in the heart of Washington D.C., was founded in 1968 by Congress as the nation's living memorial to President Woodrow Wilson. Through its renowned fellows program and a range of regional and functional programmatic activities, the non-partisan center fosters scholarship and dialogue in the humanities and the social sciences. As such, The Wilson Center serves as an ideal meeting place for scholars and practitioners of widely divergent ideological and professional backgrounds. Meetings are marked by free intellectual exchange, reflecting a tradition of bringing together people

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"The Director's Forums provide a unique opportunity for Wilson Center friends, scholars, and staff to hear leading public officials discuss current policy issues and to engage in a dialogue with them. These discussions and interactions between the speaker and audience are lively and informative and a key part of the legacy left to us by President Wilson."

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Foreword

Jennifer L. Turner, Editor

Two thousand and four was an extremely busy year for the China Environment Forum (CEF). It was also a year in which we experienced some major changes. First the busy year: We ended one study tour project and began another—our Water Conflict Resolution in the United States and China working group held its final meeting in June 2004 after two study tours in the United States and one in China (see special reports section in this issue and in issue 6). The group's team papers and final policy brief will be completed and published this year. The new study tour project also had the theme of water and was done in collaboration with Kenji Otsuka at the Institute of Developing Economies (IDE) with funding from the Japan Foundation's Center for Global Partnership. IDE and CEF created a tri-national working group—comprised of water and environmental experts from Japan, the United States, and China—and asked them to explore the potential for joint U.S.-Japan efforts to enhance river basin governance systems in China. To accomplish this task the group participated in study tours in Japan, China, and the United States that emphasized three key aspects of river basin governance (see the special reports section for the China tour summary). In April 2005 IDE and CEF published a collection of research papers titled *Promoting River Basin Governance: Crafting Japan-U.S. Partnerships in China* (see CEF website for PDF link) and will publish a policy brief on river basin governance in China in the summer of 2005.

Now in terms of major changes I first must mention that after three years of working for me as a stellar project assistant and managing editor, Tim Hildebrandt moved on to pursue a Ph.D. at the University of Wisconsin. His central interest of study will be environmental NGOs and civil society in China, so while he is sorely missed I have not “lost” him per se! The other major change in 2004 was the birth of my daughter Vanessa Skye Turner in December. During my maternity leave I was able to work on editing the *China Environment Series* and the river basin governance publication because Vanessa would take long naps, often on my lap, which actually forced me to sit at the computer longer—she was a demanding co-editor.

Some funding constraints forced us to delay Issue 7 of the *China Environment Series* and to scale back the print version. However, readers will be able to find many meeting summaries on the CEF website and most importantly, the complete Inventory of Environmental and Energy Projects in China will soon be available online as well. This is also the first peer-reviewed issue. We also are pleased to announce that a grant from Shell China, Ltd. enabled us for the first time to translate the *China Environment Series* into Chinese—big thanks to my tireless research assistant and translator Lu Xiaoqing. Also lots of gratitude to the wonderful folks at *China Development Brief* in Beijing who are overseeing the layout and printing of this Chinese issue, which will be out in the summer of 2005.

Mike Seymour, Marilyn Beach, and Steve Laister open up this issue with an informative article on the work undertaken by Shell together with other international oil companies to encourage international environmental and social impact assessment standards for the West-East Pipeline Project. In the second feature article **Runsheng Yin, Jintao Xu, Zhou Li, and Can Liu** introduce the challenges and potential of two major forestry campaigns in China—the Natural Forest Protection Program and the Slope Land Conversion Program. **Christoph Peisert** and **Eva Sternfeld** discuss how supply-management oriented strategies to quench Beijing's “thirst” are causing regional water conflicts in northern China and severely endangering Miyun reservoir and watersheds far removed from the city. In his article **Peter Riggs** highlights how Guangdong is not only in the vanguard of China's economic revolution, but also a potential leader in promoting sustainable (and profitable) agriculture.

This year's “crop” of commentaries and notes from the field covers a broad variety of issues. Three articles focus on water development projects—ranging from poorly implemented micro-level projects to promote rainwater harvesting in Gansu (**Seth Cook**) to the decision-making process behind the massive national Three Gorges Dam project (**Gørild Heggelund**), to the challenges of creating a biosphere in the cross-boundary Tuman River Basin area (**Sangmin Nam**). Two commentaries highlight the growing use of standards and green labeling to promote more sustainable food production—e.g., Green Food (**Megan Tracy**)—and energy efficiency (**Gary McNeil** and **David Hathaway**). **Sylvia Ping Song** offers our only commentary focusing on the nongovernmental sector in China with her piece on the nascent, yet growing, green NGOs in Guangdong province. While green

NGOs are most active in the area of environmental education, **Heidi Ross** and **Jing Lin** highlight how the Chinese education system is reforming itself to strengthen environmental education at all levels of schooling.

In addition to all of the enthusiastic contributing authors and peer reviewers I wish to thank Tim Hildebrandt and my wonderful research assistants—Lu Xiaoqing and Yan Baohua—and the desktop publisher Richard Thomas for all their work in getting this issue out. I also wish to recognize the various funders whose support of the China Environment Forum activities in 2004 and 2005 has been greatly appreciated: Japan Foundation's Center for Global Partnership, Carnegie Corporation of New York, Blue Moon Fund, the U.S. Environmental Protection Agency, and Shell China, Ltd.

Green Boat—Student Environmental Association in Sichuan Province

Green Boat (*Lü Chuan*) is a university student environmental association created at the Southwest Petroleum Institute (SWPI) in November 2001. This all-volunteer group initially focused most of its activities on campus (e.g., environmental speech competitions, picture exhibitions, campus water saving campaigns, and battery recycling), but has increasingly become involved in projects beyond campus. Members of Green Boat believe that environmental protection depends more on taking action and showing dedication than simply shouting slogans. The range of their work shows Green Boat is indeed a group of action. Some major campus activities include:

- *Green Library*: At the university library Green Boat has compiled a small collection of environmental books (donated by SWPI, environmental protection bureaus and nongovernmental organizations) for students to learn more about nature and environmental protection issues in China and beyond. The group also has a collection of environmental movies that they lend to teachers and students.
- *The Voice of Green*: In cooperation with the campus broadcasting office, Green Boat has created a special environmental program that is broadcast every Thursday afternoon.
- *Environmental Education*: Members of Green Boat give environmental talks and create learning games in schools near campus. Another environmental education activity is a display case containing environmental information located near the SWPI campus dormitories.
- *Green Dream*: Green Boat publishes a regular newsletter called Green Dream, which is distributed to university departments and dormitories.

With funding from SWPI, WWF-China, Global Greengrants Fund and other organizations Green Boat members have been involved in some of the following activities:

- In January 2002, Green Boat members participated in a “Nationwide University Students Winter Ecology Investigation” held by the China Council for International Cooperation on Environment and Development.
- In the summer of 2002, members of Green Boat participated in a “Wetland Ambassador Action” held by the National Forestry Bureau and WWF-China.
- In October 2002, members carried out an ivory trade investigation in Chengdu financed by International Fund for Animal Welfare.
- In the summer of 2003, Green Boat members attended a wetland investigation at the Green Camp in Ruo Er Gai.

For more information contact the Chengdu Office at swpilvzhou@yahoo.com.cn; or the Nanchong Office at gbnc@swpi.edu.cn; or Green Boat's website at: <http://gb.swpi.edu.cn>

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INVENTORY OF ENVIRONMENTAL AND ENERGY PROJECTS IN CHINA

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The Challenge of Positive Influence: Managing Sustainable Development on the West-East Pipeline Project

By Mike Seymour, Marilyn Beach, and Steve Laister

The West-East Pipeline Project is the second largest state infrastructure project in China and the first in which foreign companies were invited to participate. It is an integrated upstream, midstream, and downstream project that brings gas from northwest China to the east via a 4,000-kilometer pipeline from the Tarim Basin in Xinjiang to Shanghai. PetroChina is the company responsible for developing the project. Between 2001 and 2004, PetroChina was in discussions with Shell, Gazprom, and ExxonMobil about possible participation and these companies all signed a Joint Venture Framework Agreement in July 2002. In August 2004, the Joint Venture Framework Agreement was terminated, ending the international energy companies' interest in the project. During the discussions, a key challenge was to drive positive environmental and social outcomes in line with international expectations, within the context of negotiating a minority shareholding in a non-operated Joint Venture. Moreover, the project was already well advanced in planning and through China's regulatory approval when discussions with the international companies started, and moved into full construction while negotiations over participation continued. This paper describes how over 18 months, Shell developed strategies and tools to encourage the project towards international standards and to ensure implementation of those standards. The authors of this paper—who were members of the Shell team—put forward lessons learned and practical solutions, particularly the approaches taken for an environmental and social impact assessment, establishing partnerships, gaining reassurance about the compensation and resettlement program, and managing the expectations of different stakeholders.

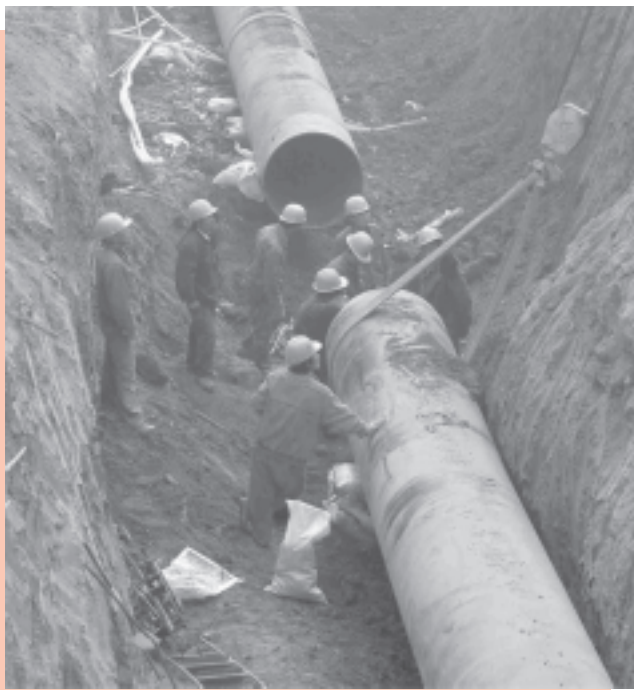


Building a 4,000-kilometer (km) pipeline comes with no shortage of complexities and challenges, whether in China or anywhere else in the world. As engineers find innovative solutions for a wide scope of technical difficulties in huge infrastructure projects, social scientists and conservationists are becoming more involved in identifying environmental and social impacts, mitigating negative ones, and promoting positive benefits in communities affected by operations of such projects.

While the degree to which a project meets sustainable development goals depends to a large extent on government policies, community expectations, public awareness, and local capacity, companies now realize the necessity of integrating social and environmental considerations more deeply into their project development decision-making. Across a broad spectrum of issues, the Shell team, representing an international consortium of companies that included Gazprom and ExxonMobil, engaged the Chinese partner—PetroChina¹—in innovative and progressive

methods to address the social and environmental implications of the pipeline's development. While partner caution and reluctance over increasing transparency and accountability, largely culture driven, certainly affected Shell's work, among the Chinese partners there were encouraging trends towards setting clearer goals for sustainable development and increasing allocation of staff and budgetary resources.

This paper draws specifically on Shell's experiences with the West-East Natural Gas Pipeline Project in China. It highlights some of the issues and dilemmas Shell faced within the context of supporting sustainable development and conservation activities on a major infrastructure project in China. In this paper we outline Shell's evolving approach to meet sustainable development goals on the project, as well as define environmental and social impact standards. We also identify the key environmental and social challenges faced by Shell and show what approach was taken to influence the activities of our prospective business partners. Finally, we conclude with lessons learned and



West East pipeline construction

Credit: Mike Seymour

recommendations for future cooperation.

The authors hope that this paper will contribute to a better understanding of how to set clear goals and establish partnerships that result in limiting negative social and environmental effects of business operations. We are proud to discuss several successes and challenges. By examining some of our challenges and regrets, we hope to provide insights on how to build capacity within the industry to protect the natural and human environments in which business and industry operate in China.

PROJECT CONTEXT

Overview of the West-East Pipeline Project

The West-East Pipeline is a complex integrated upstream, midstream, and downstream project, costing some \$8.5 billion, that brings gas from the northwest of China to the fast-developing cities in the east. It forms an important part of the Chinese government's plan to increase use of gas and develop cleaner energy resources to sustain economic growth and limit the negative effects of coal use. Shell was part of an international consortium of companies, including ExxonMobil and Gazprom, seeking to take a combined 45% shareholding in the project with PetroChina (50%) and Sinopec (5%).

The project involves drilling wells in the Tarim Basin in Xinjiang and transporting the gas via a 4,000 km pipeline across the country to Shanghai. Along the way, the pipeline will link with additional reserves in the Ordos Basin in Shaanxi province. First gas began to flow into the eastern section of the pipeline from Ordos in early 2004, with Tarim gas coming on-stream in early 2005. Sales of the gas are expected to reach 4.0 billion cubic meters (bcm) in 2005, which is one-tenth of China's total production (Reuters, 2005).

The pipeline, which is about one meter in diameter with an anti-erosion coating, is buried one meter underground and has the capacity to carry 12 bcm of gas a year. After the pipes are placed, the surface of the right of way is to be restored to its original condition, except for some parts where access a few meters wide will remain for maintenance purposes. Most of the land will be returned to cultivation or herding, as it was before the pipeline was laid. Not surprisingly, a project of this magnitude has presented a variety of environmental, land use, and social challenges, which are discussed below.

The West-East Pipeline Project was unusual in that Shell, along with its international partners, began project negotiations (and therefore due diligence) later in the timeline than usual. Shell was selected as a preferred partner for further negotiation in September 2001; the same month as full construction of the pipeline was scheduled to start. The authors cannot speak for PetroChina, which constructed the pipeline, but can discuss collaboration between Shell and PetroChina and other local and international stakeholders to establish and achieve common environmental and social standards in project development.

China's Energy Demands

China, with one-sixth of the world's population, overtook Japan in 2003 to become the second largest consumer of energy globally. It attracts more foreign direct investment per year than any other country, which has helped fuel an economy that has been growing at an unprecedented rate of over 9% on average per year for more than 20 years. China's economic growth is predicted to continue at high rates (it achieved 9% in 2003 despite the SARS epidemic), which requires a huge increase in energy use. China consumed approximately 10% of the energy used worldwide in 1997 and it is predicted to consume approximately 14 to 16% by 2020 (Baldinger & Turner, 2002, pp.11-12). China's crude oil imports are expected to reach

140 million metric tons by 2010.²

In 2003, China surpassed its 2005 targets for power consumption two years ahead of projected expectations, but the country's ability to supply the growing demand for energy continues to fall short (AmCham, 2003, p.11). For example, in the summer of 2004 China's east coast cities were plagued with brownouts during the summer months. Despite investment into clean

serious environmental conditions. Local energy supplies are insufficient for China's growing demand, prompting China's oil and gas companies to look towards supplies in Central Asia, Latin America, the Middle East, Russia, and West Africa for new reserves. To cushion itself from possible shortfalls and international price disruptions, the Chinese government has announced plans to increase oil reserves to an amount equal to 50 days of

China consumed approximately 10% of energy used worldwide in 1997, and it is predicted to consume approximately 14-16% by 2020.

energy sources, coal—currently supplying about 70% of China's primary energy demand—will continue to be the country's major energy source. Coal has caused major environmental and health problems, notably air pollution, acid rain, and dangerously high rates of respiratory disease, which is considered the number one cause of death in China.

Today, natural gas provides just 2.5% of the country's total energy consumption, but the government hopes to increase that to 8% by 2020 (AmCham, 2003, p.12). The West-East Pipeline promises to allow China to harness a cleaner fuel and limit the growth of coal use in many eastern cities. It is estimated that the pipeline will deliver 20% of China's projected natural gas demand by 2010. Thus the pipeline could have significant health benefits for people living in cities where the gas will replace coal as the primary energy source. The West-East Pipeline is part of the Chinese government's broader goal to reduce hazardous emissions.

A recent Sino-U.S. study on natural gas use in China found that for every 20 billion cubic meters of natural gas used in place of coal, sulfur emissions would decline by 650,000 tons and carbon dioxide would decrease by 14 million tons.³ It should be noted, however, that regardless of the pipeline or other increases of natural gas, coal use will still increase as China's energy demands continue to rise.

Government Approach to Addressing Energy Deficiency

The 2004 National People's Congress meeting highlighted China's severe energy deficit and proposed moves to limit investment in power-draining sectors such as aluminum (*China Daily*, 2004, p.3). Indeed, Chinese government officials and industry researchers are debating how to diversify energy supplies without threatening national security or exacerbating already

crude imports by the year 2010 in a mechanism similar to the U.S. Strategic Petroleum Reserve (*Beijing Morning Post*, 2004).

The Chinese government is actively developing clean energy resources, emphasizing the tapping of natural gas resources, although some China experts are interested in off-grid energy sources such as fuel cells, as well as liquefied natural gas (LNG) and renewable energy, such as hydropower. In the summer of 2004, the Chinese government also announced a renewed interest in developing nuclear power (Reiss, 2004). Natural gas sector development in China refers to harnessing indigenous resources and importing LNG. At present, seven LNG terminals are currently in different stages of planning. In addition to increasing production of natural gas, the National Development Reform Commission (NDRC, formerly State Development Planning Commission) indicates that the Chinese government has also decided to increase production and consumption of solar, wind, geothermal, and tidal energy.

Chinese policymakers also are aiming to reduce the environmental and health impacts of coal by upgrading and improving current coal-fired industry and developing new clean coal technologies.⁴ Energy efficiency received considerable attention during China's Tenth Five Year Plan (FYP) period (2001-2005), with special attention paid to the formation of energy service companies, called ESCOs, promoting more effective building codes, and greater use of energy efficient building materials (Baldinger and Turner, 2002, pp.19-21). Moreover, on 28 February 2005, NDRC announced a new Renewable Energy Law that aims to increase renewable energy sources to 10 percent of total energy production by 2020, an amount roughly equivalent to 300 million tons of coal (*Xinhuanet*, 2005).

While air pollution remains a serious problem

throughout China, air quality has improved in those cities where natural gas heating measures are implemented and strictly enforced (International Energy Agency, 2002, p.9). Major cities along China's coast are now in the process of converting residential heating and cooking facilities from coal to natural gas.

HOW TO DEFINE AND DESIGN INTERNATIONAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STANDARDS

Establishing Standards

Over a period of 18 months, Shell worked with its prospective partners to develop strategies and tools to encourage the West-East Project towards achieving international environmental, health, safety, and social standards and ensure their implementation on the ground. How environmental and social standards are implemented in a gas pipeline project vary from one operation to another, for joint venture partners may have different standards than Shell does. Thus, a good deal of communication on the subject of standards must happen early on. From the earliest negotiations on the West-East Pipeline, Shell managers brought environmental and social considerations to the table for inclusion in agreements and contracts.

Relevant Chinese laws and regulations on issues such as environmental protection, health, and safety, as well as resettlement and compensation were identified early in the due diligence process and a gap analysis was carried out to identify how Shell's involvement might contribute to supporting and strengthening standards and expectations surrounding these crucial issues. Throughout the process the Shell team made considerable effort to understand the expectations of local communities along the pipeline. Prior to Shell's entry into negotiations for the project, the Chinese partners had conducted environmental impact assessments (EIAs) for each province, which had been approved by the provincial Environmental Protection Bureaus (EPBs). Subsequent State Environmental Protection Administration (SEPA) approval for these EIAs came in September 2001 as

Shell was selected as the preferred partner for negotiation. As part of this EIA process, consultation was undertaken by PetroChina, which evaluated options for re-routing wherever considered practical and cost-effective.

While the EIA work already completed for the West-East Pipeline was an important step towards ensuring that the project would meet established environmental principles and satisfy both Shell internal and external stakeholders, it was believed that these EIAs did not go far enough. Thus Shell completed a gap analysis in 2001 to establish work that needed to be done to meet Shell's normal standards. After the gap analysis was done, Shell's Sustainable Development team had to work through and balance a myriad of arrangements, including:

- Building the case for Chinese partners to go beyond mere regulatory compliance;
- Justifying broader approaches to stakeholder consultation, especially to include community feedback; and,
- Undertaking an integrated environmental and social impact assessment (ESIA) to build upon the already government-approved EIAs.

The first step was to agree on the principles by which the partnership would develop, particularly in respect to health, safety, environment and social standards and the definition of sustainable development (see Shell definitions in Box 1). At an early stage all partners in the project agreed they would adopt the same standards, which enabled the partners to develop a comprehensive document detailing the standards that would be followed. This document was part of the first agreement on the pipeline—the Interim Agreement in December 2001—and part of the Joint Venture Framework Agreement (JVFA) that was signed in July 2002.

The partners quickly agreed to a set of minimum criteria, which allowed trial construction to start in December 2001 to test automated techniques new to China. The minimum criteria covered issues such as:

Box 1. Shell's Definition of Sustainable Development

Sustainable development principles were added to the Shell Group's overall business principles in 1998. These principles are: (1) generating robust profitability, (2) delivering value to customers, (3) protecting the environment, (4) managing resources, (5) respecting and safeguarding people, (6) benefiting communities, and (7) working with stakeholders.

(1) construction at nature reserves, cultural relics and world heritage sites; (2) avoidance of local communities; (3) compensation and resettlement arrangements; and (4) health and safety and audits/inspections. A joint PetroChina and Shell team audited trial sites before full construction was allowed to proceed. At the same time the partners drew up a plan for extra environmental and social impact assessment work, especially for a social impact assessment (SIA), which is not required by law in China. The project partners agreed to delay construction in most areas until these ESIA were completed. They also developed a fast-track ESIA process that allowed construction to start in a phased fashion as ESIA work was completed in each area.

Shell and partners made a particular effort to obtain credible and independent expert advice, ranging from consultants, research institutes, government departments, and nongovernmental organizations (NGOs) during the preparation of the ESIA and related management plans. In the area of environmental protection, solicited outside advice included:

- Consulting widely on biodiversity issues, locally, nationally and internationally, to build on existing information. For example, Shell worked with the Wild Camel Protection Foundation, IUCN, SEPA, Xinjiang EPB, and local research institutes to hold the Lop Nor Nature Reserve management workshop in December 2002, which discussed biodiversity challenges related to pipeline construction through the reserve.
- Preparing a series of environmental/ecological studies and plans specific to each of the nature reserves, coordinated by the Beijing University School of Environmental Sciences.
- Conducting overall ecosystem studies and a comprehensive soil and water conservation/restoration plan along the whole West-East Pipeline by The Chinese Academy of Sciences (CAS) with input from various Chinese research institutes (e.g., Arid Lands & Desert Research Institute).
- Training of construction contractors and supervision companies in biodiversity awareness and management plans.
- Ensuring expert supervision of construction and restoration activities by engaging nature reserve management staff.
- Engaging local experts to provide baseline understanding and practical measures for species



The Anxi nature reserve

Credit: Mike Seymour

preservation.

- Establishing a Land and Ecosystem Restoration Monitoring Project by the Water and Soil Conservation Institute within the Ministry of Water Resources.
- Reviewing reserve management plans by partners before any pipeline construction was done in nature reserves.

The result of these numerous studies has been a comprehensive and robust approach to understanding and managing the biodiversity and conservation issues surrounding the West-East project. In addition, local institutes and NGOs have reported considerable skills transfer benefit from involvement in these international approaches to ESIA. Environmental Resources Management (ERM), with contributions on social impacts from the United Nations Development Programme (UNDP) compiled a full midstream ESIA.⁵ However, the upstream social and health impacts in Xinjiang could not be completed in the drilling region as the State Statistics Bureau did not grant Shell and its partners a license to conduct social impact studies and consultations in this area.

Management Plans

Shell and its partners wrote management plans based on midstream ESIA reports and upstream

Environmental, Social and Health Impact Assessment (ESHIA) studies that included the social and health impact scoping review, information from independent experts and other stakeholders, and the environmental impact assessment. In order to achieve objectivity, third parties were used to create the plans, which were then submitted in English and Chinese to the partners for review. After review and comments, the plans were finalized and submitted as guidance for construction and planning.

WHAT ARE THE KEY WEST-EAST ENVIRONMENTAL AND SOCIAL CHALLENGES?

Identification of Issues

Understanding exactly what the issues were and building effective partnerships with relevant entities was critical. A High Level Assessment, conducted by an independent consulting company,⁶ was completed in the early days to provide a better understanding of the project risks and issues so that partners could manage them better.

The pipeline runs through 10 provinces, traversing a wide variety of habitats, from the sparsely populated arid deserts in the west, through the loess plateaus and erosion-prone central plains, into the more mountainous and forested areas, and then into the heavily farmed and densely populated region in the east. The pipeline traverses six state and provincial protected nature reserves, crosses the Great Wall of China (a UNESCO Cultural World Heritage site) in twelve locations, and passes close to four important state-protected cultural heritage sites and several other areas known to be of cultural heritage or archaeological significance. Moreover, as the route follows much of the ancient Silk Road trading route and undeveloped inland regions, there was high potential for further archaeological discoveries during construction.

The social context for the project was also complex. Some of China's wealthiest counties, as well as some of its poorest, are found along the pipeline, reflecting the gap between the developed east coast and underdeveloped interior western regions. Some 3,000 people needed to be resettled, and over 230,000 people were to be compensated for temporary or permanent land disturbance. Shell and its partners used the following tools to identify social and environmental issues along the pipeline's route:

- Desktop studies and assessments;

- Chinese studies (reports and EIAs);
- Stakeholder engagement;
- Gap analysis to discover what else was needed to identify all possible impacts;
- Independent consultants hired through competitive bidding to conduct ESIA for midstream and ESHIA for upstream;
- Health impact assessment conducted by an independent professional international healthcare research firm; and,
- UNDP collaboration to conduct a large-scale survey in communities along the pipeline to gauge community expectations.

What are the Issues?

The issues identification exercise revealed a variety of potential and real impacts—both positive and negative—of pipeline construction. Key real or potential impacts identified include:

- Biodiversity threats, especially negative environmental impacts on nature reserves;
- Disruption to local land use and irrigation patterns, including land acquisition;
- Difficulties in consulting with communities to disseminate information about the project;
- Social impacts, including compensation and resettlement, and livelihood disruption;
- Providing local employment opportunities (commonly referred to as “local content”);
- Overly optimistic local expectations for access to natural gas among citizens in villages along the pipeline but where gas off-take does not occur;
- Health and safety threats along the pipeline;
- Damage to cultural heritage, especially regarding Great Wall crossings; and,
- Insufficient attention to ethnic sensitivities.

This section will look in-depth at five issues we see as particularly important and useful in drawing constructive lessons about building partnerships and engaging in innovative methods new to the oil/gas industry in China. Specifically, (1) nature reserves, with a focus on the Wild Bactrian Camel and Lop Nor Nature Reserve; (2) resettlement and compensation along the pipeline; (3) social impacts and local expectations; (4) cultural heritage, with an emphasis on the Great Wall crossings; and (5) health and safety concerns/standards.

1. Nature Reserves

The West-East Pipeline runs through six nature reserves in five provinces, three of which are state protected and three provincial. Regulations relating to nature reserve management and land use in China recognize three types of management zones: core, buffer, and experimental. While core and buffer zones are meant to be fully protected from external influences, the experimental zones allow for certain activities to be undertaken that are not supposed to cause lasting habitat damage, wildlife disturbance, or pollution. The Chinese government permitted the pipeline route alignment through certain sections of the experimental zones of the reserves, a situation that is not uncommon for such developments in China (or elsewhere in the world). Notably, regulatory approval for the route had largely been obtained by the time the international partners were selected for further negotiation.

Through the ESIA upgrade and subsequent efforts, Shell and its partners worked closely to influence best practice environmental and conservation measures in each of the protected areas affected by the pipeline route. In reserves along the entire route the project partners conducted discussions with reserve managers, local authorities, as well as local, national and international conservation experts. Typically, mitigation options for pipelines going through fragile areas include major or minor re-routing, a modification of construction methods, and other remediation and compensation measures. Stakeholder discussions and ESIA's explored each of these options in depth.

PetroChina engaged the Chinese Academy of

Sciences to further assist the project by defining the scope of a "Green Action Plan" to cover environmental management for the entire pipeline route. The plan includes a series of sub-plans to cover the next 8 to 10 years of the project in some of the following areas:

- Eco-protection
- Landscape and ecosystem restoration
- Water and soil erosion monitoring
- Pollution control and monitoring
- Nature reserve and biodiversity conservation
- Cultural heritage protection
- Cleaner production
- Environmental management and supervision
- Environmental education
- International cooperation

A number of opportunities for PetroChina to further build relationships and forge partnerships with different stakeholder groups in support of sustainable development and conservation activities are envisaged through implementation of this plan.

The EIAs and studies undertaken by PetroChina and its partners have helped push for better management in nature reserves along the pipeline. For example, the route of the pipeline was moved to ensure it did not enter the core and buffer zones of the Arjin Shan Lop Nor Wild Camel Reserve in Xinjiang. Moreover in this reserve PetroChina carried out close scrutiny of vegetation and watering points to allow for micro routing away from such areas. (See Box 2). The

Box 2. Arjin Shan Lop Nor Wild Camel Sanctuary

The Arjin Shan Lop Nor Nature Sanctuary in southeastern Xinjiang is a provincial nature reserve, established in 1999 to protect the habitat of the Wild Bactrian Camel. The area is characterized by harsh desert that is remote and inhospitable. It forms part of the Great Gobi Desert, one of the world's largest deserts. Currently, there are no legal inhabitants in the majority of the reserve, however there are local communities along most of the boundaries particularly in the south where camel hunting and medicinal plant collection within the reserve threaten the species and its habitat. In some areas, in the absence of fresh water, the wild camel has adapted to drinking saltwater slush, which domestic camels will not touch. There is existing legal mining activity (permitted by a grandfather clause) and increasing illegal mining within the reserve.

Economic pressure to use the areas adjoining the nature reserve as grazing for domestic Bactrian camels has increased hybridization on the southern border and this poses a significant threat to the unique genetic strain of the Wild Bactrian Camel which current scientific research suggests might be a separate species.

The Wild Bactrian (two-humped) Camel is the ancestor of domestic camels and is only found today in four locations—three separated habitats in northwest China (Taklamakan desert, Lop Nur, and Arjin mountains) and one in Mongolia. There are approximately 600 individuals surviving in China and 350 in Mongolia and numbers are decreasing each year. This low population makes the Wild Bactrian Camel more rare than the Giant Panda and important in terms of China's biodiversity conservation.

Box 3. Social and Environmental Linkages: Land Requisition, Restitution, and Compensation

While western China is sparsely populated and the pipeline effectively avoids most areas of human activity, land plots in densely populated central and eastern China are relatively small, which makes temporary land requisition a potentially significant disruption of livelihood for farmers. Furthermore, because of the large number of individual households involved and various land use right complexities in the east, a compensation plan for each impacted individual was considered both impractical and fraught with regulatory complexities. Therefore, requisition, restitution and compensation procedures were agreed between the West-East Pipeline Company and relevant national and provincial government entities to meet legal and demographic constraints.¹ These procedures were based on Chinese land administration laws requiring governments at appropriate jurisdictional levels to manage the distribution of information and compensation funds. The land required for construction and operation of projects such as this fall into two categories:

1. Land temporarily requisitioned for right of way construction; and,
2. Land permanently acquired for ancillary facilities and service roads, thus no longer useable for its original purpose.

The compensation and resettlement process is undertaken according to PRC policy, which if correctly implemented, is quite equitable. Activities undertaken in this process include: (1) land site and asset verification, (2) independent market analysis to determine compensation basis rates, and (3) negotiation of timing of payments and timing of land clearance.

The policy requires that project proponents negotiate and confirm compensation standards for temporary land requisition with provincial Land and Natural Resources Bureaus (LNRBs), then pay compensation to the provincial-level bureau according to signed agreements. The compensation is allocated by provincial LNRBs to impacted counties for distribution. For permanent land acquisition, the same procedures apply. However negotiated compensation rates are much higher, reflecting permanent land acquisition and a Land Use Certificate is also granted by the Ministry of Land and Natural Resources.

NOTES:

¹ Key government documents guiding land requisition issues include: the 1999 Land Administration Law of the People's Republic of China; the Ministry of Land Resources Order Number 3 "Measures for Management of the Examination and Approval of Construction-Used Land" (March 2, 1999); Decree Number 10 "Methods of Land Acquisition Notice" (October 22, 2001); and Ministry of Land Resources Land Law #233 "Notice concerning the future standardization of the procedure for investigation applications for the approval of land for construction" (August 2, 2002).

reserve is home to the Wild Bactrian Camel, a critically endangered species. The re-routing to protect the reserve added an incremental cost of \$18 million to the project. In addition, PetroChina and the reserve management agreed to a compensation package that was reviewed and supported by the Wild Camel Protection Foundation (WCPF, an international NGO based in the UK). Reserve managers have prepared a reserve management plan utilizing the funds with technical assistance from the WCPF as international advisors.

In addition to the compensation package, Chinese partners sponsored a Peking University-led environmental management plan for the reserve, which complements an ecological restoration plan prepared by the Chinese Academy of Sciences. Some stakeholders were concerned about residual radiation from past

nuclear weapons testing at Lop Nur, but radiation surveys conducted by Chinese research institutes and verified by international experts indicated no abnormalities in the vicinity of the pipeline route. The series of environmental/ecological studies and management plans sponsored by PetroChina and Shell/International Oil Consortium (IOC) included:

- Chinese environmental assessments for the whole pipeline route;
- ESIA upgrading by Environmental Resources Management (ERM);
- Eco-conservation and Restoration Management Study by the Chinese Academy of Sciences (CAS);
- Reserve specific construction and operations management plans by Peking University;
- *W2E EnviroEducation Manual – State Protected*

Flora and Fauna by Province by CAS;

- *Green Action Plan* prepared by CAS;
- Lop Nor Nature Reserve Management Workshop held in August 2002; and,
- Environmental and social management plans to provide site guidance on responsible construction management.

2. Resettlement and Compensation

Throughout the early stages of their involvement in project discussions the IOC highlighted the compensation and resettlement of persons affected by the project as an important issue. Various consultant assessments, a joint Shell/PetroChina Quality and

audits independent of the IOC and PetroChina. The partners thus contracted a range of organizations to undertake the work, which included NGOs, academic institutions and a semi-private resettlement management institute trained in international practices and with experience in providing resettlement services to the World Bank for over a decade.

Organizations involved in the resettlement and compensation review work included: Institute of Environment and Development; Institute of Rural Development, Chinese Academy of Social Sciences; East China Investigation and Design Institute; Sinosphere Corporation; and Shanghai Bringger Consulting Company, Ltd. The audits conducted by these

UNDP conducted a Social Impact Assessment Survey, which was the first survey of its kind for a major infrastructure project in China.

Health Safety and Environment (HSE) audit, social impact assessment survey by UNDP, and discussions with PetroChina emphasized the need to conduct further work to provide assurance that compensation and resettlement were being carried out responsibly (i.e., consistent with Chinese law and in accordance with good international practices). The issue of compensation and resettlement was an explicit Joint Venture Framework Agreement commitment.

Primary resettlement concerns included: (1) timely payments to households; (2) existence of a dispute resolution process; (3) transparency and accountability in remuneration payments; (4) adequate notice given prior to disturbance; and (5) the quality of land and infrastructure restoration for affected people. Temporary land requisition posed the greatest challenge to the compensation and land requisition program, especially in regions where soil quality was poor and pipeline construction was built over irrigation channels.

Another activity by Shell and its partners was an eight-month review program for compensation and resettlement developed with the assistance of an independent consulting firm.⁷ In order to be effective, buy-in by PetroChina to the approach and benefits of the review process was important. Discussions were organized among managers within PetroChina, international partner companies, local researchers, and international stakeholders. Considerable effort was made to introduce the methodology, assessment criteria, logistics, and a collaborative working model for the review. This review program design required

organizations were done between December 2002 and September 2003, with a three-month hiatus due to SARS. They documented evidence on resettlement impacts, compensation entitlements, effectiveness of compensation distribution and timing, land restoration, mitigation measures, and resettlement procedures and management. Separate reports on these various impacts for each of the 10 provinces crossed by the pipeline were prepared in both English and Chinese.

Both during and after the completion of the compensation review work, the international partners worked with PetroChina support and cooperation to improve procedures. This collaborative work to improve the resettlement and compensation issues led not only to improved implementation of the legal processes and capacity building of PetroChina's staff, but also greater trust among project partners, international stakeholders, and the community members. The joint reviews were completed in all provinces along the pipeline, although at different stages of the construction process given the timing of pipeline work.

3. Social Impacts and Community Expectations

The partners recognized that social effects of the project could not be divorced from environmental or other effects and they needed to be understood and addressed in an integrated manner. It had been agreed with PetroChina that Shell conduct a social impact assessment along the entire length of the pipeline route. Managing a consultation and engagement exercise along

4,000 km of the route in China was a major challenge for a commercial company such as Shell, legally not connected to the project and faced with legislation restricting foreign companies in sponsoring surveys.

Given the complexities involved, Shell initiated a 'first of its kind' partnership in China with the United Nations Development Programme (UNDP) and the China International Centre for Economic and Technology Exchange (CICETE) to conduct the social impact survey.⁸ UNDP, with its unique status in the country, its well-developed partnerships with national institutions and its experience of conducting similar surveys in China, was well placed to perform the work.

UNDP conducted a Social Impact Assessment Survey, which was the first survey of its kind for a major infrastructure project in China, engaging 10,000 people in communities along the pipeline route. The survey contributed to a better understanding of views and expectations of local stakeholders and demonstrated the most modern, effective survey methodology practices. The survey strengthened an appreciation of the positive benefits of the pipeline, highlighted potential social problems, and made recommendations for practical mitigation measures.

The survey was structured through a Memorandum of Understanding between Shell, UNDP and CICETE. The work involved five national consulting institutions, an NGO, provincial and county statistics bureaus, the State Statistics Bureau (SSB), and a team of national and international consultants. The six institutes were:

- Central Statistical Information Consulting Center of the SSB
- College of Rural Development, China Agricultural University
- School of Public Policy and Management, Tsinghua University

- Institute of Environment and Development and Leadership in Environment & Development
- Academy of Macroeconomics Research, National Development Reform Commission (NDRC)
- Rural Development Institute, CASS

Fundamental to long-term success, however, will be the extent to which the social survey process, managed by SSB and influenced by relevant government institutions, supports the assessments.

Subsequent private sector inquiries to UNDP to conduct similar assessments elsewhere in China indicate that this innovative approach is setting a model for future projects. There were, however, regrets associated with this part of the social impact assessment work. For example, the UNDP survey had a very large sample size, which provided valuable breadth but perhaps too little depth. In addition, precise information on the actual pipeline route was inadequate despite numerous inquiries to the partner and requests for construction company involvement. Finally, the survey focused more on values and opinions associated with the pipeline development than it did with actual or potential impacts.

Tradition of Social Investment

Shell and many other international multinationals give back to the community through what is often called "social investment." Justification for such investment includes making a contribution to society that is affected by the company's operations, improving community relations, and an understanding that it makes good business sense. Some examples of areas in which companies such as Shell are actively supporting projects include: poverty alleviation and economic development; NGO and community training and capacity building; conferences and education materials;

Box 4. Shell China West-East Project Social Investment Activity¹

- HIV/AIDS work in Aksu, Xinjiang, the upstream drilling region
- Public health education in poor, remote Tibetan communities
- Capacity building for environmental impact assessments
- Poverty alleviation and education for poor college students
- Microfinance study
- Great Wall and historic preservation

NOTES:

¹ Please note that Shell China, the corporate entity, has a broader Social Investment Program.

environmental protection; cultural heritage; as well as support for public health efforts such as HIV-AIDS. The Chinese context for “social investment” is different to that in the west. Chinese companies have only relatively recently been privatized and therefore have not yet evolved well-advanced social investment programs, at least as those corporate social responsibility programs are commonly defined in the West. It should be noted, however, that state-owned industries in China have for decades acted as a social safety net, providing housing, medical care, and education for employees and communities.

Interestingly, one of the local Chinese companies operating near a project drilling site did not recognize the term “social investment,” but company staff readily produced a two-page list of donations to communities where they operate. Support ranged from infrastructure development in school and health clinics, road building, poverty alleviation, and disaster relief. One lesson Shell learned: be open to different definitions of community contribution and encourage partnership and sharing of experiences in other parts of the world.

The findings of the UNDP Social Impacts Assessment Survey, and the subsequent report on vulnerable communities along the pipeline, led Shell China to sponsor six social investment programs, as outlined in Box 4.

4. Cultural Heritage

China’s Great Wall, which was added to the UNESCO World Heritage List in 1987, stretches some 6,000 km from the eastern seaboard in Liaoning to the Taklamakan Desert in Xinjiang. The world heritage designation includes all above ground structures, standing sections of the main wall, spur lines, watchtowers and other associated structures as well as underground relics such as foundations.

The Great Wall has deteriorated to varying degrees along its length, and while it has been restored in several areas such as around large cities in the northeast and a short section at Jiayuguan in the west, the segments near the pipeline remain largely unrestored. Factors contributing to its deterioration include the natural processes of weathering and erosion, and human activities such as cutting for the passage of roads and pipelines, cultivation and use by communities as construction materials.

The pipeline crosses the Great Wall in twelve locations in Gansu, Ningxia, Shaanxi, and Shanxi provinces. Crossing points are defined as including sites at which both visible aboveground sections of the wall



Great Wall in Gansu Province. The earthen structure has been heavily weathered due to the harsh climate

Credit: Mike Seymour

will be traversed by the pipeline as well as sites at which the Great Wall once stood.

The partners were committed to working with PetroChina to ensure all work at Great Wall sites was conducted responsibly and in full compliance with PRC regulatory requirements and cultural heritage preservation best practice. PetroChina EIAs—submitted to SEPA in 2001—addressed cultural heritage preservation, including reference to the Great Wall. SEPA does not, however, have administrative responsibility for cultural heritage protection. This responsibility rests with the State Cultural Relics Bureau (CRB).

PetroChina therefore commissioned provincial CRBs to undertake cultural heritage surveys for all provinces in 2002. Supplementary field visits and discussions with CRB representatives were undertaken by IOC as part of the environmental and social impact assessment (ESIA) upgrade work, at which time photographs were made at each Great Wall crossing. The Joint Venture Framework Agreement (JVFA) clearly outlined partner agreement to refrain from construction at any Great Wall crossing until required regulatory approvals were in place, which necessitated approval of detailed engineering plans for each location by the provincial and central CRBs. The Shell-sponsored ESIA and environmental and social management plans (ESMPs) included a *Great Wall Management Plan* and *Archaeological Chance-find Policy*, prepared with input from CRBs, UNESCO and International Friends of the Great Wall. These studies and plans form part of the *Pipeline Construction Health Safety and Environment (HSE) Manual*.

Verification visits have since been made post-construction to provide assurance that the construction activities were conducted responsibly and in line with the JVFA requirements. In addition to the above studies and collaboration, Shell China sponsored a social investment program with International Friends of the Great Wall and World Monuments Fund to raise awareness about Great Wall conservation and preservation.

The report notes that the collaborative work with Shell and its partners promoted internal learning and development within PetroChina on issues of ESIA upgrade work, nature reserve management planning, compensation and resettlement audits, construction HSE and quality support and inspections, and HSE contractor management. PetroChina also saw considerable value in the social impact survey conducted by UNDP.

PetroChina achieved some notable “firsts” on the West-East Pipeline Project, such as the involvement of foreign HSE and social impact assessment expertise.

5. Health and Safety

China is a challenging culture for safety. At its peak, approximately 70 construction crews (amounting to several thousand people) were working on spreads along the West-East Pipeline route. International HSE standards were unfamiliar to many of the crews. Some examples of specific health and safety support provided by Shell included:

- Training and awareness on international HSE standards for pipeline construction and drilling activities.
- Preparation of project HSE Management System documentation and HSE Construction Manuals.
- Production of Environmental and Social Management Plans for the whole pipeline that were issue-specific (e.g., nature reserves, Great Wall, cultural heritage and desertification).
- Preparation of many specific HSE and quality standards, procedures and guidelines (e.g., hazard management, supervisor competency requirements, minimum health standards, emergency response, tunneling construction, and use of explosives).
- Joint HSE and Quality inspections, audits and reviews (construction and post-construction), with resultant significant ‘step change’ improvements in contractor HSE (e.g., carefully managed Yellow River crossings).
- Influence stronger HSE in contract requirements.

PetroChina has publicly recognized the benefit of foreign cooperation in HSE and social impact assessments for the West-East Pipeline Project in its *West-East Pipeline Company QHSE Reports 2002/2003*.

Capacity in China has been further built through skills transfer amongst local institutes commissioned to undertake ESIA and hazardous operations work. Through assistance with social impact and compensation and resettlement work, PetroChina has been able to broaden proactively the understanding of a large number of national and local stakeholder groups on international consultation expectations for major projects with regard to health and safety associated with the pipeline. This potentially serves to raise the expectation and standards for future major infrastructure projects in China.

LESSONS LEARNED AND OPPORTUNITIES

A number of lessons have been learned and opportunities identified over the approximately two years of Shell involvement on the project.

Partnership with JV partner. Strong mutual understanding, rapport developed over time, and extensive dialogue are key. Agreeing to overarching common goals helps smooth the discussion over standards. Management plans and principles will not be followed unless trust and buy-in are first achieved. If language is a barrier, then excellent interpretation must be available at all times.

Personal relationships. The importance of building personal relationships at all levels cannot be underestimated. Long-term relationships are valued and rewarded in China, whereas frequent staff turnover has a negative impact on maintaining trust. Clear, consistent project leadership is also critical. Troubleshooting from superiors or high-level representatives should not serve to undermine leadership on the ground.

Partner relationships. Local partners may be reluctant to engage as broadly as international players for fear of criticism and exposure and because it is contrary to normal process in project development in China. Political pressures and propaganda can challenge the authenticity and value of engaging with local residents, community members, and other stakeholders. It is often only after Chinese companies understand how public consultation can bring them benefits, such as how to avoid potential future problems and added costs, that they will be willing to engage.

Standards and objectives. Begin discussing standards and objectives in the earliest stages of project negotiation, and make clear to prospective partners which of those you expect the project to uphold. Ensure that they are documented and clear, and that meaning and intent are the same in English and local versions of these documents. The degree of detail needed depends on the circumstances. Standards, including wider business principles, need to be included in the contract documents or other formal agreements.

Time to agree. Do not underestimate the time it can take to reach agreement. Reaching agreement can be a protracted, time-consuming, and difficult process—particularly when justifying the business case beyond regulatory compliance and where there are several partners and various government bureaus (such as the case of environmental investment programs and social and resettlement issues) involved. Translation/interpretation from one language to another can often be a major factor in any disagreement. Partners tend to micro-edit and refine agreements in their own language and have little time left to ensure an accurate interpretation in their partner's language leading to disagreements and delays.

Measures of success. At an early stage in discussion with any stakeholder party to the project, it is important to achieve consensus on certain criteria indicating what constitutes a successful project and how this will be measured.

Involvement of third parties. Third parties provide independence and credibility to studies, assessments and plans, both within the host country and international community. Bringing in international experts can be sensitive from perceptions of cost and insensitivity to the local environment. But, they also offer huge potential for know-how exchange and local capacity building among business partners, local institutes and NGOs.

Leveraging international expertise. Use of acknowledged international environmental experts can



Cultural heritage rescue excavations and archaeological dig in Chuzhou, Anhui Province. These are the remains of a 3,000-year old site unearthed during West-East pipeline construction.

Credit: Mike Seymour

greatly support efforts of multinational joint venture partners to influence their national counterparts as to the value and importance of biodiversity and conservation.

Staffing. Mobilize key social and environmental specialists early in major infrastructure projects. Do not underestimate the health, safety, and environment (HSE) staffing requirements during early negotiation and scoping phases of the project. Try to ensure staff continuity. The over-reliance on temporary HSE staff from other offices and short-term contractors threatened to slow down progress at key stages, such as during negotiations over standards, ESIA management, and key stakeholder meetings. Complexity of the project means that newcomers face a steep learning curve.

Leverage local expertise. Foreign organizations/companies and the administrative mechanisms in government often overlook the wealth of technical and scientific capability within China. Appointing just one institute as a consultant can result in lost opportunities with respect to obtaining input from centers of excellence across the range of topics to be addressed. Involvement of local expertise is essential to enable understanding of local complexities.

Assumptions about local capacity to address key social impacts. Be careful not to overlook excellent local capacity existing in many areas. For example, contrary to some international observations, it is possible to conduct responsible compensation and resettlement in China. Audit findings indicate that the project land acquisition work was conducted by PetroChina in a responsible manner, and they have ensured that hardship or loss of income was avoided.

Local expertise in the social arena. Carefully review social expertise qualifications and experience among international and local consultants. Many environmental consulting firms profess to have social expertise. However, in the West-East Pipeline Project this kind of expertise was found to be a weak area, requiring Shell to expend considerable effort to find the right caliber individuals. International consultant understanding of how to get social impact assessments done in China was weak.

Encourage broad consultation. Engaging in dialogue with a broad set of stakeholders and encouraging public participation is standard practice for many foreign companies, but it must be recognized that this approach is new and sometimes uncomfortable for many Chinese partners and runs counter to Chinese culture where the government/party forms the core of society. Expectations should be managed accordingly.

Audits. Establish and take part in an audit process to provide assurance that required standards/project expectations are being met.

Explore breadth of participation. In addition to supporting technical and scientific expertise, consider possible opportunities not immediately apparent, e.g., for private sector companies to impart management, administration and finance skills to staff at nature reserves.

CONCLUSION

All companies investing or operating in China have the potential to make an important contribution to sustainable development and conservation, through partnership with their JV partners, government entities, NGOs and the public.

A rigorous approach to conducting ESIA's, ensuring stakeholder consultation, and leveraging the use of both international and local expertise is essential to define environmental protection needs, identify conservation opportunities and develop social programs. Moreover, it is important to ensure that an audit program is developed to provide assurance that standards are implemented on the ground.

On the West-East Pipeline Project, the specialist skills of several organizations were used directly to support ESIA's, specialist studies, management plans and monitoring. Ongoing impact assessment, monitoring and review are areas where conservation and social interest groups could continue to be directly involved and offer the benefit of independence and credibility.

Protected areas in China not only lack funding,

but also face increasing pressures from development and local communities. While the private sector cannot solve all of these problems, some significant opportunities exist where the corporate sector might support innovative, responsible approaches to environmental and social management in partnership with others.

This could include assistance to reserve management via know-how exchange programs, capacity building, complimentary research and conservation study, and support to regulatory development. In a wider sense, opportunities also exist to broaden the approach of private sector assistance to conservation activities, away from traditional approaches of monetary-based support. Further consideration might thus be given to exploring how multinational companies can bring a business approach to reserve/conservation management in China through sharing of their core business skills. These might include business planning, financial management, human resources, competence development, health and safety, emergency response, communications, marketing and supply chain management.

In summary, PetroChina achieved some notable 'firsts' on the West-East Pipeline Project, such as the involvement of foreign HSE and social impact assessment expertise, led by Shell, at a time while negotiating a minority shareholding in the project. Another significant first was the inclusion of Chinese experts in making the various assessments. These local experts conducted remarkable research and gained important new project experience. Yet another striking first was the level of interest and participation in the project assessments from a broad range of Chinese stakeholders. One hopefully lasting impact of this project will be that the achievements from the environmental and social standard work will raise the HSE and social impact standards for future major infrastructure projects in China.

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ENDNOTES

¹ The name PetroChina in this paper includes Petrochina's subsidiary companies the West East Pipeline Company and Tarim Oil Company, who were the proponents of the pipeline (midstream) and gas exploration & development (upstream) parts of the West-East Project.

² China OnLine Newservice, March 4, 2004.

³ “Expanding Natural Gas Use in China: A Joint Sino-US Research Report” *Executive Summary*, University of Petroleum-Beijing and Pacific Northwest National Laboratory, April 2002.

⁴ Notably, China has welcomed numerous bilateral and multilateral energy projects. In the area of clean coal technologies and energy efficiency The China Energy Group at Lawrence Berkeley National Laboratory has been particularly active in China. See their Web site: <http://china.lbl.gov> for more information.

⁵ The Midstream ESIA covered the pipeline counties in Xinjiang excluding those in the drilling region, as well as Gansu, Ningxia, Shanxi, Shaanxi, Henan, Anhui, Jiangsu, Zhejiang, and Shanghai.

⁶ ERM offices based in London conducted the High Level Assessment.

⁷ The independent consulting firm was Beijing-based Sinosphere Corporation.

⁸ The survey was completed in August 2002 and is available at the UNDP website (www.unchina.org/undp) at <http://www.undp.org.cn/documents/siasurvey.html> or via a link through www.shell.com.cn. Findings of the report were incorporated into the overall ESIA Report by ERM.

Save China's Tigers Works to Reintroduce Tigers

As part of its Tiger Reintroduction Project, the UK-based Save China's Tigers—together with the Chinese Tigers South African Trust, and the Wildlife Research and Development Center of the State Forestry Administration of China—organized a group of South African and Chinese tiger experts to visit Sichuan, Hunan, Jiangxi and Fujian provinces in late 2003 to survey seven proposed Chinese Tiger reintroduction sites. This survey follows the relocation of two Chinese Tiger cubs to South Africa for “re-wilding training” in September 2003. The team consisted of wildlife reserve planning and management experts and was headed by Dr. Jeremy Anderson, the first director of Pilansburg National Park. Ms. Li Quan, founder of Save China's Tigers who engineered the Tiger Reintroduction Project, noted the importance of this team's work by stating:



This is the first step in finding a home for the return of the re-wilded Chinese Tigers back to China starting in 2008. Our South African expert team is the best in the world with extensive experience in setting up and managing wildlife reserves, both government and privately owned in southern African countries. Once the suitable reintroduction site is identified, work will start to restore habitat and reintroduce wildlife previously found in this area.

The Chinese Tiger Reintroduction project marks the beginning of the establishment of a Chinese Tiger Conservation Model that aims to save this endangered big cat by combining South African wildlife and ecotourism management expertise with indigenous Chinese wildlife and unique Chinese cultural heritage to create opportunities in eco-tourism for local economic development.

Ms. Li Quan secured permission and a strong group of partners to undertake the Chinese Tiger Reintroduction project through an agreement signed in Beijing on 26 November 2002 between Save China's Tigers foundation, the Wildlife Research Center of China's State Forestry Administration, and the Chinese Tigers South Africa Trust. For over a decade, China's State Forestry Administration has been leading the effort to save this critically endangered tiger species, through the establishment of several nature reserves. The first Chinese tigers that will successfully regain hunting skills and are able to survive independently are expected to be reintroduced into the wild in China in 2008, to coincide with the Beijing Olympic Games. Save China's Tigers has been appealing to the public to vote for the Chinese tiger as the mascot of the 2008 Beijing Olympic game.

“The tiger represents the most important symbol in Chinese culture. If the tiger becomes extinct, the cultural values that embrace this icon will also be lost for future generations. We have summarized the Chinese Tiger campaign as being ‘Three Tigers,’ the Spiritual Tiger, Cultural Tiger and Ecological Tiger,” Quan said.

Save China's Tigers, the first foundation in the world dedicated to help China's conservation of the Chinese tigers and other big cats, is very grateful to its many selfless supporters, who have helped make the Chinese Tiger project possible.

For more information on the Chinese Tiger Project, see www.savechinastigers.org or contact Kate Reynolds at: Tel: +44 20 7702 9382 Mobile: +44 7968 815 171, e-mail: kate.reynolds@mailbox.co.uk

China's Ecological Rehabilitation: The Unprecedented Efforts and Dramatic Impacts of Reforestation and Slope Protection in Western China

By Runsheng Yin, Jintao Xu, Zhou Li, and Can Liu

In response to the alarming natural disasters China suffered in the late 1990s, the Chinese government has undertaken two of the world's largest ecological rehabilitation projects—the Natural Forest Protection Program and the Slope Land Conversion Program. In addition to presenting the historic perspective and reporting the preliminary impacts of these two programs, this paper discusses the challenges in carrying them out, including the “top-down” administrative mechanism, lack of interagency cooperation and long-term planning, and neglect of appropriate technical practices and market-based approaches. We argue that if properly implemented, these programs could contribute to combating some of the pressing environmental problems in China and the world, such as soil erosion, flooding, climate change, and biodiversity loss. To implement the programs properly, however, major policy and technical changes must be made.



Crisis triggers action. The serious natural disasters that China suffered in 1997 and 1998 have spurred new efforts to protect the country's fragile and fragmented environment. Due to severe droughts in 1997, the lower reaches of the Yellow River dried up for 267 days, putting industrial, agricultural, and residential water uses in the northern plains in great jeopardy (Xu and Cao, 2002). In 1998, massive floods, along the Yangtze River and waterways in the northeast, claimed the lives of over 3,000 people, and led to more than \$12 billion in property damages and output losses (Lu et al., 2002). In response, the Chinese government has initiated two major programs—the Natural Forest Protection Program (NFPP) and the Slope Land Conversion Program (SLCP)—to protect and expand its forest and grassland resources throughout the decade. If under SLCP the subsidized grain is priced at 1,400 Yuan/ton, the total investment in the program will amount to about 337 billion Yuan (\$40 billion) by 2008 (Xu and Cao, 2001; Tao et al., 2004) making it rank as one of the largest (and most expensive) major environmental programs in the world in terms of government investments and total area covered (The Forest and Grassland Taskforce of China, 2003).

The main objectives of the NFPP are to: (1) protect the existing forests and expand their coverage through artificial planting and natural regeneration, and (2) strengthen ecological restoration and management in all natural forest areas. To achieve these objectives, bans of

commercial logging are imposed in the southwest, timber harvests are substantially reduced in the northeast and other regions, and forestation and vegetation activities are proposed. The mission of the SLCP is to convert sloping cropland and degraded rangeland primarily in the upper reaches of the Yellow and Yangtze rivers and other regions of western China back to grass and tree coverage. It is hoped that once the NFPP and SLCP are completed the soil erosion, flooding and desertification problems will be halted, and thus the precarious ecological conditions in China's western regions will significantly improve.

Given the large operating scales, tremendous public investments, and profound environmental implications, these programs have drawn broad attention from academic, environmental, and development circles both domestically and abroad. Nevertheless, a thorough introduction of the two programs and a careful discussion of the related policy issues are still lacking, although some attempts have been made. Indeed, some early works have already appeared in the literature, including *Science* and other prominent journals. Zhang et al. (2000) provided an overview of the NFPP and then debated the policy measures of its implementation with Xu et al. (2000). Loucks et al. (2001) argued that the NFPP and SLCP could strengthen the conservation of pandas in China's forests by enhancing protection and restoration of corridors among remaining forest fragments and increasing habitat preservation.

Zhao and Shao (2002) noted the potential economic and environmental impacts of China's logging restrictions sparked by the NFPP. Lu et al. (2002) also remarked on China's recent forestry programs in the context of sustainable forest management. Additionally, the UN Food and Agriculture Organization (FAO) included China in their study of the impacts and effectiveness of logging bans in natural forests in the Pacific Rim (FAO/APFC, 2001), and Conservation International commissioned the Social Science Academy of Sichuan province to conduct a preliminary study of the NFPP and SLCP (Sheng, 2002).

These and other similar studies have provided useful background information and interesting case descriptions for those concerned with China's forestry and environmental problems. However, their discussions are hardly comprehensive and, in some cases, various aspects of the two programs have not been clearly presented, leading to confusion over the scope of the environmental problems and misconception regarding the actual design and implementation of the programs. For instance, to make their point, Zhang et al. (2000, p. 2135) claimed that from the 1950s to 1995, "natural forest declined to 30% of the total forest area in China." Later, Zhao and Shao (2002, p. 34), who were also coauthors of Zhang et al. (2000), stated that: "As logging of natural forests increased from 20 million cubic meters per year in the 1950s to 63 million cubic meters in the 1990s, natural forest area declined to 30 percent of 1950s levels." It turns out that these two statements are not only inconsistent but also inaccurate. As will be discussed below, China's natural forest declined neither to 30 percent of the total forest area nor to 30 percent of its levels in the 1950s. Also, government and research reports often are inconsistent in their details of the programs, making it hard to understand what actions the Chinese government has really chosen and exactly where and how they will be undertaken.

Furthermore, policy issues associated with the NFPP and SLCP have received only limited attention in previous works. So far, for example, little in the research literature has been said about the heavy reliance on the state to finance the programs, the lack of collaboration between the State Forestry Administration (SFA) and other agencies in implementing them, and the frequent neglect of appropriate technical practices. Also, the tremendous social costs induced by the programs have not been adequately addressed. Thus, the objective of this article is to fill the literature gaps by presenting a careful introduction of the NFPP and SLCP, and addressing some of the major policy concerns with these programs.

Certainly, these programs, if properly implemented, could greatly contribute to both China and the world in combating some of the pressing environmental problems—water runoff, soil erosion, landslide, flooding, and desertification (Du, 2001; Xu and Cao, 2001), as well as climate change and loss of biodiversity (Fang et al., 2001; Loucks et al., 2001). To implement them properly, however, China needs to make major policy and technical changes.

The paper begins with a brief review of the recent history of forest management and land use in China to aid the understanding of why after a series of attempts to protect fragile lands in western China the government decided to adopt both NFPP and SLCP. The second section of the paper introduces the geographic coverage, specific tasks, and project investments for the two programs. Next, the preliminary impacts and the major challenges in implementing the NFPP and SLCP are discussed, followed by some speculation on how the programs should move forward.

Historic Perspective

When the People's Republic of China was established in 1949, the country boasted large tracts of natural forests in the northeast (including Heilongjiang, Jilin, and eastern Inner Mongolia), the southwest (covering Yunnan, western Sichuan, and eastern Tibet) and parts of Xinjiang in the northwest and Hainan in the south. From the late 1950s onward, 136 state-owned forest bureaus were gradually set up in these forest areas to produce timber to fuel the industrialization of the young economy (SFA, 2001). Because of limited financial investments and availability of infrastructure and equipment, however, logging and other operations relied heavily on manpower (CFY, 1987).

Along with this strategy of resource exploitation, the planned economy system created incentives for deforestation. Under this system, the forest bureaus, like other state-owned enterprises, had to provide extensive welfare benefits to their expanding workforce, such as food subsidies, retirement pensions, healthcare, public safety, and children's education and employment (Yin, 1998). Since logging was the major or even single source of revenues, over-cutting became inevitable, while regeneration and management were often ignored.

In addition to economic pressures to over cut forests under their control, the state-owned forestry bureaus lacked the incentives and autonomy to manage and utilize the resources efficiently. Moreover, population expansion and job creation in the forest areas also led to more fuel wood consumption, housing construction, land clearing,

and other problems. Consequently, China's natural forests were depleted rapidly. According to early forest surveys, natural forests amounted to 98.2 million hectares (ha) in 1975, but declined to 66.7 million ha by 1993 (Liu, 2002).¹ Not surprisingly the over cutting also triggered serious forest degradation—the structural deterioration of forest resources was reflected in: (1) reduced per-ha stocking volume, (2) age structure tilted towards younger stands, (3) the changed species composition, (4) poor regeneration, and (5) low growth and yields of plantations (Yin, 1998).

Sadly, the environmental situation in the vast rural society across the country was even worse. The collectivization movement that began in the late 1950s deprived individuals of forest ownership rights, which discouraged people from tree-planting and forest management. While the collectivization of agriculture was still underway, Mao Zedong launched the Great Leap Forward Campaign (1958-1960) in an attempt to rapidly industrialize China's economy. This ill-conceived

campaign pushed a significant increase in iron and steel production, which led to an explosion in backyard furnaces, fueled by wood charcoal. Land exploration and reclamation schemes, as part of the national strategy of food self-sufficiency, were also carried out in the 1960s and 1970s. All of these campaigns and rapid development strategies resulted in not only deforestation but also destruction of vegetation (Du, 2001).

In many areas, particular western China, farming on steep slopes became common due to the combined effect of demographic expansion and poor regulation. Coupled with the unfavorable mountainous and hilly landscapes and uneven rainfalls, steep slope farming caused an increase in the scope and intensity of water runoff and soil erosion and a decline in the ecosystem's capacity of regulating water and holding soil. The negative impacts of deforestation and slope farming were determined to be the primary culprit of the record dry up of the Yellow River in 1997 and the widespread flooding in the Yangtze River Basin in 1998. According to official estimates, the

Table 1. Overview of China's Afforestation Programs Since the 1970s¹

Name of Program	Duration	Coverage	Stated Target	Achievements as of 1999
National Greening Campaign²	1987-Present	Has varied over time	Has varied over time	27.9 billion trees planted
"Three Norths" Shelterbelt Program³	1978-2050	551 counties in 13 provinces	Afforestation of 35.08 million ha by 2050	25.67 million ha planned
Protective Afforestation along the Upper and Middle Reaches of the Yangtze River	1989-2000	271 counties in 12 provinces	Planting and restoration of 6.75 million ha	4.8 million ha planted
Coastal Shelterbelt Development	1991-2000	195 counties in 11 provinces	Planting of 3.56 million ha	1.08 million ha planted
Cropland Protection and Agro-Forestry in the Plains	1988-2000	918 counties in 26 provinces	Set standard	850 counties reached standard
Taihang Mountain Afforestation	1990-2010	110 counties in 4 provinces	Planting of 4 million ha	3.28 million ha planted
Combating Desertification Campaign	1991-2000	598 counties in 17 provinces	Control desertification in over 7.19 million ha	Desertification controlled in 8 million ha

NOTES:

¹ Table was adopted from Lu et al. (2002).

² This campaign is also called the national compulsory tree-planting campaign.

³ This program also is referred to as the "Green Great Wall."

soil erosion area in the Yangtze and Yellow river basins reached 75 million ha, with sediments of over 2 billion tons (Li, 2001). This situation also has constituted a threat to both the life and effectiveness of the Three Gorges Dam, the Xiaolangdi Dam, and other hydro facilities in the downstream reaches of China's two biggest rivers. Another major environmental crisis in western China has been the uncontrolled grazing and poor maintenance of rangelands, causing extensive loss of grass cover and desertification.

The Chinese government has made efforts to combat the country's growing environmental problems, particularly degradation related to forest ecosystem health. Since 1978, a number of forestry projects have been launched, aimed at safeguarding and generating ecological benefits such as watershed protection, erosion control, stream regulation, and biodiversity maintenance. Major forestry programs have included the: (1) "Three-Norths" Shelterbelt Program, (2) Protective Afforestation Program along the Upper and Middle Reaches of the Yangtze River, (3) Coastal Shelterbelt Development Program, and (4) Cropland Protection Agro-forestry Program in the Plains. Table 1 reports the forestry programs undertaken and achievements made thus far. The geographic coverage of these programs has been extensive and the level of afforestation activity has been significant. Unlike the NFPP and SCLP, however, public direct investments in or indirect subsidies to these programs have been limited, and rigorous implementation has been absent. Sites are poorly selected, seedlings are not properly planted, and saplings are often not well maintained. The historical survival rates have been abysmal, which means these programs have not been as effective as expected.

Similar implementation challenges have faced attempts since the early 1980s to curb farming on steep slopes to conserve water and soil (Xu and Cao, 2001). While various "stick and carrot" measures have been tried, they were by and large piecemeal and incoherent; the central government never mobilized substantial public funds and administrative resources to bring the problem under control. Since rural reforms in the early 1980s, farmers in poor regions have used their greater production freedom to aggressively seek new cropping and grazing lands, often resulting in more ecologically sensitive patches on steeper slopes being claimed and degraded. Yields on these lands have generally remained low and poverty in these regions persisted (Du, 2001).

While in a very different spirit than campaigns created by Mao Zedong, but one with potentially harmful environmental impacts, the Chinese government launched the Great Western Development

Program in 1999. Also known as the "Go West" campaign, this program aims to speed up economic development and environmental improvement in western parts of China. The government decided to spend \$8.4 billion on four key tasks in western China:²

- (1) Accelerating infrastructure development, with an emphasis of water resources;
- (2) Improving the ecological conditions with a focus on tackling desertification, soil erosion, and worsening floods;
- (3) Promoting industrial development; and,
- (4) Strengthening science, technology, and education.

Observers believe that this "Go West" strategy signals an attempt not only to begin equalizing economic development between the eastern coast and the inland west, but also to balance economic growth and environmental protection in the west itself (Kynge, 2000; Economy, 2002; Sheng, 2002).

Nonetheless, the successive occurrences of ecological disasters in the late 1990s indicated that while there had been scattered, local-level successes in protecting forest ecosystems, they were overwhelmed by the worsening of the overall situation; more decisive and forceful measures are thus needed to halt the environmental problems. In particular, it became apparent to the central and regional governments that the ecological conditions of the upper reaches of the Yangtze and Yellow river basins are directly related to the economic welfare and ecological security of the middle and lower reaches of these basins. Key in promoting sustainable development in these basins is to control soil erosion and desertification in the upper reaches. It is against this backdrop that the two large programs, the NFPP and SCLP, were launched.

The Natural Forest Protection Program and the Slope Land Conversion Program

In the wake of the 1997 and 1998 ecological disasters, the State Forestry Administration (SFA), charged by the State Council, proposed the Natural Forest Protection Program (NFPP) in 1998 as a large-scale scheme to protect the country's natural forests and to increase afforestation. Specific objectives of the NFPP, as it was initially approved, are to:

- Reduce timber harvests from natural forests from 32 million m³ in 1997 to 12 million m³ by 2003;
- Conserve nearly 90 million ha of natural forests; and,

Table 2. The Regional Coverage and Makeup of the Natural Forestry Protection Program¹

Category	Units	Northeast and Eastern Inner Mongolia	Yangtze River Basin	Yellow River Basin
Provinces	17	5	6	7
Total entities within Provinces	901	137	406	358
National Forest Enterprises	137	86	39	12
Provincial Forest Enterprises	18	16	0	2
Counties	734	23	367	344
County Forest Bureaus	1	1	0	0
County Forest Farms	11	11	0	0
NOTES: ¹ This Table was adopted from Liu (2002).				

- Afforest and re-vegetate an additional 30.97 million ha by various means (e.g., mountain closure, aerial seeding, and artificial planting) by 2010 (Li, 2001).

China's Remaining Natural Forests

In the national forest inventory completed in 1998, the SFA lowered the criterion for closed forests once again.³ Based on this new criterion, China's natural forests amount to 106.97 million ha, which is 69.62 percent of the total forest area (SFA, 2000). Of that figure, 55.07 million ha (51.5 percent) is under state ownership, whereas 51.89 million (48.5 percent) is under collective control. In addition to the 100.05 million ha of regular forests, included in the natural forests are 4 million ha of economic forests (cash trees like rubber, chestnut, walnut, mulberry) and 2.9 million ha of bamboo forests. The gross stocking volume of natural forests is 9.073 billion m³, accounting for 89.96 percent of the nation's total. In terms of age structure, 62.89 percent of the natural forests are immature, partly a reflection of the expansion of naturally regenerated secondary forests.

China's natural forests fall into three categories: (1) forested areas concentrated along upper reaches of the Yangtze, Yellow, and Songhua rivers, and other major waterways; (2) forests already under protection—within 552 nature reserves, 874 forest parks, and parts in eastern Tibet that are inaccessible; and (3) some forests scattered across much of the country (Li, 2001). According to the SFA (2002), the first category forms the catchments for some of China's major hydroelectric and irrigation projects, as well as key navigation and flood control areas, and thus requires immediate protection. Together, these forests constitute 49.58 million ha, or 57 percent of the total natural forests in China. The second and third categories make up 20 million ha (23 percent of the total) and 17.69 million ha (20 percent), respectively.

An Outline of NFPP Tasks

The pilot phase of the NFPP began in 12 provinces and autonomous regions in 1998 and during 1999 and 2000 five more provinces were added. After the pilot phase ended in 2000, the NFPP coverage, which can be divided into four rough geographic areas is as follows:

- 1) Tibet, Yunnan, Sichuan, Chongqing, Guizhou, Hubei, and Hunan in the upper reaches of the Yangtze River (from the Three-Gorges Dam upward);
- 2) Gansu, Qinghai, Xinjiang, Ningxia, western Inner Mongolia, Shaanxi, Shanxi, and Henan in the middle and upper reaches of the Yellow River (from the Xiaolangdi Dam upward);
- 3) Heilongjiang, Jilin and eastern Inner Mongolia in the northeast; and,
- 4) Hainan Island in the south.

Despite the extensive coverage of the NFPP, China's natural forests and thus their protection remain geographically concentrated in the southwest and northeast. Table 2 lists the operational units of the NFPP in different regions, which reveals that all of the state-owned and most of the province-owned forestry enterprises are involved. Also, the program has incorporated a large number of counties in the Yangtze and Yellow river basins.

The NFPP first mandated that commercial logging would be completely banned by 2000 in the upper reaches of the Yangtze and Yellow rivers to conserve over 61.08 million ha of forests. The ban has caused the annual production loss of 12.4 million m³ of roundwood. This program also required timber resource removals from these protected forests be decreased from 87.58 million m³ in 1997 to 26.50 million m³ in 2000, with the remaining cuttings to accommodate local fuel, housing, and other noncommercial uses. Similarly, commercial logging in Hainan province would be stopped as well. Under this program logging in the northeast and other places would be curtailed substantially to put 33 million ha of predominantly old-growth forests under protection. These logging restrictions have resulted in drop in roundwood production from 18.54 million m³ in 1997 to 11.02 million m³ in 2003.

Logging bans and harvest reductions displaced a large number of loggers and other forest employees. The NFPP thus stipulated that those displaced employees would be transferred to pursue afforestation, forest management, and other activities or simply be retired or laid off. In addition, all existing and newly retired personnel would be incorporated into the provincial pension and security systems for their salary, medical, and accidental coverage.⁴ Revenue reductions suffered by governments at the provincial and county levels, and educational, medical, and other expenses previously provided by the state-owned forest bureaus, would be shared by the upper-level governments.

Between 1998 and 2000, the central government invested 22.26 billion Yuan (\$2.69 billion) in the NFPP.⁵ To continue the program the State Council, in its formal approval of the NFPP in 2000, decided to spend 96.2 billion Yuan (\$11.63 billion) over the next ten years on forest protection, regeneration, management, relocation of forest workers, and other related tasks. Under this plan, the central government would invest 78.4 billion Yuan (81.5 percent of the total), with the remaining 17.8 billion coming from the involved provinces.

To expand forest and grass covers on bare lands, retired croplands, and degraded woodlots and rangeland, the central government provides four types of appropriations to forest bureaus and other entities: (1) afforestation and reforestation of mountain closures, 1,050 Yuan/ha; (2) aerial seeding, 750 Yuan/ha; (3) artificial planting in the Yangtze River Basin (3,000 Yuan/ha) and in the Yellow River Basin (4,500 Yuan/ha); and (4) forest protection, 10,000 Yuan per worker for 340 ha.

The Emergence of the SLCP

To quickly halt soil erosion and flooding from deforestation, the Chinese government took the immediate step to reduce timber harvests in the natural forests and put them under strict protection through the NFPP. However this step alone could hardly be very effective in addressing the underlying land degradation challenges, because slope farming and overgrazing were notorious causes of soil erosion and desertification in western China. Of the 34.07 million ha farmland in the Yangtze and Yellow river basins, 4.25 million ha is on slopes 25° or greater. It is estimated that farming on such slopes can cause the average erosion index to reach 4,000 ton/km²/year; with proper forest coverage, however, 80 to 90 percent of the erosion could be reduced (Du, 2001). Hence, included in the reforestation and afforestation targets of the NFPP is to convert 5.33 million ha of croplands on steep slopes to forest and grass coverage between 2000 and 2010.

Since the spatial distribution of steep croplands and the characteristics of the involved activities and stakeholders are different from those of natural forest protection (Du, 2001), the authorities quickly realized the difficulty of administering and implementing all of the activities solely under NFPP. Thus, land conversion has evolved into another separate initiative—the Slope Land Conversion Program (SLCP)—whereas the NFPP is now largely confined to the protection, regeneration, and forestation activities within the boundaries of

natural forests (including rural communities inside).

Before the SLCP was formally launched in 2001, provinces conducted trial projects for three years—beginning in late 1999 when Sichuan started a land conversion scheme for slope protection in 120 counties. Experiments in Gansu and Shaanxi followed before the SLCP was expanded nationwide in 2001 to include 25 provinces and autonomous regions. During the first three years SLCP trial projects converted 1.2 million ha of land with an expenditure of 3.65 billion Yuan (Xu and Cao, 2002). After the trials, the government announced its intention to convert 32 million ha of marginal croplands on steep hillsides and slopes to grassland and forests in

reductions, and resource protection have been largely met (SFA, 2002). Altogether, under the NFPP the decrease of commercial roundwood production by 20 million m³ stands as one of the most dramatic logging ban accomplishments in the history of world forestry; it is even larger than the federal harvest reductions that occurred in the U.S. Pacific Northwest in the early 1990s to protect habitat for wildlife species (U.S. Forest Service, 2001).⁶ The production drop led state-owned forest enterprises to abandon about a half of their logging, hauling, and processing assets (30 billion Yuan) (Li, 2001). Moreover, an annual one billion Yuan of interest payments to loans used by these forest

Deforestation and slope farming were determined to be the primary culprit of the record dry up of the Yellow River in 1997 and the widespread flooding in the Yangtze River Basin in 1998.

the next 10 years (2002-2011).

According to the SLCP plan, the government would subsidize 2.55 tons of grain per year to farmers for retiring one ha of cropland in the upper reaches of the Yangtze River, and 1.50 tons in the upper and middle reaches of the Yellow River. The duration of the grain subsidy is set at five years for cash crops, such as chestnut, tea, and orange; and eight years for more environmentally benign species, such as black locust, pine, and cedar. Therefore, it has been commonly dubbed the “Grain for Green” program (Xu and Cao, 2001). In addition, the SLCP gives farmers a one-time cash subsidy of 750 Yuan/ha for purchasing seedlings and/or seeds, and 300 Yuan/ha/year for tending and miscellaneous expenses for the duration of grain subsidies.

The State Council has also promised that, if necessary, the period of grain and cash subsidies may be extended (Du, 2001). Moreover, farmers’ agricultural taxes could be exempted under the plan and the loss of local revenues due to reduced agricultural output and tax base would be shared by the central government. Overall, it has been projected that, if the subsidized grain is priced at 1,400 Yuan/ton, the total investment in the SLCP will amount to about 10 billion Yuan per year (\$1.2 billion) (Xu and Cao, 2001), making it rank as one of the largest (and most expensive) major environmental programs in China.

Preliminary Impacts

So far, the NFPP and SLCP have made substantial progress in reaching their intended goals. In the natural forest regions, targets of logging bans, harvest

enterprises cannot be paid and must be written off by the government. Under SLCP by the end of 2001 the total area of afforestation reached 2.195 million ha (which includes artificial planting of 1.377 million ha and aerial seeding of 0.818 million ha). Mountain closure reforested area accounted for 1.884 million ha (CFY, 2002).

In terms of timber workers, the central and local governments have taken major steps to deal with the large number of employees displaced by the NFPP bans. Government statistics show that of the 1.2 million logging and processing workers affected by the NFPP, 0.512 million were transferred, retired, or redeployed to other sectors of the local economies by the end of 2001. Personnel for forest protection and management increased from 55,000 in 1998 to 150,000 in 2001, with tree planting, forest regeneration, management, and protection being greatly strengthened (CFY, 2002). The total investment by the central government for transferring and redeploying timber workers has reached 31.89 billion Yuan. At the regional and local levels, governments and enterprises have taken concerted efforts to enhance employment opportunities and transform the forest-based economy. Ecotourism and other development activities—such as dairy, cattle and deer farming; growing annual crops of mushrooms, fruits, and ginseng; and collecting wild herbs, nuts, vegetables, and other products—have been widely promoted.

Tables 3a, 3b, and 3c summarize the results of a recent survey of the economic impacts induced by the NFPP. The tables illustrate that along with the substantial

**Table 3A. Gains and Losses Induced by the NFPP:
The Case of the Qinhe Forest Bureau in the Northeast (unit: 1,000 Yuan)¹**

Item		Year			
		1998	1999	2000	2001
Investments in forest protection and management	Total	10,871	6,520	13,632	0
	State Appropriation	5,627	6,520	5,720	0
	Provincial Match	5,244	0	0	0
	Enterprise Self-Raising	0	0	7,912	0
Gross production value		20,170	80,227	81,604	117,737
Changes in enterprise revenues ²	Log Production	1,559	-15,480	-21,382	-24,419
	Wood Processing	-3,192	-6,232	-3,152	4,538
	Other Businesses	92	9,218	9,228	14,258
Changes in local tax revenues ²		-148	-808	-1,278	-288
Changes in employee incomes ²		21,823	48,233	76,365	70,752
Changes in farm household income ³		-900	-11,568	-13,841	-15,900

**Table 3B. Gains and Losses Induced by the NFPP:
The Case of Yanbian Forest Bureau in the Southwest (unit: 1,000 Yuan)¹**

Item		Year			
		1998	1999	2000	2001
Changes in enterprise revenues ²	Total	6,570	10,304	7,252	12,877
	State Appropriation	8,087	8,296	7,015	13,224
	Province Match	0	3,525	1,754	1,170
	Enterprise Self-Raising	-1,404	-1,544	-1,784	-1,935
Gross production value		1,296	-18,868	-14,918	-33,218
Investments in forest protection and management	Log Production	-22,515	-27,956	-28,046	-29,712
	Wood Processing	-1,078	-6,348	-4,178	-4,178
	Chemical Making	-1,662	-2,252	-2,482	-2,482
	Other Businesses	274	481	820	792
Changes in local tax revenues ²		-1,258	-3,958	-4,248	-4,008
Changes in employee incomes ²		4,937	7,032	9,467	9,568
Changes in farm household income ³		-1,930	-6,286	-6,872	-7,533

**Table 3C. Gains and Losses Induced by the NFPP:
The Case of Ebian Forest Bureau in the Southwest (unit: 1,000 Yuan)¹**

Item		Year			
		1998	1999	2000	2001
Investments in forest protection and management	Total	47,297	23,133	48,212	22,873
	State Appropriation	44,860	22,230	51,635	18,960
	Province Match	1,598	1,738	858	608
	Enterprise Self-Raising	1,565	-705	-1,815	-1,415
Gross production value		75,517	-55,708	-67,870	-55,176
Changes in enterprise revenues ²	Log Production	2,194	-67,494	-55,967	-61,430
	Wood Processing	7,323	-12,757	-16,527	-18,957
	Chemical Making	1,037	-3,063	-3,113	-3,203
	Other Businesses	3,612	-5,388	-5,319	-467
Changes in local tax revenues ²		143	-9,017	-12,487	-13,407
Changes in employee incomes ²		6,618	410	-1,768	5,859
Changes in farm household income ³		-571,178	-566,798	-548,146	-541,465

NOTES:

¹ Table was adopted from Liu (2002). Except changes in farm household income, data were from the local forest bureau annual financial reports.

² Calculated by comparing to the average level of 1993-1997.

³ Farmers in the local communities are not formal employees of the forest bureau. Prior to implementing the NFPP, however, a significant portion of their income was derived from seasonal employment by the forest bureau, manufacturing activities based on raw materials purchased from the forest bureau, and services provided for the forest bureau. Changes in farm household income were estimated from a household survey.

investments made primarily by the central government, forest bureau revenues from logging and processing have indeed declined dramatically. Accordingly, local tax incomes have suffered large decreases. However, revenues from other business investments have increased following the logging bans and harvest reductions, and incomes of state employees have increased significantly. In contrast, farmers in communities inside and surrounding the natural forests, who are not formal employees of state enterprises, have experienced a severe reduction in their incomes, as a result of lost direct employment and indirect service opportunities.

Wood production reduction caused by the NFPP has mostly affected the supply of large-diameter logs (> 26 centimeters), which has in turn enlarged the gap between domestic supply and demand. The SFA projected that 13.45 million m³ of roundwood could be produced from plantations in 2000 to alleviate the

wood shortages. However, this extra production has not materialized. In contrast, imports of log, lumber, pulp, and paper products have increased enormously, topping 73 million m³ in roundwood equivalence in 2001 (SFA, 2002). Valued at \$10.13 billion, these products accounted for 4.16 percent of China's total import expenditure in 2001 and recorded an increase of more than 35 percent over the previous year.⁷

While farmers did not receive as much benefit from the NFPP, they have participated in the SLCP with enthusiasm, because they view the SLCP as a window of opportunity not only to protect the environment, but also to improve their welfare through diversifying production and introducing new farming and grazing practices. By the end of 2001, more than one million ha of sloped cropland was retired and planted with trees. In that year alone, the total investment was 3.214 billion Yuan, including grain subsidies of 2.036 billion,

Table 4. Farmers Responses to the Slope Cropland Conversion Program¹

		Survey Unit ²						
		Dingxi (Gansu)	Zhouzi (Inner Mongolia)	Ansai (Shaanxi)	Pengyang (Ningxia)	Heqing (Yunnan)	Dafang (Guangzhou)	Tianquan (Sichuan)
Land Retired (ha)	Targeted	1,200	9,333		4,667	1,000	1,333	2,600
	Completed	2,000	9,366		5,080	1,000	1,333	4,600
Degree of Household Satisfaction³	Satisfied Households	107 (96%)	196 (97%)	184 (96%)	63 (97%)	211 (99%)	51 (88%)	117 (63%)
	Dissatisfied Households	4	5	8	2	2	7	69
Yield in 1999 (kg/ha)	Retired Land	1,369			1,464		2,329	3,106
	Remaining Land	2,220			2,075		2,731	8,646
Income per Capita (Yuan)	Before the Program	2,022			1,118	1,672	1,484	3,106
	In 2000	1,487			1,134	1,921	1,197	8,646
Cropland per Capita (ha)	Before the Program	0.336			0.460	0.100	0.149	0.127
	In 2000	0.227			0.184	0.068	0.040	0.023

NOTES:

¹ Table was adopted from Xu and Cao (2002). Blank cells indicate no data available.

² Gansu, Inner Mongolia, Shaanxi, and Ningxia are in the upper reaches of the Yellow River while the other three provinces are in the upper reaches of the Yangtze River.

³ The number in the parentheses indicates the percentage of satisfaction.

seedling/seed subsidies of 0.737 billion, cash compensation of 0.35 billion Yuan, and other expenditures of 0.091 billion (CFY, 2002). The national target for 2002 was to retire 4.67 million ha (Xu and Cao, 2001). Table 4 shows that of the seven counties surveyed in 2001, per capita cropland in the upper reaches of the Yellow River ranged from 0.33 to 0.40 ha before implementing the SLCP; thereafter, it decreased to between 0.17 and 0.23 ha. Likewise, per capita cropland in the upper reaches of the Yangtze River fell in the range of 0.10 to 0.17 ha before implementing the SLCP; thereafter, it reduced to between 0.02 and 0.07 ha.

According to Xu and Cao (2002), a very high percentage of the surveyed farm households were satisfied with the program. Five of the seven counties had a degree

of satisfaction of over 90 percent. The actual land retirement was no less than the planned targets in each county. To be sure, these positive responses had much to do with the government incentives—food subsidies, which were even higher than the household annual production. Tianquan, Sichuan, was the only exception, where the household production was greater than the grain subsidy, and thus farmers displayed a higher degree of dissatisfaction. Notably, subsidized grain is free, whereas production requires labor, seeds, and other inputs at the expense of farmers themselves. Of course, this generous gesture of grain subsidies to ensure food security at the local level due to reduced farmland was made possible by the recent food surplus at the national level (Du, 2001). The dependence on a potentially short-lived food surplus raises the question of the sustainability of

Box 1. The NFPP and SLCP: Sichuan's Experience

Located in the upper reaches of the Yangtze River, Sichuan province has high topographical, elevation, and climatic variations. As such, the province features very rich flora and fauna resources, but fragile ecosystems. About 65 percent of the province's forests, accounting for 80 percent of its total stocking volume, is concentrated in Sichuan's western region. However, these old-growth forests have suffered heavy cuts due to the build-up of an expansive logging industry since the late 1950s. Also, of Sichuan's 452,000 ha of cropland, 38.3 percent is on slopes of at least 5°, and 17 percent on slopes of even greater than 25°. Most of the hilly and mountainous slope cropland is found along the primary tributaries of the Yangtze, such as the Jinsha, Yalong, and Mingjiang rivers, and it is in these places that a large portion of the province's 199,800 ha of eroded land came into existence because of the combined impact of forest depletion and farming malpractice (Sheng, 2002). Annually, 600 million m³ of topsoil is washed downstream and added to the riverbed.

As early as 1996, the then-premier Zhu Rongji had already urged Sichuan's government officials to reduce timber harvests, speed up tree planting, and strengthen forest management in order to improve the fragile and threatened environment. Despite his promise of financial assistance to carry out the necessary tasks, Sichuan's planning and action were slow and small due to concerns over lost revenues and employment.

But the historical flooding in summer 1998 propelled the provincial officials to take swift and decisive action. Commercial logging was banned by September, hauling of the cut trees was ordered to finish by June 1999, and logging and hauling workers were to be transferred to tree planting, forest protection and management. Anecdotes relate drastic measures such as the government blowing up bridges and sealing off mills to stop wood transportation and processing. Not surprisingly the "sudden death" of the logging and manufacturing industry led to heavy economic losses of uncollected roundwood and unfinished products, and transport and processing equipment.

While touring the Sichuan and other provinces to survey regional recovery from the flooding and the implementation of natural forest protection the in fall of 1999, Premier Zhu was convinced of the need to further convert slope cropland to control water runoff and soil erosion. Thus, he instructed the leaders of these provinces to pilot land retirement and conversion with government subsidies. In response Sichuan initiated slope cropland conversion in 120 counties in October 1999. The program spread across the country next year when the State Forestry Administration, State Planning and Development Commission, and Ministry of Finance jointly issued guidelines for land retirement and conversion in the upper reaches of the Yangtze and upper and middle reaches of the Yellow.

For policy changes of such magnitudes, however, Sichuan's provincial leaders did little planning and consultancy with local administrators, enterprise managers, and others as to how to mitigate the losses and make them effective. Further, while compensation was made to state enterprises and their employees under the logging bans, the livelihoods of farm households in and around state forests, who depended on logging and hauling operations for seasonal work and service opportunities, were completely ignored. Moreover, their farming, fuel, and other needs for wood were not properly considered. An even more egregious example of poor compensation is that as much as 45 percent of the total area under the coverage of logging bans and forest protection belongs to the local communities whose normal operations have been disrupted without reimbursement from the provincial government (Yu et al. 2002). These examples of insufficient compensation have caused widespread concerns and complaints.

Regarding the land retirement and conversion, the very short lead time made it almost impossible to contemplate which tracts to retire, what species to plant, where to obtain seedlings, and how to deliver the food and cash subsidies promptly and efficiently. And as the designated administrative agency, Sichuan's Department of Forestry did little coordination with other agencies on how to implement the specific tasks. For example, the Departments of Agriculture, Water Resources, and Civil Affairs were not directly involved. The whole land conversion initiative has come close to the familiar phenomenon of mass environmental campaigns—mobilizing farmers to retire cropland and plant trees, with little worry about how heavy the costs may be, what can be done to make it effectively implemented, and whether the original goals will be met.

such subsidies.

Table 4 also shows that farmers' income per capita changed in different ways. In some cases, household income has actually increased following the land retirement. Counties where income decreased may have been due to delayed delivery of grain and cash subsidies. Notably, income from non-farming activities has increased across all of the counties surveyed, suggesting that the potential for a structural adjustment—reducing

slope farming and exploring non-farming opportunities simultaneously—does exist, and these new activities should benefit the local people and lead to sustained environmental improvement.

While the central government design of NFPP and SLCP has attempted to balance forestry conservation and poverty prevention needs, it is ultimately the local government implementation that determines the success or failure of these two ambitious programs. Box

1 provides insights into some of the challenges these programs face in enforcing compliance and creating a safety net for farmers and timber workers. Interagency conflicts and poor communication between provincial and sub-provincial governments are but a few of the local obstacles to smooth implementation.

Major Challenges

In light of the ambitious goals and cross-sectoral impacts of the programs, the NFPP and SLCP face some tough challenges. These challenges, which are discussed below, include: (1) heavy reliance on state finance, (2) lack of inter-agency cooperation, (3) insufficient consideration of local interests and conditions, (4) neglect

(1) such campaigns tend to be highly politically charged with significant investment up front but little follow-through past the stated targets of completion; (2) central government officials rarely consult local officials to engage them in the campaign decision-making and execution processes; and (3) campaigns rarely employ the best policy approaches, technologies, and/or economic incentives to change behavior. Moreover, these efforts, by focusing on remediation rather than prevention, have given too much emphasis on environmental impacts instead of underlying environmental drivers (e.g., population growth, road expansion, policy shifts, local corruption) (UNDP, 2002). Without effective prevention and attention to

Central officials need to confront the weaknesses in the campaign-style strategies, which are too reactive, dramatic, and inflexible.

of appropriate practices, and (5) rigidity and inconsistency of certain policy measures.

Top-Down Initiative and Governance

Even though the local financial commitments were set at 18.5 percent of the total NFPP expenditure, they have rarely materialized (Liu, 2002), which has made the program rely too heavily on central government financing. For example, the financial obligation of Heilongjiang province amounted to 0.4 billion Yuan in 2001, but it actually invested only two million. Given this poor regional support, it is difficult to accomplish all the program tasks as planned. Similarly, because the State Forestry Administration (SFA) has been charged with administering the programs, agencies responsible for agricultural and livestock production, water and soil conservation, and poverty alleviation are not formally involved, which has meant inter-agency cooperation and coordinated implementation are very weak.

In terms of policy approach, the central government has not actively pursued market-based mechanisms (e.g., open bidding for projects) for carrying out specific activities of the NFPP and SLCP, relying instead on top-down allocations for most project activities. The potential for compromising effectiveness and misappropriation of central funds abounds. While the Chinese leadership is becoming increasingly aware of environmental problems and appears committed to finding solutions, central officials need to confront the weaknesses in the campaign-style strategies, which are too reactive, dramatic, and inflexible. As Economy (2002) pointed out in her discussion of the weaknesses of the “Go West” campaign:

the underlying drivers, however, the prospect of long-term success of environmental campaigns is less likely.

If more projects were contracted out and subject to open bidding, they would enable governments at different levels to involve various intermediary organizations, including private for-profit and not-for-profit ones, into the implementation of the forest protection and slope conversion programs. These organizations could bridge the gap between the policy initiative from the center and its localized implementation. Furthermore, they could improve the efficiency and effectiveness of the NFPP and SLCP by acting as independent parties for certifying and monitoring project activities.

Inadequate Assessment and Compensation of the Social Costs

In the southwest where the NFPP was introduced first, half of the forest areas are community forests owned and managed by rural households individually or collectively, and the bulk of them are not primary natural forests. While they also have been subject to logging bans, farmers’ losses, estimated at 5.7 million m³ of roundwood or 2.3 billion Yuan of sales revenue a year (Yu et al., 2002), have not been compensated. This major “taking” has not only greatly dampened farmers’ confidence in government policy, but also created tremendous land tenure insecurity and investment disincentive. The NFPP should thus either provide adequate compensation for foregone timber revenues or relax the bans.

Encouraged by the enthusiastic response from the farmers and local governments, the central authorities substantially expanded the operation scale of the SLCP

in 2002. In doing so, however, the central government ignored the fact there could be decreasing returns to scale—as the program targets get larger, the implementation costs go up faster. Ironically, these implementation costs have not been clearly considered. To make the situation worse, many local governments have been running budget deficits in the last two to three years due to poor performance of their economies. The sudden increased workload has thus led to an even heavier financial burden. Consequently, the quality of SLCP project tasks has deteriorated and the monitoring has weakened. In addition, the delivery of food and cash subsidies to farmers have been delayed and even misappropriated, causing widespread complaints (Xu and Cao, 2002). Many scientists and local planners feel that the SLCP should have been expanded at a slower and more feasible pace.

Insufficient Attention to Local Interests and Conditions

China's SFA is biased towards planting trees in carrying out the SLCP projects, with less interest in grass and engineering measures. As stated by the Forest and Grassland Taskforce of China (2003, p. 3),

Implementation regulation has not been tailored to local conditions, and there has been an overemphasis on tree planting rather than restoring original vegetation cover. The SLCP does not give sufficient consideration to the ecological and economic functions of grasslands in semi-arid areas and the need to restore these ecosystems.

Partly because of this overemphasis on tree planting, the central government has decided to create a separate program of 20 billion Yuan, under the coordination of the Ministry of Agriculture, to recover and restore grasslands in the west over the next five years.

Furthermore, without proper consultation and a direct stake in the endeavors, local people tend not to maintain the trees and grass, leaving meager results of survival and growth. More broadly, the authorities have failed to realize the importance of the incentive structure and project governance, with too much dependence on administrative means. Without clearly set responsibilities and appropriate incentives, however, some of the investments will be wasted, and forest enterprises, workers, and rural households will not be actively engaged in forest and grassland protection and management. Institutional instruments, including contractual arrangements, the rule of law, and community-based initiatives, should be developed to improve the performance of SLCP projects.

Evidence indicates that many opportunities indeed exist for saving subsidies while enhancing effectiveness of slope restoration (Xu and Cao, 2002; Du, 2001).

To promote more sustainable forestry management, private investments must be encouraged and protected, given the dominance of the non-state sector in commercial forestry (Hyde et al., 2003; Lu et al., 2002). But farmers in the vast south are still subject to excessive cutting regulation, price control, and taxation. Although they have been granted long-term land use and tree ownership rights, their interest and productivity in timber production remains abysmally low (Yin et al., 2003). This is in stark contrast to heavy subsidies for the environmental rehabilitation. China's forest development calls for a balanced and consistent policy portfolio.

Finally, emerging international experience has indicated that community-based forestry management is an effective way to accommodate local interests and conditions, and identify solutions to the overly top-down government programs. The essence of community-based resource management is to use locally initiated activities to serve local needs in a participatory manner (World Bank, 2002). In fact, growing efforts have been made by international organizations, especially development and environmental foundations, to introduce the international experience into China. For instance, the Ford Foundation, in conjunction with governments in Yunnan and Sichuan, has successfully promoted community forestry. Such bottom-up forestry initiatives have drawn the participation of a broad range of stakeholders, making government policies more easily acceptable to local interests and government goals more compatible with local needs (Kitamura and Cao, 2003). Conservation International, WWF-China, and Oxfam America also have nurtured examples of stakeholder participation in protecting watersheds, nature reserves, and natural forests in southwest China (Sheng, 2002; Lazarus, 2002).

Lack of Careful Long-Term Planning

While environmental conservation is a central goal of the NFPP, its induced effects on timber markets and long-term timber supply have not been adequately considered. For instance, the SFA claimed that by 2005, roundwood production from plantations that are part of the NFPP should reach 39.3 million (SFA, 2001). However, by 2003 actual plantation production had already fallen way short of projections, so reaching this target is unlikely. Even if the roundwood production target is met, the log quality may not meet the

consumption requirements. One unanticipated outcome from the logging ban has been the potential introduction of invasive species through importation of wood products, making quarantine an enormous task. Increased imports can also have adverse impacts on forests and the environment in exporting countries (Loucks et al., 2001). Incidents of illegal logging in Myanmar (Burma) and other countries that export timber to China constitute an issue the Chinese government should not ignore. China's timber supply problems ultimately should be solved in conjunction with better demand-side management of wood products. Unintended effects of the SLCP that the Chinese government needs to assess and address include distortions of local grain markets and reduced food prices (The Forest and Grassland Taskforce of China, 2003).

Besides the growing timber shortfall problem is the burning issue of what will happen if the government investments and subsidies stop in a few years. In other words, the institutional and policy climate must be stable and incentives must be sustained so farm households and their villages, as well as forest bureaus and their employees, will maintain their interest in tree planting, forest management, and grassland protection after the NFPP and SLCP campaigns end. Thus, consideration must be given to exit options for the logging bans and the termination/extension of land conversion schemes. While diversifying local economies has made strides, further actions, particularly public investments in capacity building and technical training are necessary. These will empower the rural population, and ensure the success and sustainability of various initiatives.

The Need for Better Technical Practices

The SLCP has been plagued with such challenges that impede the program's progress such as: (1) lack of adequate preparation, (2) targets in excess of the feasible capabilities of local entities, (3) a rush for participation, and (4) failure to deliver the promised subsidies. Additionally, seeds and seedlings have to be acquired from far away, which potentially lowers the seed quality and reduces the suitability of the seedlings to the local conditions.

The selection of land to be retired is also problematic, with much of it located along access roads for inspection. The environmental impact of the SLCP is not clearly understood in that it is impossible to quantify how much erosion originates from deforestation as compared to other driving forces, such as inappropriate farming and road development in mountainous regions. As found by the Forest and Grassland Taskforce of China (2003), the selection process of sites to be converted has been

inadequate and often did not include the most erosion-prone slope lands. In addition, to carry out the environmental restoration projects it is necessary to adopt an ecosystem management approach, with emphasis on sustainability, system functionality and integrity, and human interaction, and to better integrate conservation needs into development policies (Loucks et al., 2001).

Closing Remarks

This paper has outlined and discussed the multiple challenges facing implementation of China's Natural Forest Protection Program and the Slope Land Conversion Program. The goal of this discussion has been to promote better understanding of not only these programs, but also the urgent need for more appropriate policies and technical measures in carrying them out. As stated earlier, these programs, if properly implemented, could make valuable contributions to combating some pressing environmental problems, including soil erosion, flooding, and desertification as well as climate change and loss of biodiversity. Indeed, their early implementation has demonstrated not only these prospects, but also the opportunities for structural adjustment of the rural economy and the enhancement of land use efficiency. To improve effectiveness, however, China must address a whole host of policy and technical issues.

Finally, the international community needs to be more actively involved in assisting and facilitating the execution of these programs. For example, the international community could bolster contacts between governmental and nongovernmental organizations (NGOs) on the numerous environmental issues, encourage the exchange of the involved professionals, provide training and expertise on market-based solutions to relevant environmental problems, and support the engagement of domestic environmental NGOs and other institutions in these programs (Baldinger and Turner, 2002). Hopefully, stronger domestic policy implementation combined with greater international cooperation on forestry issues will make these ambitious programs more successful and beneficial.

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ENDNOTES

¹ There were no systematic, nationwide forest inventories in the 1950s and 1960s. Fang et al. (2001) estimated that China's total forest area in 1949 was approximately 102 million ha.

² Western China covers six provinces (Shaanxi, Sichuan, Yunnan, Guizhou, Gansu, and Qinghai), five autonomous regions (Inner Mongolia, Guangxi, Ningxia, Xinjiang, and Tibet), and one municipality (Chongqing).

³ According *State of the World's Forests* (FAO, 2001), forest refers to land with a tree canopy cover of more than 10 percent and area of more than 0.5 ha. Forests with a tree canopy cover of more than 40% are called closed forests, whereas those with a canopy cover between 10 to 40 percent are called open forests. However, China lowered the canopy cover for closed forests down to 30 percent in the late 1980s and further down to 20 percent in the late 1990s.

⁴ Institutional welfare provision for current employees is mandated by law.

⁵ For comparison, the country's total expenses on waterway maintenance and other related activities reached 46.5 billion Yuan during 1997-98, of which 7.8 billion Yuan was spent in the Yangtze River Basin alone.

⁶ In comparison, China's 1997 total production of commercial roundwood was 56.1 million m³, of which 61 percent came from old-growth forests and as much as 98 percent of 18.8 million m³ produced by the state-owned forest bureaus was from primary natural forests.

⁷ China's dramatically increased imports of timber products have drawn broad international concerns over the potential spread of deforestation and negative impacts on the livelihoods of forest-dependent communities in the exporting counties, such as Burma, Indonesia and Russia (Forest Trends, 2000).

Quenching Beijing's Thirst: The Need for Integrated Management for the Endangered Miyun Reservoir

By *Christoph Peisert and Eva Sternfeld*

Miyun reservoir, a large reservoir northeast of Beijing municipality, is the Chinese capital's most important source of drinking water. For many years the Beijing municipal government has made great efforts to protect the reservoir and its catchment area. However, successful implementation has been hampered by numerous user conflicts. This paper investigates the origin and various types of conflicts, which include inter-provincial, city-county disputes, as well as conflicts between county government and local residents living in the water protection zone. The magnitude of these conflicts and continued deteriorating quality of the reservoir underline the need for integrated watershed management approaches as stipulated in the 2002 revised Water Law, and the adoption of a water economy that includes the costs for water protection and compensation for those required to carry out watershed protection activities.



The large Miyun reservoir, built during the Great Leap Forward period (1958-1960) in the northeast of Beijing municipality, is a critical source of drinking water for the 14 million people living in this booming metropolis. Considering the huge population reliant on the catchment for drinking water, Miyun reservoir is one of the most important water protection areas in the world. As Beijing has been hit by ongoing droughts since 1999, the reserves of Miyun are almost exhausted and—according to Chinese news media reports—may last only until fall of 2004.¹ Moreover, there are rising concerns about the reservoir's deteriorating water quality and fears that Miyun might face a similar fate as Guanting reservoir, Beijing's second largest reservoir, built in 1952 in the northwest of the municipality. Due to wastewater discharges and washed out fertilizers and pesticides from the upstream areas, Guanting has been so severely polluted that in 1997 Beijing's government decided to cease using its water for urban supply. In recent years, Miyun's diminishing water quality and shortage have intensified competition between urban and rural users, as well as sparked inter-provincial conflicts. Beijing is facing a severe drinking water crisis that cannot be solved by simply seeking new water supplies.

The purpose of this paper is to investigate the nature of water conflicts surrounding Beijing municipality and to discuss potential strategies for the integrated management of China's catchment areas for drinking water reservoirs such as Miyun.

Natural Determinants of the Beijing Water Crisis

Beijing municipality is located in the dry northeast edge of the North China Plain bordering the Mongolian Plateau in central Hebei province. Since the last administrative reforms in 1958, the Chinese capital and its rural hinterland were expanded to cover a total area of 16,800 square kilometers (km²) with about 1,000 km² of built-up urban area. The 1958 expansion of the municipality also incorporated Miyun county, the location of the reservoir. What began as a small municipality of four million inhabitants in the 1950s has developed into one of China's most important industrial bases, with a very productive agricultural region and a current population of 14 million.

While Beijing has become a dynamic political, economic, and cultural center in China, its expansion has come at a serious ecological cost, for the region is one of very limited water reserves. Beijing's rivers belong to the catchment area of the Hai River, which among the larger Chinese river systems ranks as the lowest in terms of total runoff as well as average per capita quantity. In Beijing municipality, the average annual renewable freshwater supply available per person is less than 300 cubic meters (m³) (Duan, 2003).

Since surface water runoff due to climatic conditions can vary greatly (See Box 1), and has been reduced considerably in recent years as a result of the higher demand in upstream areas, Beijing has become increasingly dependent on groundwater supply. The alluvial plain area, covering 40 percent of the

Box 1. Insecure Water Availability for Beijing

Beijing's surface water supply comes mainly from two sources: Yongding River in the west and Chaobai River in the east of the city. Both rivers are controlled by large reservoirs that were built in the 1950s. The reservoirs regulate the surface water inflow, which not only depend on withdrawals in upstream regions, but also are dictated by the sub-humid continental monsoon climate. At first glance, a mean annual precipitation of almost 600 millimeters (mm) would appear to provide abundant water supply to the region, but precipitation varies greatly from season to season. Major rainfalls usually occur in summer, accounting for up to 75 percent of the annual precipitation, whereas winter and spring are usually extraordinarily dry. Much of this precipitation in the Beijing municipal area is lost through an annual average evaporation of 1,800 mm.

Water availability also varies from year to year, making the region vulnerable to both droughts (with annual precipitation of less than 400 mm), and floods (with annual precipitation of higher than 900 mm). Droughts as well as wet periods may last for several consecutive years, and therefore influence water management policies. For example, during the extremely wet 1950s, water conservation efforts concentrated on flood control, whereas persistent droughts at the beginning of the 1980s, and more recently a drought that has been ongoing since 1999, demanded the immediate implementation of water-saving actions.¹

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¹ In 1999, a historical low of 279 mm rainfall was recorded, followed by 371 mm (2000) and 338 mm in 2001. (*Guojia Tongjiju*, 2000,2001,2002)

municipality, has rather abundant and readily accessible groundwater resources. However, over the past 50 years, flood protection and diversion works have reduced natural recharge while abstraction increased, particularly during drought periods. Between 1980 and 2002, the groundwater table in the urban area sank by about 11.78 meters (m), creating a funnel of emptied aquifers stretching across an area of 2,200 km² (Duan, 2003).

Human Pressures on a Limited Water Supply

Short Supplies and Burgeoning Demand

In years with average rainfall conditions the mean renewable water supply in Beijing is about 4.1 billion m³, of which 1.7 billion m³ are surface water and 2.4 billion m³ are groundwater (Beijing Municipal Waterworks Company, 1993). But in 2001, the city received only 1.92 billion m³ of freshwater supply (780 million m³ surface water and 1.5 billion m³) with demand far exceeding the renewable supply (Shuilibu Haihe Shuili Weiyuanhui, 2002). Specifically, in 2001, the municipality used 3.8 billion m³; of which 1.2 billion m³ (almost 30 percent) were supplied by surface water and 2.6 billion m³ (more than 70 percent) were abstracted from groundwater (Beijingshi Shuiliju, 2002). These 2001 data highlight a huge gap between renewable supply and demand, which indicates a very unsustainable water balance. The gap was closed by diverting water from Miyun reservoir and abstracting groundwater in amounts far exceeding natural recharge,

thus accelerating the exploitation of the reservoir's storage down to a critical level and depleting groundwater tables.

In light of these water scarcities it is not surprising that competition between different user groups is becoming more severe. Agricultural water consumption considerably declined in recent years, though the greatest part of the municipality's freshwater annual resources (44.6 percent or 1.74 billion m³) was allocated for this sector. Industrial and domestic water use in the municipality has increased considerably in recent years receiving 23.6 and 31 percent of water allocations, respectively. A mere 0.8 percent (30 million m³) was classified as environmental water use² (Beijingshi Shuiliju, 2002).

With drought and the decline of freshwater supply due to withdrawals in upstream areas, problems related to water quality in the watershed surrounding Beijing are getting worse. According to the China's national standard for surface water quality the Guanting reservoir is labelled grade 5 (severely polluted), and therefore this water is presently not suitable for urban supply. Many rivers, especially in the east of the city, are likewise severely polluted, with 27 percent labelled as grade 5 or higher (Beijing Shuiliju, 2002). The greatest concern for water management authorities is how to maintain water quality at Beijing's main water supply reservoir in Miyun county, the main supplier for the Water Works Number 9, Asia's largest drinking water treatment plant.

Supply-Side Management

For many years, the water crisis in Beijing was dealt with as a purely technical issue, requiring engineering solutions to increase supply. The South-North Water Transfer (*nanshui beidiao*), a giant water transfer project that will construct three canals to divert water from the Yangtze to the North China Plain and to the Chinese capital, has been on and off the agenda since the 1950s. In 2001, in face of the present water crisis and the challenge to secure water supply for the 2008 Olympic Games the government gave a green light for one of the costliest water transfer projects in the country's history.³ By the end of 2003, construction of the middle route that will supply Beijing directly began. If construction proceeds smoothly the first water deliveries are expected to reach Beijing by 2007 and the final construction is slated to finish by 2010 ("New phase of vast project," 2003).

The middle route is supposed to divert up to 14 billion m³ of water to the north. The question on how the water will be distributed is not settled yet, but in light of the thirst for water all over the North China Plain, experts agree that Beijing can not expect more than 2 billion m³ additional supply from this project. So the project will bring some relief but not solve the city's water shortage in the long term. The current water crisis, however, needs immediate water conservation measures to improve protection of scarce water resources. A brief review of how Beijing's over-dependence on the Miyun reservoir arose exemplifies the severity of the municipality's water crisis and need for a strong water demand management strategy.

The Decline of Guanting and Rise of Miyun Reservoir

When in the 1950s the modern foundations for Beijing's water supply system were built, it was not foreseen that Miyun reservoir would later play such a crucial role for the urban water supply. Until the 1980s, drinking water was mainly supplied by groundwater, whereas Guanting reservoir, which was completed in 1954 at the north-west border region of Beijing municipality and Hebei province was designed to deliver water for industrial use and urban waterways.

The reservoir is managed by the Guanting Reservoir Management Department, which was under the administration of the Ministry for Water and Electricity between 1951 and 1970, and only in 1971 came under the administration of the Municipal Water Conservancy Bureau. However, the major part of the reservoir and its huge catchment area of 43,304 km² are located in

the neighbouring provinces Hebei, Shanxi and Inner Mongolia. According to the initial design Guanting reservoir had a planned storage capacity of 2.3 billion m³, but in recent years storage has been reduced to less than 220 million m³ (Duan, 2003). When the reservoir was constructed, planners obviously did not take into consideration the economic development and rising water demand for agricultural irrigation and industries in Beijing's neighboring provinces.

By the 1970s, 2 larger reservoirs, as well as 17 medium and 248 small reservoirs had been built within the catchment area of Guanting. These reservoirs as well as intensive groundwater mining caused a considerable reduction of Guanting's inflow. Originally, the reservoir's average runoff was calculated to be 44 m³/second, this number has now been reduced to a mere 6 m³/second. Moreover, the reservoir faces a severe siltation problem, as it is estimated that the reservoir presently contains more than 640 million tons of sediments, with several million tons being added every year (www.wasy.de/WE-BB/en). Severe pollution by untreated sewage from the cities of Zhangjiakou and Datong, as well as effluents from small rural industries and washed out fertilizers and pesticides already became severe in the early 1970s.

In an early move of environmental politics the Chinese government in 1972 responded by establishing the Leading Group for the Protection of Guanting Reservoir, which labored for years to create regulations to protect the reservoir's water resources. The Water Resource Protection of Guanting Reservoir Measures (*Guanting Shuixi Shuiyuan Baohu Guanli Banfa*) were ratified by the governments of Beijing municipality and Hebei and Shanxi provinces in 1985. Despite the years of preparation, this legal attempt did little to improve the reservoir's severe eutrophication problem, mainly because the municipality and involved provinces never agreed on who should pay for the clean up. Every year in the upstream areas approximately 100 million m³ of untreated or inadequately treated wastewater are discharged into the rivers, amounting to almost one-third of the reservoir's average annual inflow. Until recently, even in the larger urban areas such as Zhangjiakou, Xuanhua and Hailai urban waste was discharged without any treatment. It is further estimated that upstream rural counties use approximately 1,500 tons of pesticides and between 50,000 to 70,000 tons of chemical fertilizers each year, with large amounts of residues washing into the reservoir. In 1997, the reservoir's continued severe pollution levels led Beijing to cease using water from

Guanting for urban supply. Only in recent years has the Beijing Municipal Water Conservancy Bureau initiated projects to improve the water quality of the polluted reservoir and attempted to reintegrate the reservoir into Beijing's water supply cycle.⁴

The Rise of Miyun Reservoir

With deteriorating water quality of Guanting reservoir and the depletion of groundwater tables in urban areas, Beijing's second reservoir in Miyun county became increasingly important for urban water supply in the 1980s. The large reservoir with an original capacity of 4.1 billion m³ was originally planned to supply the rural areas of Beijing as well as Lanfang county in Hebei province and Tianjin municipality. In the early 1980s, a severe drought caused the fast depletion of groundwater tables in urban districts of Beijing, and consequently severe shortages in urban water supply and electricity production. The crisis induced the State Council to issue a formal order granting the capital exclusive rights to the reservoir's supply. Tianjin in exchange was assured of the immediate construction of a diversion canal from the Luan River.

During the 1980s and 1990s Beijing has gradually switched from groundwater to treated surface water for drinking water supply, which means the Miyun reservoir gained crucial importance for the capital's water supply. Since 1989, the newly constructed Water Works Number 9 began treating raw water from Miyun to supply drinking water to Beijing. In the mid-1990s, this modern water works facility reached a daily capacity of one million m³, thus providing up to 75 percent of Beijing's tap water. During the 1990s, the use of this new treatment plant led the Beijing water works company to abandon pumping from some of the older groundwater wells in the urban area. The depleted groundwater tables gradually recovered and the areas supplied by Water Works Number 9 experienced major improvements in drinking water quality.

The Beijing government is now undertaking considerable effort to protect the city's most important source of drinking water. In 1985, the Beijing government issued a trial regulation (*banfa*) titled the "Protection of the Miyun Reservoir, Huairou Reservoir and Jingmi Canal" that represents a model for Chinese water protection legislation. In 1995 this regulation was substituted with a more detailed administrative regulation (*guanli tiaoli*) that divided the reservoir's catchment area inside the boundaries of Beijing municipality into three water protection zones with

different protection requirements.⁵ The regulation bans certain economic activities, particularly inside water protection zone 1 (which encompasses the reservoir, the area inside the lakeside road and all areas 4 km off the shoreline). This regulation has helped the authorities control tourism and industrial development in the protection zone 1, as well as enforce the closure of some mines and smaller enterprises in protection zones 2 and 3. In recent years, the Miyun protection regulation has sparked programs to limit fishery and agricultural impact on the reservoir; however, it does not apply to 70 percent of the 15,788 km² catchment area in Hebei province, which includes about two-thirds of the 860,000 people living in the Miyun watershed.

The conflict concerning the protection of the headwaters of Miyun reservoir gained intensity during the drought year of 1999 when the inflow to the reservoir was reduced from a 400 to 800 million m³ (in years with average rainfall) to a mere 73 million m³. During the following drought years, the reservoir's inflow did not increase. While the reservoir has supplied approximately 600 million m³ for urban use per year, it has experienced dramatic drops in its storage, with only a few hundred million m³ left at the end of 2003. Thus if Water Works Number 9 maintains current production it will have to rely on additional supplies of groundwater. Moreover, with decreasing inflow to the reservoir there are rising concerns about deteriorating water quality and an increase in inter-jurisdictional water conflicts in the region.

Water Conflicts

Managing the city's water crisis and dealing with various cross-jurisdictional and cross-sectoral conflicts have become some of the most demanding tasks of the Beijing government. The two main water conflicts stemming from Beijing's growing thirst include: (1) regional conflicts over water distribution and quality, and (2) Beijing municipality limiting Miyun county's development aspirations—particularly under dispute are Miyun's control of mining and intensive fish farming and programs for restructuring the agricultural sector.

Regional Water Quality Conflicts

Beijing Versus Hebei

Many of these conflicts surrounding Miyun are regional in nature, crossing provincial boundaries. Since two-thirds of its catchment area belongs to Hebei province, the water quantity and quality of Miyun reservoir depend considerably on the land and water use systems in this province. How much Hebei is

Box. 2 Upstream Pollution Woes

The development of small enterprises—including iron mines, sawmills, and quarries—in the upstream areas has accelerated the deterioration of Miyun's water quality. Iron mines upstream from Miyun not only cause severe water pollution but also promote erosion as the low quality ore is quarried from open pits. One author who recently undertook extensive research on upstream pollution problems in the Bai and Chao rivers noted one particularly egregious upstream polluter is a brewery in Fengning county that annually discharged 1 million m³ of untreated wastewater into Chao River just 80 km off the reservoir (Yu Xinxiao 2003b). Yu correlated the water quality at different parts of the Chao and Bai rivers to the main locations of mines and industries and then concluded "Miyun might become a second Guanting." Industrial discharges flowing into Miyun county are often at the valueless water quality grade 5—the main standard exceeding components are ferrum¹ and phenol, which are used for volatilizing (Yu Xinxiao 2003b). The same author notes that in some upstream areas poverty of the rural population leads to over-tilling and deforestation, which promotes erosion and siltation in the reservoir. In Fengning county it is common practice for peasants to go to the mountains to cut brushwood and grass for fuel, thereby causing serious damage to the natural vegetation. To secure the annual demand of one peasant household 10 mu of natural vegetation are damaged (ibid).

NOTES

¹ In 1995, ferrum was three times above the acceptable rate, and by 1997 and 1998 rose to 39 to 150 times higher than acceptable standards, respectively

shaping the water quality is an issue strongly disputed between Beijing and Hebei.

Authorities in Hebei maintain that while more than two-thirds of the water in Miyun reservoir comes from their province, their per capita consumption is less than that of Beijing. Consequently, Hebei officials will argue internally that the government in Beijing should pay their province an adequate compensation for delivering water to Beijing—money that could be used to protect the upstream basin. Beijing's position is more elaborate: inflow from Hebei is already basically limited to the rainy season in summer, during which time wastewater and solid waste residues are being rinsed into the reservoir. Given this fact, Hebei should consider itself lucky for not being charged by the capital for water pollution.

Because of its sensitive nature, the question of the provincial shares of Miyun water has been difficult to resolve, particularly since detailed data on the amount and quality of the inflow to Beijing have been kept quite confidential. This secretive approach has started to change after a rare public statement was published in 2000 by the Beijing Municipal Water Conservancy Bureau, which frankly attributed the water shortage of the capital to the rising consumption outside the municipality:

Many new dams and reservoirs have been built in Hebei and Shanxi Provinces, which have reduced the average yearly flow of water into the Miyun

Reservoir from 1.2 billion m³ in the 1960s and 1970s to 800 million m³ in the 1990s, and into Guanting from 1.93 billion m³ in the 1950s to 400 million m³ in the last decade (Yan, 2000).

On its city web page, the Beijing government attributes the record low of Miyun reservoir "mainly to the large numbers of dam projects in the upstream areas...[where] more than 30 dam projects have been built to irrigate over 0.3 million mu⁶ of land and to support some industry" (www.bjsd.gov.cn).

Beijing has also garnered support for its position from the city's Environmental Protection Bureau, which has identified wastewater from upstream middle-sized settlements (towns, county seats, small cities) and from the light industries—mainly food processing—as the major source of pollution of the reservoir (Ding, 2001). More than 80 percent of the main pollutants in the reservoir are phosphates and nitrates originating in the upper reaches of the Chao and Bai rivers in Hebei province (Yu, 2003a). In addition to restricting industrial development within the municipality, within the Miyun catchment area Beijing's population density is below average, which further indicates that Hebei is the larger polluter of the reservoir area. The Chengde and Zhangjiakou areas in Hebei, which while not heavily industrialized contribute significantly to Miyun's headaches. (See Box 2 for more details on upstream polluters and land degradation).

Trying to solve Miyun's upstream pollution and

land degradation problems will require the creation of new, institutionalized approaches. One ad hoc attempt to solve the problem began a few years ago when the Beijing government paid an undisclosed sum of money to compensate Hebei for water obtained from the province. It is not known how this sum was calculated or whether it obligated Hebei to undertake any water protection activities. According to sources in the Beijing government this kind of ad hoc downstream-upstream compensation payment is occurring annually. The fact that a formal repayment from Beijing to Hebei based on present water issues already exists but has not yet been sufficiently institutionalized, shows the need for more analysis and agreements based on natural resource economics between Hebei and Beijing. A more precise involvement of the budgets of those departments, which help to protect the water resources, is logically the next step. Any form of payment for environmental services upstream must be transparent and should include mechanisms to directly reward upstream farmers and cities for protecting the watershed.

Compensation systems related to water reservoirs in China mainly have concentrated on reimbursing for the losses of arable land due to the construction of a reservoir. Such land compensation is relatively straightforward to calculate and execute. The establishment of compensation systems that relate to the availability of water is much more complicated and has a much wider range of impacts. In the case of Miyun, both the water shares with Hebei province and the water quality aspects would have to be taken into account in any calculation of compensation. In other words, an inter-provincial system of environmental economics would have to be established.

Beijing Water Disputes with Tianjin

The decision to designate Miyun as a water resource exclusively for Beijing in 1983 immediately caused a major water problem in the second metropolis in the region, Tianjin, for which a support diversion from the Luanhe River was built. Water from the Luanhe River began flowing in 1985 from the newly built Panjiakou reservoir, which has its main catchment area in Hebei. This new water diversion was only a short-term solution for Tianjin, which has been suffering from continuous droughts since 1997—exacerbated in 2000 when the water supply from the Panjiakou reservoir was exhausted. An emergency canal connecting Tianjin to the Yellow River in Shandong province has been used over the past few years, demanding frequent route changes to follow the varying flows of the river. Most

likely these additional diversions to Tianjin from the notoriously dry lower reaches of the Yellow River are causing constraints for water users at the middle reaches. Since institutionalized compensation systems such as between Beijing and Hebei have been difficult to establish, setting up compensation mechanisms over a wider range to include Tianjin and some western provinces at the middle reaches of the Yellow River, would be even more challenging.

In order to promote better coordination and fewer conflicts over Miyun and other water resources in the region, in 2001 the State Council ratified the “Plan for a Sustainable Use of the Capital’s Water Resources in the Beginning Period of the 21st Century (2001-2005). This plan paved the way for a successive rise of water fees to promote water saving, water treatment and water construction projects, and approved the inauguration of an inter-sectoral and inter-provincial coordination group responsible “for the protection of the water resources of the Miyun and the Guanting reservoirs and for inter-provincial water distribution” (Zhonghua Renmin Gongheguo Guofuyuan, 2001).

The group is chaired by the Ministry of Water Resources, co-chaired by the National Development Planning Commission, the Ministry of Finance, and the Beijing municipal government, and joined by the Ministry of Construction, the State Environment Protection Administration, the State Forestry Bureau and Hebei and Shanxi provincial governments. This multi-agency group formulates project management and implementation schemes to strengthen water resource protection and inter-provincial water allocation (Ministry of Water Resources et al., 2001). The State Council’s plan requires that projects within Beijing mainly be financed by the municipality’s budget, with adequate support from the central government. Water projects undertaken in the provinces of Hebei and Shanxi that benefit the capital should be financed by the central government (Zhonghua Renmin Gongheguo Guofuyuan, 2001). Together with the 2002 revised Water Law the formation of this group seems to be at least a significant first step in establishing a framework of new forms of cooperation between provinces and agencies, a step urgently required for improved watershed management.

City Versus County: Beijing Constraining Miyun County’s Development

The requirement to protect the reservoir’s water for supply to Beijing has complicated and constrained how the Miyun county government pursues economic

development.

This burden on Miyun's economy is at the center of contentious urban-rural water conflicts sparked by Beijing's growing thirst for drinking water.

With the establishment of water protection zones for the Miyun reservoir and its connections (Huairou reservoir and Jingmi canal) under the 1985 and 1995 regulations, a new legal framework with far-reaching land use and production restrictions was enforced in the Beijing part of the catchment area. Although not in all of its aspects fully coherent (Bucksteeg, 2001) and thus giving insufficient guidance to local leaders,

population pressures around the reservoir was seen by the Beijing leadership as a difficult, yet crucial policy to protect water quality.

Mining Around Miyun

All 47 small iron mines in Miyun were reportedly closed in 2000 by intervention of the local government to halt toxic pollutants and soil erosion into the reservoir. These illegal mini-enterprises usually used phenol for volatilizing, which was carelessly allowed to wash into the soil and the reservoir. After the sudden closure the miners gathered at the county government seat,

This burden on Miyun's economy is at the center of contentious urban-rural water conflicts sparked by Beijing's growing thirst for drinking water.

these regulations strongly restrict the production and income opportunities of the three counties (Miyun, Huairou and Yanqing), that share the Miyun water protection zones in the Beijing area (140,000 inhabitants, 4,500 km²). While the regulations lay out some compensation and alternative economic development strategies for the counties, these have not yet been fully carried out.

The most fragile parts of the reservoir are under the greatest pressure to limit economic activities. According to the 1995 water protection regulation, protection zone 1 of the Miyun reservoir is basically marked by the ring road around the reservoir (Yu, 2003a).⁷ The areas inside zone 1 used to have the highest population density and the best access to water. Ironically, these land use limitations for the local farmers are triggering alternative economic activities that are harmful to the reservoir—such as mining, intensive fish farming, and excessive breeding of other aquatics (Yu, 2003a). While tourism activities have been forbidden within all the protection zones since 2000, mining and small restaurants that have been set up within protection zone 1 are major pollution sources on the upper reaches of the reservoir within Miyun county.

In addition to regulations limiting many different types of economic activities in the reservoir—mining, aquaculture, and agriculture—there has also been a broad resettlement of residents away from the reservoir's banks since 1999.

There is little information available on the scope and impact of this resettlement policy, but lowering

demanding compensation (a member of the county government informed us later, that the government officials "could not leave the offices for one week"). In the weeks after the incident, the pits were emptied of already mined ore and left abandoned with no environmental remediation measures taken. In 2003 the municipal environmental and forestry bureaus started to discuss a program to afforest the open pits, in order to halt continued erosion of tailings and soil from the mines.

The closure of the mines around Miyun reservoir was made easier by increased production costs and declining product prices in recent years. Insufficient productivity is a common problem not only in small mining industries, but also has been a typical excuse by many enterprises in Miyun for their inability to invest into pollution prevention as required by the law.

Intensive Fish Farming near Miyun's Interlake

Commercial fish farming in one part of the reservoir's interlake began in the mid-1980s by introducing two new species of edible fish from southern China (e.g., variegated and silver carp). In 1986, fish farming in cages, a new farming technology from Japan, was introduced and subsequently sparked much debate about the economic advantages and ecological damage of intensive fish farming in the reservoir that carries drinking water (Liu, 1989). However, in 1995 this business expanded to 2,013 cages covering an area of almost 50 hectares (ha). In peak times, 1,500 tons of fish were produced per year using the cage technology, causing 2,250 tons of waste,

Map 1. Catchment of Miyun Reservoir



nitrate and residues to be dumped in the reservoir. By 2002, while only 1,080 cages owned by 80 fish farmers were left, they had increased production, which led to a yearly output of about 3,500 tons of fish and approximately 4,000 tons of waste (Yu Zhimin, 2003). Only in 2003 did the Beijing government issue a regulation prohibiting cage fish farming in the Miyun reservoir.⁸ (In the weeks thereafter, consuming fish was jokingly called a “patriotic” diet). However, this does not necessarily mean that fish farming in the reservoir and its vicinity has been totally abandoned.

The present Five-Year Plan of Miyun county indicates that the development of fish farms with a production volume of 1,000 tons is still promoted. Restaurant business (or at least the investment into it) directly at the reservoirs’ tributaries and within protection zone 2 is booming. One restaurant sign advertises: “Catch your fish (and we offer very exotic ones from south China) in artificial ponds and get it prepared within 30 minutes!” As these mini fish farms in artificial ponds need a constant flow of water, they directly dispose their wastewater into the reservoir.

Programs for the Restructuring of Agriculture in Miyun

As a special local variation of the nationwide “land conversion program,” in 2001 the government of Miyun county announced it would completely abandon

growing cereals, and instead develop perennial cultures, mainly fruit trees. Funds for compensation of the peasants during a five-year adjustment period were said to be available. The program expanded quite rapidly in Miyun and today small fruit tree seedlings have been planted on almost all of the cropland in the county, even on the larger plains, which during the first years of this land conversion program continued to be used for grain production. When asked about the conversion to fruit trees, peasants informed us they were not all that convinced about the shift, for the seedlings appeared to be mismanaged. Poor seedling quality and lack of management know-how, as well as uncertain marketing opportunities are common conditions of large-scale programs like this. While this land conversion program eventually could help to reduce the agricultural water demand in the county, it would probably raise the

input of chemicals for plant protection. Notably, while writing this article we heard that the county’s initial demand for a complete shift from grain crops to fruit trees was going to be modified.

Another major shift in the county’s agricultural sector came in 2001, when the Miyun county government announced a complete ban on chemical fertilizers within the next five years; several fertilizer companies were set up to produce organic fertilizers instead. Much of the county is using organic fertilizers, but there is still a long way to go for the transition to be complete. Since more limits were being placed on agricultural activities and fertilizer use, some peasants have attempted to set up dairy farms. After 2001 cowsheds suddenly appeared in large number throughout the county, notably close to rivers and evidently without any ground seal. Today, most of these sheds are empty, because—as we have been informed by local officials—the peasants had insufficient command of the new milking business.

Miyun’s land conversion and organic programs are in line with a general restructuring of Beijing’s agricultural policy, as announced in March 2001:

Grain-growing areas will be reduced to save ground water and more trees will be planted. Animal breeding and other ‘highly efficient’ agriculture

with modern water-saving irrigation methods will be developed. It is predicted that the water used in agriculture will drop to 35 percent of the city's water consumption in 2010 from 43 percent in 1998, and the figure will continue to drop to 28-30 percent in 2020.⁹

Miyun's local restrictions to protect a watershed are unparalleled in China where no other small or large watershed requires such strict controls on land use. Beijing has only slowly acknowledged the extreme economic burden being placed on Miyun county. Acknowledging the dramatic social and economic disparities between the city districts and the countryside in Beijing and the vast water-saving potential in Beijing, the city government has started to strengthen and improve overall water management. For example, water fees have been increased sharply twice since 2000¹⁰ and are expected to double by 2005. In a detailed Beijing government notice issued in 2002 the city's water and urban construction units were reminded to properly collect and deposit water fees—including the fees for industrial waste water recycling, water supply in city districts and townships, groundwater used for urban and rural supply systems and by township and village industries, as well as groundwater used for agricultural production (Beijingshi Renmin Zhengfu Gongbao, 2002, No.12).

The improvement of the water price management can be seen as very positive economic and political developments.¹¹ Despite the fee increases, water remains under priced in the Miyun watershed region, which has led to wastage. For example, the average production value of 10,000 Yuan in the Miyun area requires the consumption of 250 m³ water, whereas the creation of the same production value in the national average requires 103 m³ (Yu, 2003b).

In addition to rationalizing water prices in 2002, the Beijing government issued a bulletin (Beijingshi Renmin Zhengfu Gongbao, 2002, No.14) to strengthen water management overall. This government bulletin set up a detailed list of targets for municipal bureaus and commissions responsible for water, agricultural, political affairs, and city planning. Besides a long list of technical projects such as urban wastewater control and treatment, water plants or pipe improvement to reduce loss caused by leakages, the list of targets includes:

- 1) Introducing irrigation with treated water on 14,700 ha of farm land, and the closure of 1,000

groundwater wells in the districts of Chaoyang, Tongzhou and Daxing, where groundwater has been over-depleted;

- 2) Constructing 4,000 small water storage dams in mountainous areas;
- 3) Abandoning 1,400 ha of rice cultivation;
- 4) Installing water meters in 25,000 motor-pumped wells;
- 5) Extending water saving irrigation systems in 2.6 million m² garden and park areas;
- 6) Building 100 water catchment dams in mountainous areas and other water collection facilities, a further 13,300 ha to be subjected to water saving irrigation, erosion control on 300 km²; and,
- 7) Planting a total of 4,667 ha water resource protection forests.

Most of these tasks were assigned to the Beijing Agricultural Commission and Water Resource Bureau. Two tasks exclusively concerning Miyun (and Huairou) county were given to the Beijing Environmental Protection Bureau to: (1) close mining industries; and (2) increase the use of organic fertilizer in protective zone 1 and reduce chemical fertilizer input in 2002 by 30 percent in Miyun (with 70 tons being reduced in protection zone 1), and in Huairou by 1,000 tons.

Despite the important role given to the Agricultural Commission in this constellation of tasks, this list does not address all land use aspects sufficiently. Extension of water-saving irrigation, closure of deep wells and partial reduction (as opposed to a full retreat) of rice growing areas are without a doubt urgently needed and represent proper remediation measures. Dams and other water-collecting structures as well as erosion control should be useful if properly located and constructed—which is often not the case in such projects. The small amount of area designated for water protection forestry is however a surprise, but the Beijing government has issued some ambitious forestry activities in other city planning documents.¹²

Concerns about implementing the targets on this list are nevertheless justified. Many water dam and erosion control projects in China are often too ambitiously designed and then poorly funded. Local water bureaus tend to over-emphasize impressive engineering projects (especially dams) and neglect measures to promote their sustainability—particularly the project's susceptibility to erosion and siltation. A similar inclination for big engineering projects can be observed in the forestry departments, in which new

plantations and the beauty of accurately lined plant pits are emphasized, instead of the ecological functions of the vegetation (Rothe, 2000).

Another one-size-fits-all national strategy that needs adjustment in Miyun is the prioritization of soil and water erosion control in mountainous areas, which aims to keep as much soil and water on the slopes in order to overcome drought periods and to improve local economic village conditions. In many regions of China halting erosion through self-sufficient grain production and development of fruit tree planting have been excellent strategies to help address rural poverty and watershed degradation. In the semi-arid Miyun county, which must protect a large reservoir for a major city, however, the erosion protection strategy must be adjusted. Currently, Beijing's policy is ecologically and economically unsustainable in that it demands strict erosion control measures in Miyun while simultaneously draining increasing amounts of water from the reservoir *and* from new remote water supply sources. A part of the funds now used for the construction of expensive new supply systems would be better invested into local water resource protection and land management efforts that address both Miyun's development and Beijing's water needs.

Present Emergency Water Management in Beijing

Emergency plans for the present water supply to Beijing were worked out approximately three years ago. These plans rely on expensive diversions from other water-short areas with high transportation losses and on expanded extraction of groundwater resources. At the end of September 2003 a transfer from the Cetian reservoir, 157 km away in Shanxi province, marked the beginning of Beijing being supplied by a trans-regional water diversion. 50 million m³ were sent through the Sanggan River to the Guanting reservoir in a transfer, which lasted approximately 10 days with half of the consignment lost to leakage and evaporation along the way.¹³ As part of the "Plan for a Sustainable Use of the Capital's Water Resources in the Beginning Period of the 21st Century (2001-2005)" the transfer from Cetian reservoir will be repeated several times in the next years to help quench the capital's increasing thirst, supplemented by another major diversion project from Shijiazhuang (capital of Hebei province), which was launched October 2003 and connects Beijing to four reservoirs in the Hebei area of the Taihang Mountains. The provinces of Hebei and Shanxi are expected to annually contribute approximately 150 and 90 million m³, respectively, which equals about half the total

volume of tap water the city demands.¹⁴ Currently, the most important (and most ecologically precious) emergency supply resource is a 300-meter deep groundwater reservoir in Huairou county. Pumping officially started in September 2003; this aquifer potentially will provide the city 40 million m³ a year, a rate of pumping that exceeds the natural recharge, so this source of water can not solve the city's long-term water needs (Zhang, 2003).

Strategies and Conclusions

Beijing's water shortages and Miyun's conservation problems are complex and intimately linked. Solutions are also complex, but could most fruitfully be found by: (1) demanding improvements in Beijing's infrastructure, (2) requiring economic analysis of water transfer projects to the city, (3) enforcing better inter-sectoral coordination in the region, and (4) promoting true integrated watershed management in the Miyun catchment.

Beijing has already built up a fairly high quality urban water engineering system, however there exists considerable potential for water saving—particularly in improving urban water recycling technologies and making water use more efficient. One crucial investment would be to repair pipes to reduce water losses caused by leakages, which presently lose approximately 30 percent of piped water. In addition to repairing and upgrading the water infrastructure in the city, urban water saving systems also must be expanded to areas outside the city. Education and incentives to promote water conservation among citizens should also be emphasized. Ultimately, Beijing must shift its water management philosophy from an engineering supply management approach towards resource and demand management approaches (Yu, 2003b).

In addition to improving infrastructure, changes must be made in creating a water economy to strengthen water protection. Thus, the economic impacts of water conservancy projects must be better analyzed. Beijing already has no choice but to pay a much higher price for water supplied from the south than for water supplied by Miyun reservoir. However, a fully protected Miyun reservoir and a restored Guanting reservoir catchment could in the future provide the city with two much cleaner and cheaper water sources. It would be a big mistake to neglect these protection alternatives and let the pressure of the current emergency lead Beijing to focus solely on the "big supply remedy" from the south.

The establishment of the inter-sectoral and inter-provincial coordination group mentioned above is a very important first step towards sustainable water management in this huge country, but one should not expect such groups to produce immediate miracles. On the surface this coordination group looks comparable to effective international institutions created in Europe in the 1960s (e.g., International Water Protection Commissions for the Bodensee or the Rhine River). However, inter-sectoral cooperation is traditionally as weak in China as inter-provincial cooperative initiatives. One positive sign of change is that the National People's Congress (NPC) is currently working on a law to lay out a framework that commits different government departments to work together on water and other issues. Successful cooperation will require intensive collaboration at the technical level and steady inter-disciplinary work, not occasional meetings where the different departments claim their political interests.

By empowering river basin commissions, the 2002 revised Water Law significantly strengthens the strategy of using the natural boundaries of watersheds as a more relevant frame for water-related land use decisions than administrative boundaries. When the NPC was adopting this progressive water law, NPC representatives also discussed the option of improving the protection of Miyun reservoir by incorporating several Hebei provincial counties that lay in reservoir's watershed under the Beijing administration. Although this would be advantageous for integrated water management administration, it is not enough to help resolve the urban-rural conflicts and would only serve to increase tensions with Hebei. A more ambitious step would be for Beijing to extend—and help fund and enforce—the water protection zones beyond the municipality's borders into the Hebei areas of the watershed.

The protection of Miyun reservoir could be greatly improved by the integrated management of the entire catchment area. We suggest that the Miyun and other similar reservoir catchments in China apply the following key strategies:

- Promote and better control water discharge from the villages in catchment areas;
- Require the establishment of compensation systems in water protection zones that are not only transparent and protected by law, but also ensure upstream stakeholders who undertake water conservation work receive funding and are involved in the land use decision-making process;

- Introduce and fund rural solid waste and wastewater management measures;
- Restrict agriculture to water saving crops and water saving irrigation methods in terms of both water quantity and quality. One strategy could be to establish special land use types such as water resource protection forests and water resource protection orchards; and,
- Promote the development of water resource protection forestry, which requires a shift from the present focus on afforestation practices to a nature-oriented management of young trees, with forest types, vegetation patterns and vegetation intensity completely defined by their ecological and hydrological characteristics.

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ENDNOTES

¹ According to a *China Daily* report in October 2003, Beijing's existing freshwater reserves from Miyun are sufficient for fulfilling the city's needs for approximately ten more months (Guo, 2003).

² Water used for irrigation of urban green space.

³ The costs of building all three of the canals from south to north are estimated to be 486 billion Yuan (\$60 billion) ("New phase of vast project," 2003).

⁴ One such project has been a joint Beijing Municipal Water Conservancy Bureau and Sino-German project titled "Technical

Solutions for Sustainable Water Supply for Beijing from the Yongding River Basin/Guanting Reservoir." This project, which started in 2002 and is supposed to continue until 2005, concentrates on technical solutions and pilot projects for reducing the inflow of sediments and pollutants into the reservoir, as well as focusing on improvements in water quality of the Yongding River and artificial wetland construction. (www.wasy.de/WE-BB/en). However, these pilot projects will only bring minor improvements as long as inflow of untreated wastewater and sediments from upstream areas continues.

⁵ The complete text of the regulation in *Guojia Huanjing Baohuzongju Zhengci Faguisi* 1999 was translated into German in Sternfeld 1997a.

⁶ 1 Mu = 1/15 hectare.

⁷ The zone 1 area is approximately 217 km². A more topographical oriented area that would better protect the reservoir would not only include the ring road but also smaller nearby watersheds and to riverbanks, which would result in an area of about 600 km².

⁸ Document No. 47/2003 of Beijing Municipal government (Yu Zhimin 2003, *Miyun Xian Renmin Zhengfu*, 2003).

⁹ www.china.org.cn/english/2001/may/13001

¹⁰ With different levels for different user types and consumption quota, and including extra fees for water resource protection, tap water supply and wastewater treatment: (People's Daily 9/21/2000, 11/02/2000, 10/03/2003, Xinhua News Agency 01/21/2003).

¹¹ Yu Xinxiao (2003b) notes the desperation of the poor farmers in the upper reaches of rivers feeding the Miyun who have started small industries to improve their economic situation. Many of these industries use up natural resources and are seriously destroying the watershed's ecology. When their profits are low they intensify the degree of destruction. Similarly, if the profits are high, the farmers will extend their production, which also extends the ecological destruction.

¹² Such as the 2003 Beijing Water Resources Forest Protection Construction Plan (*Beijingshi Shuiziyuan Baohulin Jianshe Guihua*) and the Beijing People's Government 2003 Announcement (*Beijingshi Renmin Zhengfu Gongbao*).

¹³ Xinhua News Agency, September 28, 2003 www.china.org.cn/english/2003/Sep/76227.

¹⁴ The Shijiazhuang project will be completed by the end of 2006 (Xinhua News Agency, September 8, 2003). Most likely any transfers prior to that date will use existing waterways, similar to the diversions now taking place from Cetian reservoir.

Animals Asia Foundation: The China Bear Rescue

Across China, Asiatic Black Bears, (known as Moon Bears after the golden crescents of fur across their chests), are incarcerated for up to 22 years in tiny metal cages no bigger than their own bodies. According to the last official government figures, 7,002 bears are factory farmed under the most deplorable conditions and painfully milked each day for their bile, through crude metal catheters implanted into their gall bladders, or via permanent, open and infected holes in their abdomens - known as the "free-dripping" technique. Bear bile has been used in traditional medicine for over 3,000 years, but today, doctors agree that it can be easily replaced with numerous herbal and synthetic alternatives, which are both cheap and effective.

Following her horrific discovery of bear farming in 1993, Jill Robinson (MBE) campaigned tirelessly within China, resolutely building relationships and negotiating with government departments to bring an end to this cruel practice. The breakthrough came in July 2000 with the signing of a landmark agreement between the Animals Asia Foundation, the China Wildlife Conservation Association (CWCA) and Sichuan Forestry Department (SFD), which pledged to rescue 500 bears from the worst farms in Sichuan and work towards the final elimination of bear farming. Sanctioned by the central government in Beijing, this historic agreement was the first accord between the Chinese government and any outside animal welfare organization.



Since October 2000, dozens of bear farms have been closed and nearly 140 bears have been released into the care of the Animals Asia team at our Moon Bear Rescue Centre in Chengdu. On arrival, the bears undergo extensive surgery to repair their damaged bodies and months of patient rehabilitation, integration and enrichment, before release into a semi-natural bamboo forest sanctuary, where they will live out their lives free from pain and fear. Central to the Rescue Centre will be the Education Village, providing a unique opportunity for Animals Asia to spread a message of respect for all animals, whilst advancing the concept of animal welfare in China.

Already, growing interest is now being seen in China itself, following extensive coverage from Chinese print and television journalists, whose stories are spreading across the country in support of rescuing the bears and closing the farms. As a result, the groundswell of encouragement from the general public within China continues to escalate and shows how supportive people are towards ending a shameful and unnecessary practice.

Background to Bear Farming

The practice of farming bears for their bile has a relatively short history: Introduced in Korea in the early 1980s, the procedure of surgically implanting metal catheters into the bears' gall bladders to milk them daily was soon adopted by China. It was hoped that the introduction of bear farming would provide an easy solution to satisfy the local demand for bile, whilst reducing the number of bears taken from the wild. However, bears are still poached from the wild for their whole gall bladders or as an illegal source of new stock for the farms and the availability of farmed bear bile has saturated the market and fueled an increased demand for bear bile and bile products.

The Asiatic Black Bear (*Ursus Selenarctos Thibetanus*) is listed under the Convention on International Trade in Endangered Species (CITES) as Appendix 1 - the most critical category of endangerment. The growing demand for bile and body parts, combined with dwindling habitats has decimated the population of Asiatic Black Bears and it is estimated that only 16,000 remain in the wild in China.

To find out more about the historic China Bear Rescue please visit our website at www.animalsasia.org

A Different Growing Season South of the Mountains: Guangdong Province Rethinks Its Agricultural Development Model

By Peter Riggs

Guangdong Province has been the bellwether of change in China since the beginning of the reform period. In the early 1980s Guangdong was home to China's first experiments with "Special Economic Zones," which opened the floodgates of overseas investment into manufacturing and other light industries. Generally overlooked, however, is that Guangdong is again has the vanguard of change in still another sector: agriculture, which contributes substantially to the province's GDP and exports. Sustaining this agricultural success will be a major challenge, for in the rush of economic development over the past two decades, the environmental health of Guangdong's countryside—and oftentimes the welfare of its farming communities—has suffered. However, provincial leaders, in partnership with Guangdong's agricultural university and its network of extension agents and consumer health specialists, are rising to the challenges threatening the province's agricultural sector. Today, Guangdong is dramatically reorienting its food production and agricultural research systems, putting long-term environmental sustainability and the promotion of chemical-free and/or organic agriculture at the center of its provincial rural development efforts.



Guangdong Province has been the bellwether of change in China since the beginning of reform period. In the early 1980s Guangdong was home to China's first experiments with "Special Economic Zones," which opened the floodgates of overseas investment into manufacturing and other light industries. In the last decade the province has developed its capital, Guangzhou, and its second-largest city, Shenzhen, which borders Hong Kong, into major banking and finance centers. The province today remains at the forefront of the "economic revolution" that has transformed China in the space of two decades from a developing country into the world's most dynamic emerging economy.

Guangdong is again the vanguard of change in still another sector: agriculture. Too often overlooked by economists focused on the province's industrial muscle, agriculture contributes substantially to Guangdong's GDP, and agricultural products comprise a major part of its exports. Sustaining this success in the future will be a major challenge, however. In the rush of economic development over the past two decades, the environmental health of Guangdong's countryside—and oftentimes the welfare of its farming communities—has suffered. Several food safety and environmental health scares over the past few years have underscored the importance of developing "new thinking" for this vital economic sector.

But provincial leaders, in partnership with Guangdong's agricultural university and its network of extension agents and consumer health specialists, are rising to the challenge. Today, Guangdong is dramatically reorienting its food production and agricultural research systems, putting long-term environmental sustainability and the promotion of chemical-free and/or organic agriculture at the center of its provincial rural development efforts. It is giving farmers more control over production decisions, and in some cases, taking steps to ensure better treatment for farm laborers. Guangdong is skillfully positioning itself to take advantage of rising Chinese consumer awareness of food safety and quality concerns, and to secure the position of the province's agricultural-sector exports under the new international rules impacting China as a result of its accession to the World Trade Organization.

Stresses Sparking Change

Before noting the steps in the transformation of Guangdong's approach to agriculture, and the stresses that led to this transformation, it is important first to note the particularities of the sector there. This coastal southern province has never been a "rice bowl," in the sense of committing vast acreage to the growing of staple grains. Rather, Guangdong has long enjoyed comparative advantage in the production of subtropical

fruits, sugar cane, as well as farmed fish and horticulture products. For example, in the very recent past, Guangdong accounted for more than half of the *global* production of lychee, a fruit much-coveted by the Chinese. While households in this region obviously grow products to meet their own needs, Guangdong's farmers are not known for pursuing the conservative, "subsistence agriculture" strategies characteristic of Chinese agriculture in the pre-modern period. As the scholar Robert Marks notes, farmers in the region have long had a strong market orientation, with a commercial agriculture sector dating back to the Ming Dynasty (Roberts, 1998).

Another distinctive factor has been range of agricultural systems based on Guangdong's diverse topography. The flat and well-watered Pearl River Delta region was famous for the "dike-pond" agriculture system, in which farmers devote the major share of their acreage to ponds for raising fish, particularly carp, and recycle pond wastes onto the bunds and dikes fringing the ponds to grow citrus fruits, sugar cane, pineapples, and mulberry trees for feeding silkworms.² Most outside observers equate Guangdong with the Pearl River Delta, but in fact this fertile area comprises only a fraction of Guangdong's total land base. Eighty percent of Guangdong's land is hilly, and in this subtropical climate zone the soils are generally poor and highly susceptible to erosion.

Three major deforestation events in China's recent past—during the failed "Great Leap Forward," the chaos of the Cultural Revolution, and in the late 1970s and early 1980s as a response to insecurity of land tenure—led to alarming levels of soil erosion. Indeed, control of soil erosion has been a major concern of the Guangdong government for the last twenty years, and while initial erosion control efforts were designed primarily to prevent catastrophic flooding in urban areas by rivers swollen with soil loads—rather than the conservation of the rural land base—these erosion control programs planted the initial seed for the agricultural transformation now underway.

Initially, provincial and local authorities focused on engineering solutions to erosion problems, but this approach is gradually giving way to a more holistic focus on securing farmers' access to land, and the promotion of multi-storied agricultural systems that do a better job of holding soils in place. Lower-value annual crops ranging from corn to peanuts are therefore increasingly found as components of an integrated cropping plan, rather than as disease- and pest-prone monocultures. This green-cover, "multi-story" approach

to agriculture (indeed, one Chinese term used to describe the cropping system translates as "stereo-agriculture") captures the pounding rainfall that visits this subtropical region and prevents soil loss.

Soil erosion is but one of the drivers in Guangdong's agricultural transformation. Of equal importance was another kind of erosion: loss of consumer confidence in the province's food supply resulting from increased awareness of pesticide residue problems. Southern China has been the epicenter for a range of food safety scares in the last few years, ranging from chemical use on pig farms to avian flu in poultry to high levels of heavy metals in vegetables. Hong Kong, with its more rigorous food safety regulations and stringent testing requirements, has often served unwittingly as the "early warning system" for some of these scares (Ng, 1999; Stewart, 1999; Civic Exchange, 2004). Fairly or unfairly, suspicions have fallen on exports from mainland China (especially Guangdong) to the Special Autonomous Region of Hong Kong.

A third, more prosaic driver of change has been market forces. As China's internal transportation system led to lower costs for moving products to market, and as supply of certain agricultural commodities outstripped demand, different growing regions in southern China came into direct competition for markets. A glut in key commodities—particularly fruit—has put a premium on differentiating products by quality, and on more aggressive marketing of products from Guangdong both within China and abroad. Over the past few years, municipal leaders from Guangdong have spent weeks each spring traveling to metropolitan centers in China's north and east to secure contracts for the purchase of their goods.

Finally, two other, more recent phenomena are important in understanding the nature of the rural sector in Guangdong today. One is the presence of a huge number of seasonal migrants from other provinces (particularly Sichuan, Guizhou, Hunan, and Anhui) who flock to Guangdong seeking wage-labor opportunities in its orchards and fields. Indeed, while the "smallholder" model of agricultural production most associated with rural Asia still prevails in some pockets of hilly Guangdong, the overwhelming majority of field jobs in the province are now held by migrants. A huge percentage of the land base is leased by rural families to corporate or other "scale-farming" enterprises. Due to China's social and political structure, Guangdong has not, in a formal sense, had the massive consolidation of landholdings that is found in, for example, the Philippines; still, the presence of outside investment,

particularly from Hong Kong- or Guangzhou-based firms, is a major factor in production relations in the province. Recent legal changes that further secure land-use contracts and leases are accelerating the pace of outside investment into the agricultural sector in China. One can again look to Guangdong as a model—and in many cases, as a warning—of trends now sweeping China as a whole.

The penetration of national and international capital into Guangdong's countryside has also necessitated a rethinking of agriculture extension services. Provincial authorities are wrestling with these transformations, forming public-private partnerships for agricultural development and allowing for new types of farmer organizations to flourish. It is fair to say that

and increasingly finicky Chinese consumers while simultaneously halting degradation of the rural land base and reducing reliance on dangerous pesticides and chemical fertilizers? The following describes Guangdong's accomplishments in meeting this challenge.

Critical to the transformation has been the South China Agricultural University (SCAU), located on the eastern outskirts of Guangzhou city. Led by its president, Professor Luo Shiming, SCAU has put agroecological approaches at the center of its research methods.⁴ For the last ten years, talented graduate students from all over China have flocked to SCAU, attracted by the university's innovative approaches to ecological agriculture. While still a "work in progress,"

Food is absolutely central to Cantonese culture, and banqueting is the preferred medium of "social display" by those hoping to impress a sweetheart or a business partner.

the "next wave" of agricultural research in Guangdong will include much greater attention to social science concerns than was true in the past. Due to the fact that an increasing share of funding for agricultural extension is going to come from counties and townships, we can also expect that such support will become increasingly "site-specific" in orientation—with possible benefits for agroecological approaches based on local soil and climactic considerations.

Balancing the Food Production and Quality Demands

Having served as the "laboratory" for many of China's market reforms in the 1980s and 1990s, Guangdong became China's wealthiest province.³ This meant that the province had the financial resources to deal with the alarming legacy of environmental damage bequeathed from the policy instability of an earlier period. It also meant that there was a shift in the priorities of local consumers, from just being able to fill their stomachs to a greater concern for food quality and safety. This recent shift, however, may just be the reestablishment of a much older cultural pattern: food is absolutely central to Cantonese culture, and banqueting is the preferred medium of "social display" by those hoping to impress a sweetheart or a business partner.

The major agricultural policy challenge facing the province in the early 1990s can thus be summarized as: how can Guangdong meet the food production and food quality demands of both international markets

SCAU's curricular shift is worthy of study for institutions of higher education throughout China—how to bring priorities of the academe into accord with the broader social needs of China's people, particularly its less advantaged residents in the rural sector.

Another important player in the transformation has been the Guangdong Provincial Committee on Science and Technology, and its research-grant arm, the Guangdong Natural Science Foundation. While most Chinese research programs have had a highly applied focus, the Guangdong Natural Science Foundation—the first such provincial-level foundation in China—has shown unusual willingness to support long-term basic research, and to consider seriously input from farmers and other land managers. Dr. Luo Fuhe played a particularly important role in persuading the provincial science and technology committee to commit to long-term, participatory agricultural research. Dr. Luo is now a member of the National People's Political Consultative Congress. Further, high-quality research institutes at the provincial level dedicated to botany, geography, entomology, and animal science round out Guangdong's "knowledge infrastructure." With resources to contribute to collaborative research programs, high-level political support for rural development, and a scientific cadre oriented towards agroecological research, the structure was in place for Guangdong to make rapid strides in reorienting its agriculture sector away from an exclusive focus on production volumes, and towards ecosystem

health, environmental services, food quality and safety, and enhanced farmer incomes.

Current agricultural research and development (R&D) in Guangdong is organized in three areas: (1) demonstrating model systems, (2) enhancing core technologies, (3) and providing information and technical services. Below are some examples of agricultural R & D that is pushing Guangdong in the direction of more sustainable agriculture production systems.

Organic Lychees

Lychee is a fruit crop of particular economic importance to Guangdong, and has been a major focus of quality-enhancement efforts. At a number of research stations in lychee-growing areas of hilly Guangdong, SCAU has worked to develop organic and “high-quality” production lines. Pest management has been a major concern. Research has focused on stock enhancement, biological control, production of appropriate organic fertilizers through on-farm composting, and the intercropping in fruit orchards of species that provide habitat for those “natural enemy” species that keep pest numbers in check. It is also interesting to note the varied farm settings in which SCAU’s research teams work: on state farms, with farmer groups, and on lands leased by an outside entrepreneur. While this diversity of production settings is a complicating factor in the design of appropriate extension services, it helps diverse research programs to flourish.

Integrating Animals into Farm Production Systems

Despite a long tradition of integrating animals into farm production systems, the recent trend in China, as elsewhere, is towards more concentrated animal rearing systems. However, the severe water quality problems in Guangdong associated with over-reliance on chemical fertilizers has led researchers to consider ways to reintegrate poultry and pork production back into the overall farm plan, and also to expand research on composting of livestock wastes. Researchers at SCAU have developed organic “rice-duck” farming systems, and one can now buy “Organic Duck Brand” rice in urban markets! Both the organic rice and duck products are highly prized and fetch excellent prices. Research on organic pork production (including the formulation of organic feeds) is now underway at SCAU. Researchers in Guangdong increasingly take animal welfare concerns into account in the design of production systems. It may surprise westerners to learn that animal welfare concerns are even on the radar screen—but this

again shows Guangdong’s pragmatism: the province is merely anticipating the rise of these concerns as salient factors in international trade.

Farm-to-Table Orientation

Perhaps the most dramatic factor in the reorientation of Guangdong’s agricultural sector has been the advancement of a *farm to table orientation*—an approach not normally associated in China with scientific research and agricultural extension services. South China Agricultural University has set up an Organic Agriculture Information and Technology Service Center that is attempting to respond to the needs of producers and consumers alike. Organizing market and production services in such a way that brings concern for the entire agriculture supply chain under one roof is unprecedented in China. Provincial officials have harnessed the power of news media to promote and build broad social support for organic agriculture: the Organic Agriculture Information and Technology Service Center based at SCAU intends to use radio, TV, the Internet, and “informational hotlines” for disseminating consumer information, and to provide market information and production advice to farmers. This orientation, of course, reflects more than just the province’s concern for public health and the local supply of quality foodstuffs. It also demonstrates provincial leaders’ understanding that the future success of Guangdong’s rural economy will depend on its ability to develop and maintain a reputation for high-quality agricultural products. Guangdong’s long-term commitment to organic food production should enable it to maintain and expand its trade of fruits, grains, vegetables, meats and poultry in increasingly competitive domestic and international food markets. The Information and Technology Service Center is also an attempt to build a bridge between one model of agricultural extension—that based on former production brigade and smallholder models—to a newer, more integrative, and more corporate model for delivery of extension services. Rather than concern itself solely with production methods, the service center also attempts to give timely market price information to farmers, local leaders, and agribusiness concerns, which may affect planting and marketing decisions.⁵

Worldwide, much energy and attention have been devoted to organic certification and food labeling questions as part of the “sustainable agriculture movement.” The same is true in China. At present, two domestic food labeling programs in China compete for market share and consumer trust. One, administered

by the Ministry of Agriculture, is the “Green Food” program; the other, the Organic Food Development Center of China, is attached to the State Environmental Protection Administration, and is recognized by the International Federation of Organic Agriculture Movements. Both programs operate in Guangdong, but for the most part Guangdong has stayed out of the often-fractious debate over eco-labeling in China. The provincial “Green Food” office in Guangzhou failed to earn the trust of farmers, foreign investors, or quality-control inspectors, because it was seen primarily as a

general trend in agribusiness—a trend with profound implications for the future development of the Chinese organic foods sector, as well.

The organic sector in China did not originate as a “social movement.” From the beginning, the organics sector in China has shown strong “market fundamentals.” There is, of course, good and bad in this development trend: the market-price premium enjoyed by organic products helps to drive agricultural transformation, but farmers do not necessarily have the economic bargaining power to benefit from those

China has the most aggressive and well-financed genetic engineering sector of any non-OECD country, but there is considerable nervousness in China over genetically modified foods.

marketing arm of the Ministry of Agriculture’s State Farm Bureau. The Organic Food Development Center (OFDC) carries out some certification programs in Guangdong. There is, at this point, a substantial body of research on different organic certification schemes in China.⁶ To generalize the differences between the two schemes, OFDC has focused on partnering with foreign partners to certify particular products for export, while Green Food has concentrated its efforts on domestic marketing. Green Food has used its connections to the Ministry of Agriculture, and particular its close relation to the State Farm Bureau, to develop a vast array of certified products, and to market those products through retail outlets in most medium-to-large cities in China. Some Chinese researchers note that in a few cases, Green Food producers will quietly work with OFDC in order to gain certification of their products for international markets.

Private sector businesses are increasingly big buyers of farm products in Guangdong, and for them, supply chain management is a critical business parameter. The French retail giant Carrefour, for example, has contracted with particular farms for the delivery of high-quality lychee. In its negotiations with partners and research farms associated with SCAU, Carrefour made it very clear that it was uninterested in seeking third-party certification for these “quality product lines”—rather, what it wanted was supply chain assurances, which included spot-checks by Carrefour personnel in the fields and processing plants and greater vertical integration of its business concerns, “from farm to table.” This concern for vertical integration, of course, reflects a more

premiums. The broader question of how to increase the political and economic bargaining position of farmers and the rural labor force appears to have engaged China’s new leaders, and it will be interesting to see how such power might influence the development of the organics sector. At the other end of the “value chain,” we are seeing an astonishingly rapid rise in “supermarket culture” for urban Chinese. As buying patterns shift, the market position of major food retailers is growing much stronger. It remains to be seen if Chinese urban consumers will go the same route as consumers in Europe, Japan, and the United States in embracing the “organic farmers markets” and “community-supported agriculture” programs that place more control in the hands of farmers themselves.

For now, Guangdong farmers know that domestic markets for most agricultural products are completely saturated, which is pushing prices down. This relentless downward pressure on prices can best be combated by a focus on product quality. Again, the farm-to-table approach is backed by the province’s substantial efforts to market Guangdong’s products elsewhere in China. While there certainly is awareness amongst Guangdong consumers of the health and safety claims made for organic foods, the experience of food quality—*intensity of flavor*—appears to drive the market to an extent equal to that of the health and safety claims. And while exports of organics—to Hong Kong, and to further abroad—helped to jump-start this production orientation, urban purchasing trends suggest that local purchases of organic foods in southeastern China will grow at rates of 20 to 30 percent per annum, rates similar to that which has characterized the “take-off”

period of organic-sector growth in Europe, Japan, and the United States.

Guangdong has thus developed the *technical* capacity to reorient its rural sector toward “sustainable agriculture.” With South China Agricultural University as the focal point, Guangdong hopes to build the service infrastructure for organic production. There is political will at the provincial, county, and township levels to implement changes in orientation, but still in most cases a generally weak understanding of what is required to meet international organic production standards.

There are a number of controversial issues regarding the rural sector and the shift toward “quality production” that have yet to be fully addressed, whether at the national (Ministry of Agriculture) level or within Guangdong. These include:

- *The “planned” or “spontaneous” creation of farmer organizations.* Many voices in China are now calling for better rural-sector political representation—and political space for the creation of market-oriented cooperatives is opening up. Still, the creation of cooperatives is hampered by the long and distasteful hangover of past attempts at agrarian communalism; the creation of market cooperatives should be viewed in the larger perspective of building rural social capital in China. Of course, increasing the market power of farmers will obviously increase their bargaining position in other spheres as well—something to which provincial and central governments pay close attention.
- *Adoption and enforcement of national eco-labeling standards.* The Ministry of Agriculture feels that strict organic standards are simply too difficult for most Chinese farmers to meet, and hope to see less restrictive food safety and quality standards adopted nationwide. Yet farmers that enjoy OFDC labeling for their products have done extremely well in the international marketplace. China will need to take into account IFOAM (International Federation of Organic Agricultural Movement) standards if it hopes to penetrate the international organic food market.
- *Genetic engineering in food.* China has the most aggressive and well-financed GE sector of any non-OECD country, but there is also considerable consumer nervousness in China over genetically modified foods. The position of South China Agricultural University, for example, would strike

many westerners as schizophrenic: the university sees no fundamental contradiction between biotech and agroecology, and is encouraging research on both fronts.

- *WTO compliance.* While there is a strong national commitment to complying with the new rules and regulations brought about by China’s accession to the World Trade Organization, there is as of yet little understanding in rural areas about the potential impact of food safety standard rules. Local officials can be expected to resist enforcement efforts that undercut their authority. Still, it is tempting to overstate the degree to which WTO membership has driven changes in the agricultural model.⁷ It is more accurate to say that Hong Kong’s proximity and tougher food-safety standards have long conditioned Guangdong’s thinking about markets “abroad,” and that the arrival of WTO disciplines merely highlights Guangdong’s greater readiness to take advantage of new market opportunities.

- *Water pollution.* Both the continued over-reliance on chemical fertilizers and the increase in concentrated animal feeding operations are wreaking havoc with surface water quality in Guangdong. There is an urgent need to develop organic fertilizers, improve municipal solid waste management (including through composting of the organic fraction of urban wastes), and prioritize the safe handling of livestock wastes. Much of SCAU’s research also focuses on the development of botanical pesticides and on relating chemical ecology to insect predator-prey interactions.

- *Re-tooling extension services.* The move from a planned to a market economy has completely changed the way that agricultural extension services should operate. In Guangdong, many such extension services have been privatized. A variety of public-private partnerships might be explored, but it is crucial that the worst abuses of the “contract farming” approach found elsewhere in Asia be avoided. To date, we have no evidence that new approaches to agriculture in Guangdong have had any impact on increasing rural-urban income disparities.

- *The proletarianization of Guangdong’s rural labor force.* With its huge number of seasonal and permanent migrants—speaking different dialects, working under harsh conditions of dubious legality, remitting major chunks of their income

back to families elsewhere—Guangdong province’s agricultural labor market may resemble more an “advanced industrial agricultural sector,” such as that found in California, than it does other provinces in China. This industrialization of Guangdong’s agriculture does not preclude the creation of an organic farming sector; it means that increasingly corporatized models of organic production prevail—another way in which Guangdong could resemble California. Rural social relations, where Cantonese-speaking bosses oversee groups of Sichuanese and Guizhou migrant laborers, admittedly can be tense in Guangdong.

• *The role of agricultural universities.* Traditionally, agricultural universities in China have been under the joint control of the Ministry of Agriculture and the State Educational Commission in Beijing. High provincial officials in Guangdong, along with the SCAU leadership, have lobbied Beijing to put SCAU under the direct control of the provincial leadership. At the time this article goes to press, this move has yet to be finalized. But in any case, the province is pouring money into the university, greatly expanding student numbers and curricular offerings. This may indicate a move toward the “land-grant institution” model prevalent in (for example) the United States, with potentially positive implications for agricultural extension.

Agroecological Restoration

While the immediate driving force behind Guangdong’s rural-sector reorientation may be a concern for the competitiveness of its agricultural products in markets increasingly concerned with food quality and safety, the goals of the reorientation are much broader. The goals include restoring a degraded land base; maintaining rural communities and reconnecting them with local cultural traditions; and combating severe surface and ground water quality problems. To achieve these goals, scientists and planners in Guangdong have become practitioners of *agroecological restoration*, the attempt to “reconnect food systems with ecosystems.”⁸

Of course, one can see a number of fascinating agricultural-reform efforts in other parts of China today; indeed, the greater attention given to rural issues is one important way in which China’s new leadership is differentiating itself from Jiang Zemin and Zhu Rongji’s past urban bias. Yet it is in this wealthy southern province where the farm-to-table market opportunities, the “knowledge infrastructure,” and the

political willingness to innovate have come together most dramatically. Guangdong’s changing countryside may hold important answers not just for the future of agriculture in China, but also for the fate of rural livelihoods in response to globalization generally. The extent to which Guangdong’s new course can also assist western scholars and policymakers to focus on processes of regional differentiation occurring now in China—thereby correcting for the frequent Beijing-centric, urban, or Pearl-River-Delta-only lens we bring to our analyses—is also to be welcomed.

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ENDNOTES

² Silk production was formerly a mainstay of Guangdong's economy and remains in some areas an important alternative income stream for farm families.

³ Municipalities such as Beijing, Shanghai, and Tianjin are wealthier on a per-capita basis, but none have a rural hinterland into which such calculations figure; and the disparity in rural-urban incomes is among China's more intractable social problems.

⁴ Luo Shiming was one of the first students selected from China to study abroad in the early reform period (1979). Professor Luo worked at the University of Georgia's famous Institute of Ecology,

led by Howard Odum, where he imbibed the "whole-systems thinking" of this groundbreaking research group. Returning to China, Luo worked to combine the wisdom and experience embedded in traditional Chinese farming practice with newfound ecological approaches to agricultural development: hence the term "agroecological."

⁵ Some additional examples of agricultural innovations can be found in an article by Parham (2003) that describes a workshop the Federation of American Scientists and SCAU conducted to educate Chinese environmental nongovernmental organization leaders.

⁶ See in particular the work of Dr. Paul Thiers (1999, 2000, and 2004), Washington State University; reports from the International Federation of Organic Agriculture Movements (IFOAM, <http://www.ifoam.org>); publications of Pesticide Action Network Asia Pacific (<http://www.poptel.org.uk/panap/>); and an article by Jessica Hamburger (2002).

⁷ This point was made forcefully by senior Ministry of Agriculture officials at a seminar in Beijing hosted by the ministry and Action Aid China in December 2002.

⁸ See *The Farm as Natural Habitat* (Dana L. Jackson, Laura L. Jackson, editors; Island Press, 2002) for an excellent summary of how this rural-sector transformation is being approached in the United States. It is worth noting that several Guangdong scientists are also now establishing a China chapter of the Society for Ecological Restoration.

Assessing the Achievements and Problems of Rural Resource Management Programs in Western China: A Case Study from Gansu Province

By Seth Cook

In recent years, environmental problems in China's western regions such as water shortages, desertification and deforestation have generated considerable attention in the Chinese press. The government has responded with an array of measures designed to ameliorate these conditions, including sloping land conversion, the logging ban, and rural water supply initiatives. How effective have these programs been in rural areas? Using a case study of one project in Gansu province, with comparative reference to two other programs, my aim is to illuminate some of the achievements and problems of state-sponsored resource management in western China.

From 2000 to 2002, I conducted 11 months of dissertation research on a rainwater harvesting project in Gansu province, which is being promoted as a means of overcoming severe water constraints and poverty in rural areas. Rainwater harvesting is the collection and concentration of rainfall runoff, and has been used for centuries in northwest China to meet household water needs. Modern iterations both for household use and for irrigation are a recent innovation pioneered by Chinese scientists since 1988. Originally a provincial government program in Gansu, it has since spread to neighboring provinces. While quite successful in some respects, rainwater harvesting also faces systemic problems that are common to other rural development programs in China. The current focus on western regions in the central government's Western Development Program (*xibu da kaila*) underscores the importance of a critical analysis of these issues.

Government Promotion of Rainwater Harvesting

The large-scale dissemination of rainwater harvesting in Gansu has occurred in two main phases: (1) the 1-2-1 program, which began in 1995 and centered on solving drinking water problems; and (2) the current focus on the use of stored rainwater for the supplemental irrigation of grain, orchards and greenhouses. The 1-2-1 program derives its name from the recommended proportion of catchment area, storage tanks and cropland targeted for

irrigation. The idea was to build 100 m³ of catchment area, and two concrete water storage tanks and irrigate one mu (1/15 hectare) of courtyard land devoted to cash crop production. In practice, the 1-2-1 program focused on building water tanks for household use, with roofs and courtyards serving as the principal catchment surfaces that channel water into the tank.¹ County and township governments together with county agricultural extension bureaus provided the concrete needed for water tank construction, with villagers supplying the sand and labor.

Since 1997, dissemination efforts in Gansu have shifted to include rainwater harvesting agriculture,² which aims to provide limited irrigation of crops, particularly grain, vegetables and fruit trees. Water tanks have been built adjacent to fields, with roads, hillsides and concrete surfaces serving as catchments. Precipitation stored during the previous fall and winter supplies enough water to irrigate crops during the critical period before the arrival of the summer rains. Supplemental irrigation via rainwater harvesting has led to substantial increases in yields of grain crops (e.g., corn and wheat) and fruit trees (e.g., apple, pear, and peach) in some localities (Li et al., 1995; Gao and Zhu, 1996). It has also facilitated the commercial production of vegetables in greenhouses, providing farmers with an alternative source of income. The implementation of rainwater harvesting in Gansu has led other northwestern provinces such as Ningxia, Shaanxi, Shanxi and Inner Mongolia to adopt similar programs aimed at disseminating rainwater harvesting for household and agricultural use.

On the whole, the 1-2-1 program has been quite successful. It has basically solved the drinking water problems of more than a million people in semi-arid rural areas of Gansu.³ This is a major achievement, and has led to a dramatic improvement in the living standards of rural residents. The construction of water tanks in the courtyards of rural homes has eliminated the need to spend time and energy hauling water from distant sources, as farmers were forced to do in the past. This has freed up labor for other activities, such as the expansion of

animal husbandry, which had been restricted by water scarcity. Water harvesting has played a role in improving dietary patterns, particularly in terms of greater consumption of meat and vegetables, since production of these foods was limited in the past by lack of water. The increased availability of water for washing has also led to improvements in hygiene.

The success of the 1-2-1 program can be attributed to a number of factors. First of all, the program addressed

rainwater harvesting agriculture has been far less impressive. While it appeared to be working well in a few showcase villages that I visited, it has not been as widely disseminated, and has run into a number of problems, such as farmer skepticism, inadequate technical assistance and relatively high start-up costs. While the technical viability of rainwater harvesting agriculture and its appropriateness to the region have been demonstrated both in scientific experiments and

It appears that provincial and county government agencies can accomplish simple projects of limited duration like 1-2-1, but tend to stumble when implementing programs that require sustained work with close attention to local context.

a critical need of rural residents using a relatively simple, inexpensive technology. The program was well timed, in that it began in 1995 during a period of severe drought, which underscored the need to address rural drinking water shortages. The fact that it built upon indigenous water storage systems meant that it was already deeply familiar to farmers rather than something new that was imposed from the outside. Having depended on earthen tanks to supply drinking water in the past, farmers readily appreciated the value of concrete water storage tanks. The small scale of the tanks made them appropriate to the natural conditions of the area, as well as to operation by individual households, which are the primary unit of agricultural production in China today. Moreover, rainwater harvesting systems such as that promoted by the 1-2-1 program can produce immediate benefits, without the long construction delays associated with large-scale water conservancy projects. As soon as the tanks are completed, they can be used to store water for household needs. The fact that the program could be accomplished quickly in a given village accorded well with the short time horizons of local officials, whose terms are only three years long and who need to make their mark quickly if they are to rise in the bureaucracy.

The 1-2-1 program was able to harness local initiative where past rural development projects did not, because it was directly in line with farmers' need to assure subsistence and their sense of self interest. Unlike improvements to the land such as terraces, water tanks became the property of the household. They were something that farmers built for themselves, not for the government. For this reason, farmers have had a clear incentive to construct and maintain the tanks with care.

Compared with the 1-2-1 program, the record of

in the fields of a number of enterprising farmers, government agencies have not been very successful in disseminating it on a large scale.

The contrasting achievements of household and agricultural versions of rainwater harvesting are indicative of state capacities in rural development. The 1-2-1 program was designed to address a relatively simple problem—essentially all that was needed to meet a household's drinking water needs was to build one concrete water tank and pave over their courtyard—and one that lent itself to top-down, bureaucratic implementation. It succeeded partly because it fit well into the campaign framework. Conversely, the agricultural applications of rainwater harvesting require continuous extension work over several years (and longer in some cases), as well as enough flexibility to meet the specific ecological and socioeconomic conditions in each locality—things which government bureaucracies are not as well suited to providing. Thus it appears that provincial and county government agencies can accomplish simple projects of limited duration like 1-2-1, but tend to stumble when implementing programs that require sustained work with close attention to local context.

Rural Resource Management: Problems and Contradictions

Many of the problems that I observed in my research on rainwater harvesting are systemic in nature and thus are relevant to other state resource management programs currently underway in western provinces. These problems, in turn, are often symptomatic of more fundamental issues such the target-driven nature of China's administrative system in rural areas, as well as the lack of accountability on the part of local cadres both to their rural constituents and to the dictates of central authorities. Under the

xiaguan yiji (one-level-down) management system which was implemented in the mid-1980s, officials at all levels were given full authority over their subordinates. As O'Brien and Li (1999: 171) observe, "one-level-down management has encouraged cadres to be hypersensitive to their immediate superiors at the expense of other interests, and it has increased the ability of superiors to get their underlings to carry out unpopular policies. Rural cadres may obey a directive from their bosses one rung up, even if they know it conflicts with a measure promoted by higher levels." A related issue are the incentives created by the cadre responsibility system (*ganbu gangwei mubiao guanli zerenzhi*) to meet fixed targets assigned by one's superiors (O'Brien and Li, 1999). Targets are assigned to tax collection and family planning, as well as other measures like tree planting. Each target is assigned a numeric value in the cadre's performance evaluation. In the case of tree planting, what matters is the number of trees planted in a given year, not how many trees survive one or two years later. The necessity of meeting fixed targets and pleasing one's immediate superiors, together with the brief tenures of most cadres in a given post, encourage short-term thinking and the tendency to favor display over substance in rural development and natural resource management.

Display over substance. Water collection tanks for rainwater harvesting agriculture built adjacent to roads were often intended as a showcase for official display. In many cases tanks were poorly constructed and lasted only a couple of years, but they fulfilled a purpose in terms of meeting bureaucratic targets and facilitating convenient inspection by visiting cadres. From an official standpoint, appearances are more important than whether programs actually work. As long as higher ups and other visitors are pleased with what they see on cursory tours of rural areas, then projects are deemed a success. The views of local people matter little, because officials are not directly accountable to their rural constituents, only to higher levels of the government bureaucracy. Furthermore, official visits to rural areas are carefully scripted, and there is little chance of local views being heard which contradict the priorities of the cadres arranging the visits. For this reason, officials have little incentive to produce lasting results, only to meet their targets in the current campaign. From the perspective of state agencies, whether or not a given program lends itself to display often matters more than its content. The emphasis on large infrastructure projects in the central government's current Western Development Program—as opposed to investments in areas such as primary education, health care and local

road improvement which matter more to rural people—is partly a result of the imperative for display.⁴

Science and technology fetishism. The obsession with technological solutions to complex problems that characterizes China today borders on a religious faith.⁵ While there can be no denying the importance of science and technology in China's development, in many rural development projects there is a clear tendency to value technology without reference to its ability to improve human welfare, just as there is an *a priori* preference for greater technological sophistication. I observed this in Gansu with respect to greenhouses irrigated by rainwater harvesting. There are at least three gradations of sophistication available in Gansu, but it is the most advanced types of greenhouses which are upheld as examples, and that local government officials show most often to visitors. The implicit assumption behind this is that the latest technology is the best, seemingly without consideration of whether it is suited to the actual conditions prevailing in an area. Rainwater harvesting is relatively low tech, and this has been a major source of its success. However, this simplicity is seen not as an asset, but rather as a liability. In fact, provincial and county government officials speak of the need to "raise its scientific and technical content." Ironically, high tech is glorified in spite of the fact that China has an excellent record in the development and dissemination of appropriate technologies such as rainwater harvesting, efficient cookstoves and biogas generators, which have benefited a much larger number of people than advanced technologies. For instance, more than 120 million efficient cookstoves have been disseminated in China, reaching seven out of ten rural households (Kammen, 1995). About five million household biogas digesters are in use today, mostly in the southern provinces, serving some 25 million rural people (Qiu et al., 1990).

The preference for technological sophistication is evident even in afforestation projects. As one report on a large shelterbelt system emphasizes, "the composition of [the] shelterbelt forest system was based on countless laboratory experiments involving computer modeling and wind-tunnel tests. As a result, the shelterbelt forest was planted in a configuration designed to provide optimum protection for vegetation and the surrounding environment" (Williams, 2000: 510). While afforestation is less of a technical problem than a social one (particularly a collective action issue), it is no accident that technical solutions are preferred. Social approaches open up the possibility of questioning and thus are potentially threatening to a party that has long presented itself as the arbiter of truth. Technical approaches, on the other hand,

facilitate the exercise of state power under the seemingly neutral guise of science.

Corruption. Corruption is symptomatic of a lack of accountability on the part of local government officials to both their rural constituents and to central authorities. It is often extremely difficult to detect, because cadres are adept at concealing evidence from visitors to their localities, whether they be higher officials or foreigners. For instance, villagers in Gansu told me that before representatives from a Chinese foundation visited their village to view a water harvesting project they had funded, local cadres arrived first to replace the lids of water tanks with ones which bore the foundation's name. The foundation representatives went away satisfied with what they had seen, when in fact they had viewed tanks that had been constructed with money from another organization. There were numerous other examples of cadre corruption that I encountered in my fieldwork, such as discrepancies in the number of bags of cement delivered to build water tanks as part of the 1-2-1 program. Another case was the reduction or even outright cancellation of grain and cash subsidies for sloping land conversion (*tuigeng huanlin*). Villagers in one of my field sites told me that the police set up roadblocks to levy charges on tractors, and that their vehicles were subject to five different types of taxes. Farmers who refused to pay were beaten up. Corruption is rampant in rural areas for a number of reasons: lack of accountability on the part of local governments, bureaucratic control over the distribution of resources and the expansion of township-level administration in the last two decades (Bernstein and Lü, 2000; Saich, 2001).

Top-down, one-size-fits-all approaches. There is a longstanding tradition in China of using large-scale campaigns to develop the economy, consolidate state power and achieve environmental goals such as afforestation (Economy, 2002). The Western Development Program is the latest example of this tradition. The government's predilection for mass campaigns is symptomatic of the tendency towards top-down, one-size-fits-all approaches to rural development and resource management that ignore local ecological, social, and economic differences. In China, there are often large variations within counties, let alone within provinces, so attention to these differences in formulating policy is paramount. However, state bureaucracies are not accustomed to conceiving and implementing context specific approaches, and this has been a major stumbling block to the dissemination of rainwater harvesting

agriculture.

The sloping land conversion program, which has been conducted on a wide scale in Gansu and is part of central government policy to promote grass and tree planting in ecologically fragile areas throughout western China, typifies the limitations of the state's campaign-style implementation. The program arose from the center, not from the localities where it is being promoted, and so the program reflects central state rather than local perceptions of land use issues. As with past grass and tree planting projects, since local people were not consulted in the planning process, they do not necessarily see their interests as coterminous with the project, and may not participate conscientiously in its implementation. Apparently, tree survival rates are even lower than in previous tree planting campaigns—a stark commentary indeed, given the high seedling mortality rates of the past.⁶

The limited nature of local participation removes those who have the most at stake from the decision-making process, and also those who are most familiar with local conditions, and may be in a position to suggest solutions. Farmers know better than anyone else which lands (if any) are suitable for trees, which ones are best planted in grass, and which plots should be maintained in grain crops. But the farmers are not being consulted in making each county's crop retirement plan. Instead, the county government decides how much land to allot each year to crop retirement, then hands that figure down to the township government, which then draws up a plan of which lands will be included in the plan for that particular year. In two of my research sites that have been included in the plan, the only lands being retired are adjacent to roads, clearly meant for convenient viewing by cadres who will be able to drive by and inspect the program without having to get out of their cars. Several of my other research sites that lie close by were not included in the plan, and villagers believe this is because they do not have any land adjacent to the main road. Another feature of the sloping land conversion program is that in practice it does not seem to be exclusively targeting fragile hillside lands, which are the ones where planting grass really makes sense and were supposed to be the focus of the program. This is not only the case in Gansu. For instance, a former Ford Foundation program officer in China informed me that flat lands all around Zhongdian in Yunnan province were planted in trees to meet targets in this program.

The fact that sloping land conversion builds the interests of households into the program is positive, as is

the scale of state investment in terms of the commitment that it represents to environmental goals. On the other hand, there are doubts about its long-term viability. The types of vegetation created tend to be single species, so it is of dubious value ecologically, besides the potential for slope stabilization. Since there is little monitoring of its environmental impacts, there is no way to tell whether or not the program is actually stemming erosion. Another problem is the economic distortions created by grain subsidies, which have depressed the incomes of grain farmers in some areas.⁷

Many of the same patterns are also evident in the logging ban. The areas covered by the ban are determined by government agencies, without consulting local people or compensating them for the inability to harvest products from individually and collectively owned forests. Moreover, the lands covered by the logging ban are not exclusively primary forests, and include many secondary forests which are not necessarily critical in terms of biodiversity, but which rural people depend upon for their livelihoods (Xu et al., 2001). The policy is an attempt to stem deforestation through central planning, when in fact a large part of the forest loss was originally caused by central planning.⁸ The logging ban is causing enormous hardship at the local level both because of the failure to distinguish between areas of greater and lesser ecological importance, and because of a preference for locking up tracts of forest land (often prohibiting the extraction of non-timber forest products as well as timber), rather than promoting sustainable use.⁹ The logging ban's simplification of a complex landscape has facilitated bureaucratic administration, though at a high price in social and economic terms. As in the case of rainwater harvesting agriculture, the tendency towards simplification in sloping land conversion and the logging ban underscores the state's inability to cope with complexity and heterogeneity at the local level.

Conclusion

The problems with government-sponsored programs suggest the need for alternative approaches. In the case of rainwater harvesting agriculture, a more limited state role in the dissemination process may be needed. Rather than trying to manage all aspects of the program, county and township governments can focus on providing training and facilitating the creation of markets for affordable irrigation technologies such as micro-drip systems. This was the case for the successful National Improved Stove Program in China, which has led to the adoption of more efficient biomass stoves in some 120 million rural households.

Nongovernmental organizations can also play a key role in market creation. For instance, the efforts of International Development Enterprises to promote drip irrigation systems geared towards small farmers in northwest China and elsewhere have been quite promising (Postel et al., 2001).

In the case of tree and grass planting programs, a more limited state role is also appropriate. Rather than township governments dictating to peasants where and when to plant ground covers—an approach which is almost certain to fail—local governments should encourage farmers to retire hillside lands on a voluntary basis once their food security needs have been met (a process which rainwater harvesting can facilitate). Once farmers are ensured of adequate grain supplies even in dry years, hillside plots can be planted in grass, which can serve as fodder for the expansion of animal husbandry. Provided that greater attention is given to the marketing of animal products—a role that county and township governments can provide—the expansion of animal husbandry can lead to higher incomes for farmers, as it already has in many cases. Other options include orchards and greenhouses for cash crop production. The common denominator is the need to pay close attention to farmers' preferences and maximize their choices. This in turn implies a qualitatively different role for the state in rural areas, namely less emphasis on control and more attention to the facilitation and provision of services.

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ENDNOTES

¹ In some of the villages I visited, the irrigation of courtyard cash crops was a part of the 1-2-1 program. However, in most villages in Yuzhong and Dingxi counties (where my field sites were located), the 1-2-1 program focused on constructing household tanks to meet villager's drinking water needs, and did not include an irrigation component.

² For a more extensive discussion of rainwater harvesting agriculture, see Cook et al. (2000) and Li et al. (2000).

³ This is the case regardless of whose figures one uses, and even if government estimates are substantially downsized. In times of severe and prolonged drought, however, those households with only one tank would still suffer from water shortages. Furthermore, rainwater harvesting cannot cope with droughts that last several years.

⁴ There are several other key reasons for the emphasis in the Western Development Program on major infrastructure investments like the Tibet-Qinghai railroad and road-building projects. The first is the belief that poor infrastructure is a major bottleneck to the development of western regions. The second is economic stimulus. As Kahn (2003) observes, the Chinese leadership is concerned that a slowdown of the economy could threaten its hold on power, and is pumping large amounts of money into infrastructure in western regions in order to keep the economy growing rapidly.

⁵ China's successful launch of a manned spacecraft in October 2003 is the latest and perhaps most dramatic example of this phenomenon.

⁶ Information on tree survival rates in the sloping land conversion program from Hein Mallee, Ford Foundation Beijing (personal communication, 30 July 2003). See also Smil (1984:13-15) for information on the dismal record of past afforestation campaigns. Smil notes that according to Chinese government sources, no more than one-third of seedlings planted since 1949 have survived. In many cases, survival rates were below 10 percent.

⁷ Hein Mallee, Ford Foundation Beijing (personal communication, 30 July 2003). See also Xu et al. (2001).

⁸ On the contributions of central planning to forest destruction, see Richardson (1990) and Ross (1988).

⁹ Seen in a wider regional context, the logging ban has simply shifted unsustainable logging to neighboring countries, including Myanmar, Russia, Malaysia and Indonesia. China is even importing wood from countries as far away as Gabon, and is now the second largest timber importer in the world after Japan (Pearce 2001).

Food, Environment and Health Post-SARS: Corporate Expectations and Participation

By Megan Tracy

In first half of 2003, SARS (Severe Acute Respiratory Syndrome) challenged Beijing's urban population to reflect on what were for some of its members already significant anxieties about the health and well-being of themselves, their families, and, to a degree, of the entire nation. I received many well-intentioned warnings about many things during the peak SARS period, especially in the area of what food to consume and where to go to purchase it. "Eat more meat, eat *paocai* [pickled vegetables], avoid big supermarkets, cook at home"—all these admonishments and more I heard from Beijing friends, colleagues, and even the occasional taxi driver. What seemed clear in a country that spends a significant portion of its time in the production and consumption of food was that apprehension over health and food safety was exacerbated during this period.

The most explicit links between SARS, food consumption, and environmental issues were the connections made largely in the media between the consumption of wildlife and the possible link to the virus' origin, which caused the government to enact stricter regulations to limit wild animals landing on dinner plates. The opportunity, however, to use SARS to draw attention to other environmental issues was not lost on environmental groups. A news article published by Xinhua News Agency in May 2003 reported that Chinese environmental groups had targeted several sectors of society, including local communities, businesses, scientists, and journalists, with the responsibility for both protecting the environment and "rethinking their behavior." Specific demands listed in the article included greater community participation in environmental protection, increased scientific exploration into the links between environment and disease and promoting ideas of sustainable development within the corporate community. The environmental groups' appeal to encourage healthy lifestyles and protect against disease came at a time when probable cases in Beijing were numbering in the thousands and speculations about the human-animal link of the disease's origins were being disseminated widely.

More than half a year away from the early and tense days of the SARS virus, Beijing's populace seems to have returned largely to their pre-SARS patterns, routines, and behavior. Restaurants are full again, stores are as crowded

as ever, and the obligatory hand-washing when entering a building has petered out. However, the news media has continued to publish information about SARS research while the government maintains a low-level public health and sanitation campaign. Moreover, some commercial sectors in China have utilized the public's greater attention to the food, environment, and health nexus to promote their own products and ideas. One such sector is the "Green Food" (*lüse shipin*) industry that concentrates on the development of pesticide-reduced and chemical additive-reduced products. In conversations with representatives of a few Green Food corporations and with the Green Food Development Center just after the height of the SARS virus, I found expectations were high that experiences from this period would aid in the promotion of their products. In my more recent exchanges, Green Food representatives have begun to downplay the impact of SARS, but have emphasized the industry's continued commitment to both the environment and public wellbeing.

Green Food's Goals and Protecting the Public's Health

In 1992, the development and management of the Green Food industry was instituted under an organization created by the Ministry of Agriculture—the Green Food Development Center (GFDC), which was charged with certifying food-items as compliant with green foods standards.¹ Green food production, according to the institution's representatives, is envisioned as achieving several goals—protecting the agricultural ecological environment, improving food quality and safety, and ensuring people's health along with improving economic development in rural areas.² Products certified by GFDC, the only entity able to certify this type of food, bear the Green Food trademark along with a product's specific serial number. The mark itself depicts a sun, leaf and bud within a circle, which according to materials provided by the GFDC, represents the "harmonious" relationship between man and the environment. Corporations that meet the certification requirements of GFDC are given permission to use the trademark for a period of three years. At the end of 2002, more than 3,000 products nationwide were registered with the Green Food

Table 1. Scope of Green Food Certification 1997 and 2002

Year Certification Granted	Total Number of Enterprises Employing GF Certification ¹	Total Number of Certified GF Products	Monitored Area (per 10,000 mu) ²
1997	544	892	3213
2002	1756	3046	6670

Source: Adapted from *Green Food Statistical Report* (2002).

TABLE NOTES

¹ Corporations are allowed to use the Green Food trademark for three years before having to be recertified.

² One mu equals .165 acres.

trademark. (See Table 1). Moreover, most certification is taking place in relatively underdeveloped areas in China, which are considered to be less polluted than in the over-industrialized coastal areas. (See Table 2).

CSR and Green Food Producers: Ongoing Activities and Possibilities

In midsummer 2003, I traveled to the Inner Mongolian Autonomous Region (IMAR) to conduct preliminary interviews with the regional GFDC office and with two of the largest Green Food dairies in the region. My goal was to learn if they perceived a significant increase in interest in their products or new opportunities for Green Food development as a result of the epidemic. Notably, both dairies responded to the health crisis by donating both money and goods to help in the regional and national “battle” against SARS. I was intrigued with these donations, for the usual type of “socially responsible” activities by Chinese national corporations are often limited to their support for ubiquitous (usually unsuccessful) tree-planting campaigns that are carried out by schools, nongovernmental organizations (NGOs), and government offices. Thus, I was curious to hear directly from dairy representatives how these particular donation activities fit within larger corporate objectives. Moreover, I was intent on learning about the extent of corporate social responsibility (CSR) activities within these two corporations with an eye toward learning if there was a general interest in these issues within industry. CSR focuses on the integration of a set of ideas into corporations’ core business practices, encompassing but not limited to corporate governance, philanthropy and social investment, leadership, and corporations’ relationship with all of their stakeholders.³

In general, most experts and practitioners I consulted

during my field period consider CSR knowledge and practices to be fairly limited among Chinese corporations. At the same time, preliminary information that I was gathering about these corporations indicated that they were engaging in “socially responsible” activities, posing an interesting area for further investigation with the companies themselves. What I discovered was a strongly articulated commitment in these dairy corporations to the welfare of China’s citizenry and to the larger nation, which I am using here deliberately to refer to both the land and the people.⁴ Their position is echoed in statements produced by the GFDC and the China Green Food Association (CGFA) and its agents.⁵ Below I highlight the insights I gained into one of the companies, the Mengniu Dairy Corporation.

Milking SARS for What It Was(n’t) Worth

On driving to Mengniu’s operations in Helin county outside Huhhot, my host from the Inner Mongolia GFDC office informed me that Mengniu’s development has transformed one of the poorest counties into one of the wealthiest. The amount of new buildings and ongoing construction that we observed as we drew closer to Mengniu’s plant drove this point home. Construction of new buildings, however, was balanced by open spaces, dotted with cement replicas of traditional felt homes of Mongolian herders. In a news article about their SARS donation (Sohu.com, 2003), the corporation’s CEO, Niu Gensheng, was quoted as saying that Mengniu’s success was dependent upon the people and therefore the Mengniu Corporation had a responsibility to take care of the people—a sentiment echoed by Mengniu’s representative in our interview. Niu Gensheng also stated that the demand for her corporation’s products increased during SARS—largely due to the nutritional, healthful

content as well as the bulk packaging of their product. During the SARS outbreak, consumers were reluctant to spend a lot of time in stores and thus tended to purchase items available in bulk quantities.

Mengniu, however, in Niu's view, is not the average Chinese privately held corporation in that it has operated from its very beginning as a "true" joint-stock system (*gufenzhi*) rather than being a transformed state-run enterprise (*guoyingqiye*). The latter type of corporations often are hampered by management styles and a corporate philosophy leftover from their state-run days. When asked directly about their responsibility to the environment and to the common people (*laobaixing*), she replied that competition between dairy companies has spurred on development in the region. Thus, without these corporations, local people would have no market for their products, so their economic livelihood is therefore the company's responsibility. With regard to the environment, in addition to tree planting and trash collection programs in accordance with local government plans, the corporation has also initiated a program in their immediate area to convert farmland to grasslands. Although the area is not large, the ultimate goal is to

promote local farmers' understanding of the environmental and economic advantages of maintaining grasslands. My interviews and review of Mengniu's corporate materials stressed their dependence on healthy grasslands.

Still at the Initial Stage

When I attended a Green Food conference in the fall of 2002, I was struck how these corporations from across the country did not express strong commitment to social responsibility or at least they did not articulate these commitments in a manner that we in the West are used to hearing them. With the former structure of the state-run enterprises' that once provided the bulk of their employees social welfare needs (such as schools and clinics), it is, perhaps, not a surprise that they seem still to be framing the meeting of such needs within what may be considered as "corporate paternalism."⁶ Particularly in the case of the rural populations that are often the suppliers of land and labor for these corporations, corporate comments often focused on their ability to shelter from a potentially volatile market and provide services that these groups might not otherwise

Table 2. Locations Reaching Over 100 Certified Green Food Producers

Location	2000	2001	2002
Entire nation	1831	2400	3046
Beijing	58	90	100
Shanxi	81	107	188
Inner Mongola	159	183	220
Liaoning	77	104	154
Jilin	101	106	129
Heilongjiang	205	401	532
Jiangsu	90	118	149
Fujian	133	129	127
Shandong	136	150	153
Sichuan	76	103	170
Xinjiang	57	87	118

Source: Adapted from *Green Food Statistical Report (2002)*.

be able to access (e.g., loans and housing). Mengniu's clear mission to social welfare and the environment and its largesse in corporate social responsibility activities are perhaps the exception rather than the rule among Green Food industries.

Similar to other types of corporations in China, many of the Green Food industries as yet fail to see a direct link between social and environmental welfare activities and a tangible benefit for their corporation. The Green Food industry itself has had to launch widespread information campaigns to educate consumers and other members of the public about the potential benefits of Green Food. These campaigns appear to be quite successful given the rapid growth and development of the industry. National Green Food corporations are already employing technology and standards intended to further sustainable development and provide economic benefits to rural communities. Encouraging them to promote other types of activities that may provide additional advantages to their corporations could add another supportive dimension to their campaign. Moreover, because this industry is run assuming benefits to the "common people" are seen as able to be achieved through the corporation rather than coming up from the grassroots level, promoting these developments at the corporate level is a necessity.

A Boon for Green Foods?

Green Food industries remain unsure whether SARS actually sparked more than a short-term increase in the consumption of their products. While the long-term impact of SARS is even more difficult to assess, it is striking as one in a series of indicia that has propelled the food, environment, and health nexus into a prominent position in public conversation.⁷ One does not have to look beyond the daily news to get an idea of what other factors have raised public consciousness of food safety—such as the overuse of pesticides, chemical fertilizers, and other food additives.

That companies and other representatives of the industry have seized upon SARS as a potentially profit-enhancing factor indicates a need for those interested in these issues to examine how this incidence and other events are being constructed and used by these actors. For example, the upcoming 'Green' Olympics, with its attempt to create associations between environment and health, is another such event that these Green Food corporations have mentioned explicitly as an opportunity to capitalize on this relationship.⁸ Supporters of this industry, whether they are the companies, the regulators or informal promoters, see the environment, food, and health link as a method to gain competitive advantage

in the Chinese market with the hope of expanding internationally.

The Green Food industry could also increase their market niche by becoming the China's first industrial sector to develop a strong commitment to corporate social responsibility in the environmental and health spheres. While some domestic and international environmental NGOs have conducted CSR-related projects,⁹ the bilateral aid and international business communities could also help in cultivating the emergence of CSR and greening of the post-Socialist corporate landscape.

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ENDNOTES

¹ For a comprehensive discussion of the organization of the Green Food industry in the late 90s see Thiers (1999 and 2000). The standards referred to here are national standards.

² The most recent public statement of these goals I have heard is at the 2003 China Green Food Development Summit Forum in Beijing during a speech given by the China Green Food Association's president, Liu Lianfu (2003).

³ For further information and dialogues about CSR and corporate citizenship, see the United Nation's webpage on the Global Compact initiative at www.unglobalcompact.org or the World Economic Forum's webpage at www.weforum.org.

⁴ I am not making any assessment as to the efficacy or follow-through of these verbal commitments. Rather this data only speaks to their public commitment. Conversations with other actors have indicated that these verbal commitments often remain just that.

⁵ While the CGFA is a national specialized association under the administrative jurisdiction of the GFDC, it is considered a nongovernmental association that possesses a great deal of autonomy. Its primary goal is the promotion of Green Food development.

⁶ Special thanks to Jennifer Turner for underscoring this point on paternalism.

⁷ For relevant discussion, see Jessica Hamburger's feature article in *China Environment Series, Issue 5*, (2002).

⁸ Most recently, corporations mentioned the marketing of Green Food during the Olympics during two international conferences held in October of 2003.

⁹ The Chinese NGO Institute of Environment and Development has been active in CSR projects, as has the U.S.-based NGO PACT.

Atypical Environmental NGOs in Guangdong, China

By *Sylvia Ping Song*

With increasing economic integration between Hong Kong and Guangdong province's Pearl River Delta, it is imperative that civil society on both sides of the border becomes involved in the policy process to help guarantee the region develops in an environmentally sustainable way. While Hong Kong has a fairly active environmental nongovernmental organization (NGO) community, little is known about green social organizations in Guangdong province. In recognition of the need for greater dialogue and cooperation on environmental sustainability issues between civil society groups in this fast growing, highly populated region, the Hong Kong-based independent think-tank, Civic Exchange began in 2003 to develop a directory of NGOs involved in environmental issues in Guangdong. The directory aims to identify the environmental NGOs in Guangdong, including their contact details and short descriptions of their activities, which will help international and domestic organizations in seeking partners. Box 1 relates the initial challenges in setting up this survey project.

China's NGOs are emerging in a unique economic, social and political context, which gives them particular "Chinese characteristics" that distinguish them from

Western-style NGOs. For example, some are outgrowths of government bureau downsizing—called government-organized NGOs or GONGOs—and are not strictly nongovernmental in terms of their funding, staffing and policy activities. Truly independent NGOs do exist—some formally registered as a social organization or business, while others simply remain unregistered. The Civic Exchange directory mainly includes Guangdong's formally registered provincial-level environmental NGOs. However, to capture a complete and accurate picture of environmental civil society development in Guangdong, the importance of university-affiliated student environmental organizations, unregistered research centers and NGOs registered as businesses cannot be neglected.

Atypical Environmental NGOs in Guangdong

By the end of 2002, there were 744 provincial social organizations (or NGOs)—73 of which focusing on the environment—formally registered in Guangdong.¹ All of Guangdong's environmental NGOs fall into one of four categories: foundations, academic associations, professional societies (e.g., Urban Planning Association of Guangdong Province), or industrial associations (e.g.,

Box 1. An NGO-Related Survey in China: A Unique and Challenging Journey

Civic Exchange, a Hong Kong based public policy think tank, began compiling a directory of NGOs in Guangdong in mid-June 2003 after the SARS outbreak. To abide by the regulatory needs and to ensure that the project could proceed smoothly, Civic Exchange researchers began discussing the project with the Guangdong Provincial Bureau of Civil Affairs (which registers social groups) and the Guangdong Provincial Bureau of Environmental Protection (which is the professional sponsor [yewu zhuguan bumen] of most environmental NGOs in the province). Information was gathered through interviews carried out with Guangdong-based environmental groups and relevant government officials and researchers.

Before the real work could begin, however, Civic Exchange was advised by officials in Guangdong to enter into a collaborative arrangement with a Mainland Chinese organization, which could then issue a recommendation letter (jieshaoxin) to the provincial authorities. Civic Exchange approached the Liaison Office of the Central Government in Hong Kong, the Guangdong Provincial Bureau of Foreign Affairs, the Guangdong Provincial Bureau of Statistics and some other departments to find the best way to get an appropriate recommendation. On 25 August, the Guangdong Provincial Bureau of Foreign Affairs informed the Civic Exchange researchers they needed to comply with the Interim Measures for Administration of Foreign-related Social Survey Activities¹ and find a qualified Mainland organization that could be a partner for this project.

On 22 September, Civic Exchange entered into a collaborative agreement with Tsinghua University's NGO Research Center, which agreed to enable a Civic Exchange project manager to join one of their own NGO research projects. By being a part of the Tsinghua team, Civic Exchange's project manager would be able to collect information in Guangdong. However, the Guangdong Provincial Bureau of Civil Affairs later agreed to provide the required data only through Tsinghua University's NGO Research Centre, which would then forward the information to Civic Exchange. Civic Exchange researchers are pleased the project ultimately ran smoothly and grateful for all the help they received as Civic Exchange spent three months seeking legal status for conducting research. Going through the complex labyrinth to start the research notably gave the project staff insights into the challenges Chinese NGOs face when seeking legal status.

NOTES

¹ It is stated in Article 3 that "Organizations and individuals from outside the territory, subsidiaries of foreign enterprises and resident representative offices of foreign enterprises within the territory and resident institutions in China of other foreign organizations shall not, by their own, conduct social survey activities within the territory of China. Where there is a need to conduct such surveys, they shall be conducted by domestic institutions with the qualification of conducting foreign-related social surveys.

Guangdong Association of Environmental Protection Industries).² In terms of legal standing, environmental NGOs, like other social organizations in China, have three main options for obtaining a legal status: (1) submitting registration as "social organizations" to the Ministry of Civil Affairs; (2) registering as businesses with the Bureau of Industry and Commerce; or (3) operating as a research center or student environmental organization affiliated with a university (Lawrence, 2003; Young 2002). The data of registered environmental NGOs or social organizations are available from Guangdong Provincial Department of Civil Affairs. However, statistics regarding "atypical" NGOs—unregistered research centers, student environmental organizations, and those registered as businesses—are very difficult to gather. For example, it is challenging to locate information about student environmental organizations, as they concentrate their activities on campuses and are small, often unstable organizations plagued with the perennial problem of

frequent membership turnover (Lu, 2003).

Whether using top-down or bottom-up means of gaining legal status, many green NGOs—as well as GONGOs—are becoming important agents for improving environmental protection in China. The formation and impact of two atypical grassroots green NGOs—Fresh Environmental Association (a university student group) and Guangzhou Green Country Ecological Education Centre (established through contributions from Hong Kong and registered as a business)—are discussed below. While not included in the directory because it is a municipal GONGO, not a provincial NGO, Green Messengers is included in the discussion below, for like the other two groups it is one of the most influential green groups working in Guangdong.

Fresh Environmental Association

Fresh Environmental Association (Fresh) is a student green group established at the South China University of

Technology in June 1999. The group aims to “popularize environmental knowledge and ideologies, and advocate green civilization.”³ Now in its fifth year, Fresh has developed into an important student environmental association (SEA) with about 350 members on campus. Similar to their counterpart groups in other parts of China that arose in the mid-1990s, Fresh has successfully organized many environmental activities, including tree planting, environmental lectures, a “green” youth camp, and a paper recycling and other campus campaigns. One of the most effective projects was the “Anti-White campaign” (*fan bai*), which aimed at eliminating the use of white plastic lunchboxes on campus. This project significantly increased awareness of the environment campus-wide and raised the group’s profile among students.

As a SEA,⁴ Fresh did not register with the local Department of Civil Affairs, rather with the university’s Student Association Committee, listing the Environmental School of South China University of Technology as its sponsor. Fresh and other Guangdong student groups notably have not yet formed their own formal regional network, but Fresh members are increasingly cooperating and communicating with other SEAs, as well as other green NGOs.

Guangzhou Green Country Ecological Education Centre

Located in Longgui town, Baiyun district, the Guangzhou Green Country Ecological Education Centre (GGCEEC) was jointly established in 1998 by Green Power (a Hong Kong NGO), the Guangzhou Environmental Protection Bureau, and the Guangzhou Research Institute of Environmental Protection. The mission of GGCEEC is “Green, Ecology and Education,” which is embodied in the group’s goals to raise the public’s environmental awareness through audiovisual and demonstrative education.⁵ GGCEEC also sets up “return to nature” field trips, which include tours to understand natural farming and the ecological cycle. The centre is developing into a multifunctional centre of education, research, training, experimentation, and entertainment. It also acts as a forum for organizations from Guangzhou and Hong Kong to meet and exchange ideas.

GGCEEC originated from the efforts of Green Power, which wanted to establish an environmental education center in Guangdong. Early in 1994, Green Power visited the province and began to look for a partnership with the local government, and found it in Wu Zhengqi, the then-director of the Guangzhou

Research Institute of Environmental Protection.⁶ Wu is an excellent environmental expert and educator who often sparks interest in environmental issues in many who meet and hear him speak. Wu was integral in helping the GGCEEC’s founders come together. Wu’s dynamism coupled with support from the Guangzhou government in financing and supplying the land for the center facilitated GGCEEC’s smooth and quick establishment. The current director, Zhang Xijuan, noted that without the government’s support, GGCEEC would have been unable to obtain the more than 200 official chops permitting the construction of the centre or surmount other bureaucratic hurdles to complete the education center’s construction within two years. Green Power provides economic help for the center as well as technical support for the construction and maintenance of GGCEEC’s Web site.

Despite being an environmental NGO that enjoys government support, GGCEEC was unable to register as a social organization as there had been no precedent (*xianlei*) for such an organization. Thus, GGCEEC had to register as a business with the Bureau of Industry and Commerce, and as such cannot enjoy some favorable policies, such as a tax exemption, reserved for social organizations.

Leiwan’s Green Messengers

Green Messengers was informally established in early 1996, when the Leiwan Environmental Protection Bureau (EPB) was dissatisfied that the responsibility for environmental protection was restricted to governmental departments and environmental professionals, while public participation was limited. The Bureau’s Youth League therefore organized 25 young staff to form the group “Green Messengers,” who carried out a series of voluntary activities to further inform and engage the public in environmental issues. They initially distributed environmental pamphlets and newsletters, but quickly built their capacity to organize celebrations on World Environment Day (June 5) and carry out a broad range of public environmental education activities.

Representatives from Green Messengers describe their group as the first mass citizen (*minjian*) environmental organization in Guangdong with close links to their local community. Green Messenger is a nonprofit organization with a strong public outreach component that embraces the mission to “carry out public environmental education, develop and advocate green culture with Chinese characters, and promote Chinese environmental protection.”⁷ Green Messengers registered in 1999 as an NGO with the approval of the Leiwan Department

of Civil Affairs,⁸ but judging from its registration, funding, and staffing it is more like a GONGO. For example, the key leadership (the chair, vice-chair and general secretary) are staff in the Leiwan EPB. Green Messengers obtains funding mainly from the EPB, which is clearly important for the survival and stable development of the organization. Unlike most registered NGOs it has been allowed to grow from a single office to more than 10 branch offices. This expansion has facilitated its membership to grow from 25 government professionals to over 1,500 members that include a broad range of community members and educators. Its integration into community service and education combined with its close ties to the EPB has meant Green Messenger is capable of bridging dialogues between the government and public about environmental protection and sustainable development—a role that ultimately makes it a unique GONGO, which increasingly resembles a true independent NGO.

Problems Confronting Environmental NGOs in Guangdong

Environmental NGOs in Guangdong are still in their early stages of development and the three profiled above are similar in that they all face challenges to becoming sustainable—ranging from management and funding to issues of government control.

Chairman Zhou of the Fresh Environmental Association stated they are eager to improve the group's "internal framework [and] organization" and are therefore exploring options for an appropriate framework for operating effectively. One new change in operation will be to switch from organizing activities from within the environmental science department to creating more campus-wide event-based activities.⁹ Zhou further stated that Fresh lacks a stable and effective contact and communication system within the organization, due in part to the busy class schedules and high turnover of members. Most limiting is the challenge of finding sufficient funding. Although Fresh has so far survived on a small four-year membership fee of RMB 20 *Yuan* per person, the group has recently increased its revenue through a 2,000 *Yuan* award for being one of the top ten outstanding student associations of South China University of Technology, which established this award to improve campus life.

GGCEEC is concerned about its future, for their funding is primarily from the Guangdong Research Institute of Environmental Protection (GRIER) and Green Power. However, GRIER is adopting a more market-focused approach and is starting to move away

from nonprofit management activities. Thus, GGCEEC wishes to change their sponsor—colloquially known as its "mother-in-law" (*popo*)—to the Centre of Environmental Propaganda and Education under the Guangzhou Administration of Environmental Protection. If they cannot find another government supporter, the staff at GGCEEC believes their NGO will be limited in its growth and influence.

Green Messengers' staff believes they must increase their scope of operations and influence in order to address more effectively the public's lack of education and indifference to protecting the environment. One obstacle to their expansion goals is the numerous government restrictions. For example, Green Messengers wishes to expand its activities outside Leiwan District to Guangzhou and beyond and detach from Leiwan EPB. However, current government policies dictate that every social organization must specify the area where it operates, which means that Green Messengers can only carry out activities within Leiwan District where its sponsoring agency, the EPB, has jurisdiction.¹⁰ Breaking from the EPB would mean an end to government support, but this loss could be counterbalanced by hiring an influential environmental activist leader—following the model of Friends of Nature, one of China's leading green NGOs, headed by a famous and respected historian Liang Congjie.

The Government's Perspective

In Eastern and Central Europe's former socialist states, environmentalism was used as a mobilizing agent of popular protest against the old regimes. The environmental movement in China, however, seems to be traveling another path: environmental social organizations are increasingly courting government approval and influence in policymaking, rather than seeking a potentially dangerous confrontation with the government (Ho, 2001). This collaborative relationship with government is clearly demonstrated by the above three environmental NGOs, which notably differ in their legal status. As Knup (1998:9) correctly noted, "Chinese social organizations are tied more closely to the government than in many other countries, but this closeness, while limiting, also allows these groups to operate effectively within current Chinese context."

Interviews with local officials from Guangdong's Department of Civil Affairs offer a glimpse into the government's attitudes towards social organizations. The government adopts a *laissez-faire*, or even supportive, attitude if the organization and their activities do not confront the state or pose a threat to social stability. This new permissive attitude towards social

organizations reflects a significant shift from past government policies that totally controlled or suppressed social organizations or independent organizing of any kind. Table 1 shows this significant change in the state-society relationships in China, as well as speculation on future trends for greater NGO independence.

Despite the lackluster development of social organizations in Guangdong, the local government departments of Guangdong have done a fairly good job in managing NGOs. Guangdong province was the first province in China to: (1) finish the review and registration of the branches and representatives of social organizations, (2) complete the annual review of private non-corporate organizations (*minban feiqiye danwei*), and (3) regulate or close illegal foundations. In its most creative initiative, Guangdong leads the country in providing management training programs for the officials of social organizations. To better manage professional unions, Guangdong officials carried out a province-wide survey in 2003 not only to improve their knowledge of these social organizations, but also understand their perspectives and concerns.

Following the emergence of the Falun Gong, central and provincial governments in China have begun to more closely manage and supervise social organizations, which perhaps explains the slight drop in the growth of social organizations in Guangdong in the late 1990s. (See Table 2). The Guangdong government's management of social organizations has improved in the past few years—instead of being disorganized, passive, and secretive,

oversight of registration and supervision of social organizations is much more systematic and transparent today.

The Public's Attitude and Participation

According to one survey carried out by Civic Exchange on the attitudes of the public towards the environment,¹¹ few Pearl River Delta Region residents participate in environmental protection activities. Among those surveyed who do, the most popular activities are tree planting, visiting a natural reserve, and participating in clean-up campaigns—38, 35, and 33 percent, respectively. People visiting environmental facilities, engaging in environmental education activities or material recycling schemes represented less than 15.6 percent of the total number of respondents.¹²

Public attitudes in China towards environmental social organizations are related to many factors. Guangdong has led China's bold and ambitious drive towards modernization, but the public has not been as eager to participate in or support the development of social organizations as have citizens in other parts of China. Guangdong residents are known for being hardworking and flexible, and more interested in business and economic profits than social and environmental issues. In other words, Guangdong people are not as active in environmental initiatives as they are interested in economic development, a relationship they view as mutually exclusive. This is the primary reason given by Guangdong officials for the contrast between the slow development of NGOs and remarkable economic

Table 1. Evolution of the State-Society Relationships Surrounding NGO Activism in China

	Past (1949 to mid-1990s)	Present (beginning mid-1990s)	Future
Role of Government	Complete dominance	Relative dominance	Cooperation
NGOs Status	Government control	Government still controls registration and supervises NGOs, but NGOs create partnerships with government & private sectors. Public begins to recognize and respond to work of NGOs.	Self-management and greater public support
State-Society Relationship	State-dominated cooperation	Transition	Society-dominated cooperation

Source: Adapted from Chinese Youth Development Foundation and Research Committee of Foundation Development (2001,29)

Table 2. Growth in Social Organizations in Guangdong (1993 to 2002)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Total Registered Social Organizations (SOs)	7911	8679	9405	10011	10124	9783	8416	7675	7723	7636
Provincial Level SOs	748	807	852	906	931	935	910	813	820	845
District Level SOs	3616	3990	4370	4632	4727	4589	4121	3810	3882	3723
Country Level SOs	3547	3882	4183	4473	4466	4259	3385	3052	3021	3068

Note: Data up to 2000 drawn from the annual reports of the Guangdong Department of Civil Affairs, [Online]. Available: <<http://www.gdmz.gov.cn/tongji/index-n.htm>> last reviewed in April 2004. Data for 2001 and 2002 from interviews with local government officials in 2003.

success of Guangdong.

Green NGOs in Guangdong could become more successful by integrating environmental education and propaganda with economic development. One of the three NGOs profiled above has followed this strategy; specifically, GGCEEC has created a relaxation retreat for corporate managers during which the NGO provides them with lively environmental education. Environmental NGOs in Guangdong could also learn how to better work with local business communities by communicating and cooperating with their counterparts in Hong Kong. Furthermore, through Hong Kong, Guangdong has a built-in connection to the global community of environmental NGOs. Increased efforts in promoting environmental issues are critical considering Guangdong people are less receptive to such issues. Educating the public as well as government officials is necessary. Moreover, environmental NGOs need to play an effective role as a bridge between the government and public to better serve both sides.

Summary

The development of environmental NGOs in Guangdong has been relatively slow because economic development has been the overwhelming local priority. However, the rapid pace of development has resulted in significant environment degradation and sustainable development; therefore, it is beginning to attract more interest from the authorities. As environmental NGOs in Guangdong begin maturing they will be able to play an increasingly important role to help integrate environmental education with economic development.

This is perhaps their greatest and most urgent challenge.

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ENDNOTES

¹ Data available on-line at www.gdmjzz.gov.cn. Interviews were conducted with officials of the Department of Social Organization Management, Guangdong Provincial Bureau of Civil Affairs.

² There is a fifth category—unions (*lianhe hui*), however to date, there are no Guangdong environmental social organizations falling into this category.

³ Interview with the Chairman, Zhou Yunpeng of Fresh

Environmental Association in 2003. Their Web site is <http://www.scutfresh.100steps.net>.

⁴ For a review of the student environmental associations see Lu, 2003.

⁵ Interviews with the ex-director Wu Zhengqi and current director of GGCEEC Zhang Xijuan in 2003. The Web site is www.greenpower.org.hk/new/yellow/ (which is supported and maintained by Green Power) or www.gzlty.com.

⁶ Wu Zhengqi is now the Mainland China representative of Green Power.

⁷ Interview with Huang Jiwei, General Secretary of Green Messengers in 2003. <http://www.green-china.org>

⁸ Leiwan is a district of Guangzhou.

⁹ Interview with the Chairman Zhou Yunpeng of Fresh Environmental Association in 2003.

¹⁰ "Regulations on Registration and Administration of Social Organizations" Decree No. 16 of the State Council of the People's Republic of China (1998).

¹¹ Civic Exchange and China Development Institute, 2002, Project Report "*Attitudes on the environment: A survey of Pearl River Delta Residents*," available online at www.civic-exchange.org.

¹² Opinions about public perception towards social organizations in China can be found in "Chinese NGO's – Carving a Niche Within Constraints" (The American Embassy in China, 2003). [Online]. Available: <http://www.usembassy-china.org.cn/sandt/ngos.htm>

Green Labeling and Energy Efficiency in China

By Gary McNeil and David Hathaway

Worldwide, “green labels” work to reduce environmental degradation by helping consumers make more informed choices about the products they buy. Amidst a growing number of green labels in China, one of the most well developed is an energy efficiency green label program managed by the Certification Center for Energy Conservation Products (CECP). The CECP label (See Figure 1) identifies products with superior energy efficiency—those products that perform the same work while using less electricity. Chinese product manufacturers voluntarily decide to use the label since the label enhances the attractiveness of their products in the Chinese consumer marketplace.

Figure 1. CECP Label



The environmental impacts of electricity generation are well known, and make a compelling case for energy efficiency labeling. In China and the United States most of the electricity supply is generated by the combustion of fossil fuels, primarily coal. The environmental consequences of coal burning are very serious:

each kilowatt-hour produces approximately a kilogram of carbon dioxide, and coal-fired electricity generating facilities also emit substantial amounts of air pollutants such as sulfur dioxide, oxides of nitrogen, mercury, and particulates.

Manufacturers and Consumers in China Embrace the Energy Efficiency Label

When developing a recent promotional campaign for CECP-labeled products, CECP hired a Beijing-based advertising firm to conduct market research to better understand the concerns of potential refrigerator purchasers. CECP found that 68 percent of consumers felt that a label indicating “authoritative (e.g., state) certification” was the most compelling when selecting an energy-efficient product. In another study, the majority (54 percent) of those surveyed indicated that they first looked to an authoritative product label when they made a refrigerator purchasing decision, while personal

information from others, product manuals, and evaluations from manufacturer associations ranked lower in importance.

Interestingly, the CECP survey revealed that the Chinese consumers are confronted by an overload of certifications and claims that they felt they could not trust. Products often included claims and information from organizations that were unfamiliar to consumers. Based on these results, CECP decided to stress its state-authorized certification authority in campaign messages. For example, to emphasize these ideas, it developed a new label tagline: *Superior Energy Efficiency, Authorized Certification (Gaoxiao jieneng, quanwei renzheng)*. CECP’s experience suggests that government-backed green labeling programs, or those with similar state authority such as CECP’s program, may have the most potential to influence the behavior of Chinese consumers.

Labeling Will Help China Meet Growing Energy Demand

As the widespread brownouts along China’s east coast in the summer of 2004 demonstrated, China is an energy-starved nation. Thus, measures to improve energy efficiency of appliances, office equipment, computers, consumer electronics, and other electrical products are particularly important in China. Ownership of these products is increasing rapidly. For example, as of 2002, 87 percent of urban households owned refrigerators, and an even larger share owned washing machines (93 percent) and televisions (126 percent).¹ Rural appliance ownership is also growing rapidly, and China leads the world in the manufacturing of many key appliances. Electricity consumption is growing faster than other major energy uses—increasing an average 14 percent annually from 1980 to 2003.²

To address this challenge and opportunity, CECP was established in 1998, and in 1999 issued energy efficiency performance specifications for refrigerators, the first products eligible for the CECP label. Refrigerators with superior energy efficiency—defined as using 25 percent less electricity than allowed by mandatory energy efficiency standards—were eligible to display the CECP label.³ The U.S. Environmental Protection Agency (EPA) believes that the CECP label can foster efficiency improvements that will save at least 58 million tons of carbon dioxide, along with millions of tons of pollution that is degrading the air of Chinese cities.

China and the United States Start Working Together on Green Labeling

In late 1999, CECP's director, Mr. Li Tienan, proposed that CECP cooperate with ENERGY STAR, a U.S. energy efficiency labeling program managed by the Department of Energy and the EPA. The partnership was built on two key factors. First, as the largest and longest-running national voluntary energy efficiency labeling program in the world, ENERGY STAR offered potentially useful lessons for an equally ambitious program in China. Second, the U.S. EPA had a successful history of working with Chinese partners on promoting energy efficiency in consumer products.⁴

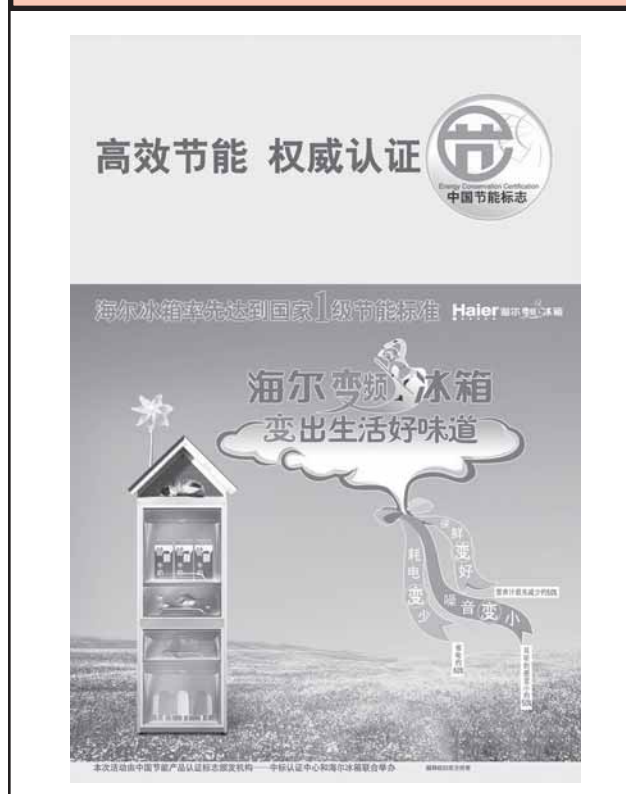
One example of the CECP-EPA collaboration is CECP's adoption of ENERGY STAR performance levels in printers (in 2003) and color televisions (in 2002), which represented two new products that CECP targeted for labeling. This collaboration helps both programs, because manufacturers who sell products in both countries can more easily qualify their products for both labels. In addition, during the refrigerator promotional campaign, CECP worked closely with EPA to strengthen its product promotion activities, drawing on the successful experience of ENERGY STAR. CECP has based its consumer research strategy on ENERGY STAR methods, using a combination of market research, focus groups, and other tactics to develop an effective product promotion. The refrigerator campaign was launched in November 2003 in conjunction with China's national Energy Week. CECP worked directly with Haier—China's largest refrigerator manufacturer—to promote labeled refrigerators in over 90 stores in 18 cities in China. (See Figure 2. Haier-CECP promotional advertisement).

China Leadership in Asia

Based on the success of CECP, Li Tienan has become a leader of efforts to promote wider use of energy efficiency labels in Asia. In 2003, he addressed regional meetings in Bangladesh and Australia, sharing CECP's experience with officials from Australia, Bangladesh, Bhutan, Chile, India, Japan, the Maldives, Mexico, Nepal, New Zealand, South Korea, Russia, Sri Lanka and Taiwan. Several of these nations are planning a study tour in China to learn how CECP established its program.

CECP has also been selected to manage the next phase of the Efficient Lighting Initiative (ELI), a Global Environment Facility sponsored program for lighting products that began in seven countries including Argentina, Czech Republic, Hungary, Latvia, Peru, Philippines, and South Africa.

Figure 2. Haier-CECP Advertisement



Gary McNeil (McNeil.Gary@epa.gov) is manager of bilateral cooperative activities between China's Center for Certification of Energy Efficient Products and the U.S. Environmental Protection Agency's ENERGY STAR® program; David Hathaway (dhathaway@icfconsulting.com) leads ICF Consulting support to EPA for those activities.

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¹ National Bureau of Statistics, *China Statistical Yearbook 2003*. Beijing: Statistical Press, 2003.

² National Bureau of Statistics, *China Statistical Yearbook 2003*. Beijing: Statistical Press, 2003; *Zhongguo Dianli Bao (China Electricity)*, cited in *China Energy Report Weekly*, Vol. 3, Issue 4, 17 January 2004.

³ The specification has since been strengthened to require that a refrigerator be 35% more efficient than the minimum mandatory standard (China Energy Conservation Products Management Committee, *Technical Specifications for Energy Conservation Product Certification for Household Refrigerators*, CCEC/T01-2001, 1 May 2001).

⁴ Case study articles on prior EPA collaboration on energy efficiency in China can be found at:

<http://www.usctcgateway.net/casestudies/CasestudiesDetail.cfm?LinkAdvID=34579>

<http://www.usctcgateway.net/casestudies/CasestudiesDetail.cfm?LinkAdvID=34339>

Addressing Urgent Needs: The Emergence of Environmental Education in China

By Jing Lin and Heidi Ross

Since 1996 we have conducted educational fieldwork in numerous schools across China. Our initial involvement in environmental education emerged from observing changing school landscapes where we worked—Chinese schools have not been immune to the impacts of pollution and natural resource degradation. Sometimes on early Beijing mornings, through the heavily dusted sky, the sun hung so dull and so faint over school playing fields that we could stare into it without hurting our eyes. Floodwaters—caused in great part by upstream deforestation—periodically swamped our field sites in southwestern and southern China. Shanghai campuses were murky with exhaust and discharge when we visited in the 1990s and only recently have begun to clear up. Across China, we have encountered more and more small but vocal groups of educators who have begun to speak passionately about the relationship between human welfare, sustainable development, and the schools' responsibility to nurture citizens with ecological consciousness.

Increased environmental awareness among teachers and administrators, in tandem with recent school reform trends (expansion, de-politicization, individualization, and increasing inequality of educational opportunities), reflects a significant post-socialist shift in the purpose, content, and outcomes of Chinese schooling. The emergence of environmental education, which is now a national mandate in all schools, is a significant dimension of change in Chinese education. Although environmental education is at the beginning stage of development, its long-term potential deserves careful study and reflection, for it is sparking intriguing changes in the educational system. Moreover, effective environmental education will be crucial in pushing China onto a sustainable development path.

Five Reform Trends Shaping Environmental Education in China

Over the last decade as the Chinese education system has undergone massive reform, environmental education

has emerged as a new priority. In 1992, the first environmental education conference was held in China. Prior to the conference, environmental education had generally been restricted to biology classes, in which students were cautioned not to eat polluted seafood or swim in polluted rivers and lakes. By the mid-1990s, growing news media attention to, and public debate about, the rapid deterioration of China's air, water, and land galvanized state, education, and nongovernmental leaders to discuss how comprehensive environmental education could be integrated into the school curriculum. In 2003, the Ministry of Education published new guidelines, written in collaboration with WWF-China, requiring that environmental knowledge, attitudes, and values be integrated into the compulsory school curriculum. These guidelines, described by the Ministry of Education as central to "the nation's sustainable growth strategy," have been deemed so potentially significant to the global community that they have received the WWF-China's "Gift to the Earth" award (Fang, 2003).

Five environmental reform trends were central in shaping these guidelines: (1) expansion and commercialization of post-secondary schooling, (2) inclusion of environmental training and study in teacher education programs and research institutions, (3) development of "integrated" textbooks and teaching, (4) emergence of environmental nongovernmental organization (NGO) activism, and (5) establishment of state-supported "green schools."

1. The expansion and commercialization of higher education. Environmental education first entered formal schooling in China, as it has worldwide, at the tertiary level. Recognition of the economic costs of pollution, as well as the need to cultivate a cadre of researchers and teachers in environmental science, provided the impetus for China's first environmental studies programs in the late 1970s and early 1980s. Departments, programs, and centers of environmental studies at tertiary institutions have rapidly expanded since the mid-1990s. This

expansion is due in great part to researchers and academic leaders, now responsible for generating much of their own funding, using environmental studies as a vehicle for revising, re-tooling, and expanding engineering and other physical and earth science programs that had begun to lack student appeal as China's colleges and universities diversified and expanded. In short, academics have found in environmental studies programs a new niche from which to attract students and funding. Significantly in

content learning and methodological approaches. This trend will accelerate as colleges and universities respond to multiple pressures from the state, the market, the public, and an increasingly global higher education discourse of competition—symbolized by recent WTO-inspired legislation in China to allow international firms and institutions to operate schools in China—to reform curricula and educate students for a knowledge and service-based economy.

The emergence of environmental education, which is now a national mandate in all schools, is a significant dimension of change in Chinese education.

the past few years as government policies and five-year plans have increasingly prioritized environmental protection to guarantee economic development, establishing programs of studies in environmental protection has become a trend in all major universities.

2. The inclusion of environmental training and studies in teacher education programs and research institutes. Central government pronouncements to include “entrepreneurial and market principles” within higher education have changed the nature of teacher education in China significantly. Although normal colleges and universities still train the majority of teachers, comprehensive universities are now also encouraged to establish teacher-training programs. Normal universities are responding to this competition with more specialized and flexible training options, such as setting up environmental studies centers for physical and earth science majors. For example, WWF-China's Environmental Educators' Initiative, begun in 1997, supports mainstreaming environmental education in Chinese schools through enhanced teacher education and the preparation of environmental education training manuals and model lessons for grades 1-9. Phase one of the project involved the establishment of Environmental Education Training Centers in Beijing Normal University, East China Normal University in Shanghai, and South West China Normal University in Chongqing. Teachers trained in these centers have acted as members of Ministry of Education teams producing national guidelines for environmental education. Research institutes, such as the Beijing Educational Science Research Academy, also have set up environmental centers to conduct research and implement programs funded by international organizations. Our survey of teacher education programs suggests that teacher educators are gradually incorporating environmental education into their training of prospective teachers, both in terms of

3. The writing and publication of “integrated” textbooks. From 2000-2003 the Ministry of Education's Curriculum Research Center has been testing, revising, and publishing a new national series of nine-year compulsory education textbooks, which for the first time includes teaching guidelines and learning standards that are written from an integrated, interdisciplinary perspective for secondary school science students—rather than focused upon knowledge and skills of discrete subject areas. Chinese and international educators alike stress that integrated curricula are a necessary structure for teaching environmental studies. Currently, the schools in Beijing and other cities testing the new textbooks are attempting to integrate environmental education into all subject areas, especially science, language, and biology. Schools also have received guidelines regarding how they can connect textbook contents to raising students' environmental awareness and helping students gain knowledge about environmental protection. Gradually, these revised textbooks will be used in schools throughout the country.

4. The influence of NGOs on environmental education. Since the mid-1990s, China's environmental NGOs have emerged as a new form of social organization that is influencing educational policy and practice. Because of their diverse constituencies and broad missions—ranging from increasing women's involvement in environmental protection to raising environmental awareness among children, and to using the news media to promote public understanding of environmental laws—China's green NGOs are shaping the direction of environmental education in many ways. First, and perhaps most importantly, Chinese environmental NGOs concretely convey the message that public matters (such as guaranteeing clean water) are no longer just a government responsibility, and they are providing professional

educators and schools with a new venue for facilitating school-family linkages on behalf of the environment. One example of this possibility, discussed in greater detail below, is the institution of green school designations for schools, whose environmental awareness programs move beyond the formal school curriculum and help students and their families think about environmental challenges in their local communities. People's Education Publisher and WWF-China also have established a web site to publicize laws relating to environmental protection, and to assist teachers and students across China share their ideas, reflections, and work.

Although registering an NGO is difficult, since the mid-1990s, more and more individuals—many of whom are teachers or university professors—have been setting up NGOs that attempt to spread information about the importance of environmental protection and sustainable development. For example, China's first environmental NGO, Friends of Nature (FON, founded by a renowned history professor Liang Congjie), is giving advice and funding to university green groups in Beijing on setting up environmental education programs in migrant schools. With support from a German foundation, FON has created a Tibetan Antelope Mobile, which brings environmental education materials and activities to poor rural schools.

The number of universities with student-organized green associations has similarly exploded since the mid-1990s (Lu, 2003). Almost all of these green student groups create environmental education initiatives to raise awareness of pollution and threats to nature both on and off campuses. The green activities of Chinese NGO and student groups are frequently reported in the journal *Environmental Education (Huanjing Jiaoyu)*, which has played a pivotal role in China's environmental education development. The journal not only publicizes state environmental policy, but also provides schools and environmental educators a forum for exchange of successful programs and activities and experiences.

5. State Establishment of "Green Schools." In December 1996, China's National Environmental Protection General Bureau (Now State Environmental Protection Administration or SEPA) and the former National Commission on Education (now Ministry of Education) jointly issued a policy statement, *An Outline for National Environmental Education Actions*.¹ The *Outline* stipulated that by the year 2000 "green schools" would be promoted throughout the country and schools meeting general criteria for a "green" curriculum, administration, way of

living and environment would receive green school certification. The green school model emphasizes the integration of hands-on, research-based interdisciplinary environmental content and learning activities, as well as the creation, by proactive administrators and teachers working in collaboration with communities, of independent courses on environmental education. By October 2000, 16 provinces participated in the creation of 3,207 green schools, which by 2001 grew to 4,235.

The introduction of green schools is part of a broader policy supporting the "diversification" of secondary schools to better meet the needs of the diverse interests and economic conditions of local communities. Some green schools appear to be reconverted agricultural schools for rural children (which are often of very low status), suggesting that concern for the environment can be capitalized upon by schools struggling to provide students (and their parents) relevant and credible education. Other green schools are materially rich suburban and urban institutions desirous of the cachet of the green label.

Significant obstacles prevent schools from fully implementing the green school concept, including lack of funding. However, the greatest barriers are non-material, for instance:

- The indifference of or resistance to environmental education on the part of professional educators. Many school leaders perceive environmental education as being yet another redundant mandate imposed from above.
- The lack of understanding regarding the importance and need for environmental protection and sustainability leads to superficial implementation of environmental education, which many school leaders take to mean the planting of more trees or creating a green lawn on campus.
- The absence of pre-service and in-service teacher training in environmental education also hinders the creation of effective programs. While prominent teacher education institutions like Beijing Normal University have active environmental education centers, no systematic training program exists to inform teachers of relevant laws and theories regarding environmental protection and sustainability.

This latter issue of teacher training stands as a major challenge to all Chinese schools trying to "green" their curriculum. Although over 86 percent of 489 teachers participating in a 2001 survey of environmental

knowledge rated environmental education as very important, only 30 percent of the respondents could suggest how they might relate environmental content to the subjects they taught. Only 16 percent evidenced a clear understanding of the concepts of environmental education (Lin, 2001). Teachers in the study who taught environmental content did so by adopting *ad hoc* approaches based on their own interest and enthusiasm. Notably, many secondary school teachers are reluctant to accept the burden of squeezing into their class schedules “another subject” when they are rewarded primarily for their students’ achievement on high stakes examinations, the contents of which do not yet include substantial environmental education knowledge. The pressures placed on secondary school teachers, often by parents, to “measure up effectively” (e.g., produce high test scores) ensures that environmental education in many schools is just “for show.”

Educational Innovation Through Environmental Education

Despite these challenges, environmental education has great potential for supporting educational reform and teaching innovation in China. A perennial criticism of Chinese schooling, particularly at the secondary level is that it is rigidly remote from practice and cultivates students who know how to study but not with a sense of social responsibility. In contrast, schools active in implementing environmental education have demonstrated that their programs provide opportunities to break away from the traditional mode of rote education and become creative and innovative. Their inquiry-based, student-centered, and experiential learning approaches are precisely the teaching methods promoted by China’s ongoing nationwide curricular reform process.

For example, students in many green schools form their own environmental protection clubs, design “case study” projects for studying local water and air pollution or other urgent problems in the local community. Students involved in such projects are active researchers gathering and synthesizing data and working collaboratively with community leaders to solve local problems. According to supportive teachers, such activities link academic work and advocacy, and stimulate in students a sense of responsibility and awareness of their roles as global citizens. Finally, teachers we have interviewed in one dynamic green school maintain that because students’ diverse abilities and interests anchor the educational process, new teacher-student relationships and student-teacher roles result. Teachers become facilitators of learning rather than authority figures.

The Ministry of Education’s 2003 *Educational Outline for Making Environmental Education a Special Subject* directed all bureaus of education and schools, starting in the spring of 2003, to: (1) offer courses on environmental education as an independent subject; (2) fully integrate environmental education into school schedules; (3) offer teacher training; and (4) conduct research on environmental education pedagogies. This directive also stressed that environmental education should enhance student sensitivity for environmental issues through active learning by focusing on current debates such as the impact of automobiles on the environment and comparative studies of environmental quality within China and between China and other nations. If this new outline could be fully implemented, the potential for significant reform of teaching and learning would be great indeed.

Reflecting on our insights from seven years of interviews and studies of China’s educational system, we are cautiously optimistic that Chinese schools will rise to the challenge of incorporating environmental education into their curriculum. Moreover, such programs will promote greater interdisciplinary education, something sorely lacking in Chinese schools. Chinese schools will strengthen such “green” classes and programs, for there are both top-down and bottom-up forces, within China and transnationally, advocating for stronger environmental education.

Top-down Impacts: Central government policy has directed schools to adopt environmental education textbooks and curricula. As noted above, People’s Education Publisher has responded by creating and testing such curricula in select primary and secondary schools. Environmental education is also highlighted in advanced professional training. For example, Chinese University of Political Science, the State College of Judges, and the All China Lawyers Association recently sponsored a third national class on environmental law. The decentralization, diversification and rapid expansion of higher education in China indirectly inspire creative developments in university-level environmental education, in part as a way to attract students. Centrally mandated reporting on China’s environmental quality also has greatly expanded environmental education in newspapers and television, which in turn sparks interest in and demand for such knowledge by students and teachers. SEPA programs largely carried out through GONGOs and research institutes are providing environmental education materials (books and videos) to schools. Furthermore, bilateral agreements between China and the U.S. have supported

the inclusion of environmental education in the school curriculum through projects such as the international GLOBE program that links high school students worldwide to discuss their countries' environmental challenges, and the Chinese Environmental Global Alliance (CEGA), which supports the translation of U.S. environmental education textbooks for use in Chinese schools.

Bottom-up Impacts: As we have noted above, NGOs, such as WWF-China, are providing key support for many activities promoted by the central government, particularly in the area of curriculum development. Likewise, formal education institutions, from the primary to the tertiary level, are joining forces with community organizations and research institutions in umbrella organizations such as the China Environmental Education Network. University student groups, such as the Shanghai Tongji University Green Path and the Shanghai University of International Studies Green Window advocate among their peers for environmental awareness. Furthermore, newly piloted environmental education textbooks and school-based projects highlighted through the China Environmental Education Network indicate that environmental education enables schools to stretch the boundaries of appropriate school knowledge, promoting more general education reform in the direction of multi-disciplinarity. Demands by educators and communities for environmental education also have arisen as a result of local activism and NGOs working outside the formal school sector (Zeng, 2001).

Finally, transnational NGOs and educational institutions in the United States and other countries have established ongoing environmental education exchanges with Chinese institutions through one-to-one exchanges, through organizations such as the Global Environmental Educators Initiative, and through symposia and forums, such as a recent Beijing meeting on cooperation between environmental NGOs in China and international NGOs. Many such transnational initiatives have the explicit aim of promoting environmental awareness as a form of civic participation in China. We believe that this aim is one-sided. Our research convinces us that Chinese educators' approaches to environmental education have much to offer the global environmental education community. One fruitful area of collaboration toward this end will involve careful evaluation of Chinese philosophical traditions that privilege harmony, sustainable relationships with nature, and trans-generational communication and support.

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ENDNOTES

- ¹ An "outline" implies no legal mandate. Rather, such policy statements and instruments serve to introduce and publicize through schools and other social institutions goals the state deems desirable for discussion, experimentation, and implementation. In China many government policies are announced in the form of "outlines." Given the relatively centralized nature of policy development in China, such "outlines," while not carrying the force of the law, are duly adopted and carried out.

Running into Dead Ends: Challenges in Researching the Three Gorges Dam

By *Gørild Heggelund*

When I first began to study the Three Gorges Dam in the late 1980s to write my master's thesis, I did not realize that the dam would dominate my life for the next decade—both for master and doctorate degrees. Apart from an interval of three years working for the UN in Beijing and taking maternity leave, I devoted years of research examining various political and social aspects of this controversial dam project.

Not surprisingly, I was exposed to the complexity of the political debates surrounding the project early in the research process, as one of my first encounters with people involved in the discussion about the dam was Dai Qing.¹ She presented me with her book *Changjiang Changjiang* (Yangtze Yangtze), which was published in 1989 as an attempt to lobby against the dam. While the Chinese news media and official discussion in China were rather one-sided and biased, this book was intriguing, as it shed light on a lively debate among Chinese bureaucrats and academics, a debate nearly unknown to the outside world. In her book Dai Qing harshly criticized the closed decision-making surrounding the dam, a topic I would go on to explore as I pursued in my Ph.D. thesis. I wanted to take a closer look at how decisions were made for this dam, for the political landscape in China had changed greatly since Mao's era, when ideology was often the basis for decisions. Decision-making in China today is influenced by many more factors, not only diverse information and pressure from different political and academic actors, but also (albeit to a limited degree) pressure from society and the international community for greater transparency.

The highly politicized nature of the Three Gorges Dam and the harsh international criticism of the project meant researching the decision-making behind the dam was a challenging and time-consuming endeavor. However, despite the numerous hurdles over three years of research between 1999 and 2002, I did gain intriguing insights into the Three Gorges project decision-making process for resettlement and the environment, as well as the long sought-after degree.²

The Three Gorges project (*sanxia gongcheng*) on the Yangtze River is unique both in China and the world due to its great size, the number of people to be resettled, and potential environmental impacts. The long project history and the large number of disputing interest groups have

made it one of the most controversial construction projects to date in China. While it will play a crucial role in flood control and energy generation, it is ultimately a political project with much government prestige at stake. The Three Gorges project easily draws criticism, as it has great implications for both people and the environment in the Three Gorges area. Nevertheless, passing judgment on whether or not the dam should have been constructed was not the objective of my thesis. My aspiration was to provide information that highlights the developments in the resettlement process for this project, as well as relating them to general political and social trends in China. One of the main advantages of doing research on an intriguing project such as the Three Gorges is the potential for increased comprehension of the Chinese society at large, as the project touches upon a number of political, environmental, legal, economic, human right, and research issues. It merits mention that some of the trends I discovered on growing involvement of diverse interests in the Three Gorges resettlement issue, have continued in the dam debates in China—as illustrated by the broad nongovernmental organization (NGO), news media, and think tank involvement in critiquing some dams being built without proper environmental impact assessments in southwest China.³

China's Resettlement and Environmental Policymaking as Research Topics

The resettlement issue is a particularly difficult topic to study, since the government perceived relocation work as the key to success for the project, and any negative reporting is unwelcome. My research concerned resettlement of the rural population and the reasons for a policy change Zhu Rongji introduced in May 1999. The resettlement policy change he introduced involved moving nearly one-third of the rural population away from the reservoir area (*waiqian*) to other provinces. This was a striking deviation from the original plan that involved resettling all the population within the reservoir area. The official reason for the “out-moving” was the already low environmental capacity—severe erosion, desertification, and water pollution problems that were threatening human health and livelihoods in the reservoir area.

In addition to the poor ecological health of the area, I discovered that other problems in the resettlement

process were instrumental in bringing about the policy change. Many reports in scientific and policy journals, as well as the news media in China, discussed a litany of troubles faced by the resettled people—most notably local government corruption, which caused more resettlement money to land in the pockets of officials than in those of the relocatees. Moreover, poor local planning and execution of the moves left many relocated people with inadequate or poor quality land. In the new areas some also faced issues of homelessness, limited educational opportunities, loss of vocation and social status. While Zhu did not mention these problems in his announcement, he clearly had access to information on the resettlement troubles. Unlike the early years of the PRC when top leaders tended to hear only glowing reports of policy implementation from lower level government leaders, today consultative organs such as the Chinese Academy of Sciences, which increased its importance under Zhu's tenure, have been included in the policymaking process. Input from such consultative organs in the dam decision-making process has given the leadership more information revealing a series of problems surrounding resettlement. In addition to the increased importance of information in the decision-making process in China, Zhu Rongji's direct and problem-solving leadership style has been instrumental in forging changes in the resettlement policy.

The controversies surrounding the resettlement process created some limitations for me in selecting the angle of my research. A study of the implementation process alone would have been difficult, as it would be hard for a foreigner to obtain permission to carry out long-term fieldwork and independent research on the resettled rural population of the Three Gorges project. My meetings over several years with officials in the Three Gorges project bureaucracy have confirmed that deep suspicion exists towards foreign scholars, as we focus on what is perceived by the authorities as negative aspects of the project. To avoid criticism and possible loss of promotion opportunities, both local and central officials wish to keep the publicity about the negative aspects of this project as low key as possible.

Particularly sensitive has been research into oft-neglected aspects of dam and other infrastructure project resettlement. The side effects of moving people into new environments where current residents view them as unwelcome competition for scarce resources (e.g., jobs, land, and schools), are not emphasized in reports or acknowledged by many officials. I sought to understand why the human dimension and struggles for people to rebuild a new niche in society were often overlooked. The central government set the rules and regulations

for resettlement, while the provincial and local authorities were in charge of the actual resettlement and responsible for solving the problems relocatees face in new communities. The central government has limited capacity to follow up local implementation and therefore regards resettlement as a local issue. Notably, China has been praised by the World Bank for decentralizing the implementation of the resettlement policy, where all responsibility for resettlement is given to local or city governments, and resettlement solutions are developed locally. In theory, local empowerment is important in development projects because it gives local citizens a greater voice in decision-making. However, in China—where local leaders are not elected and citizen access to courts limited—decentralization lacks crucial checks and transparency, which gives local Chinese officials the opportunity to pocket resettlement funds and to mismanage their resettlement responsibilities.

While local officials made it very difficult for me to examine quality of the Three Gorges resettlement process in restoring people's livelihoods and compensating them for loss of land and houses, I did have access to information regarding environmental impacts of the dam through interviews and research reports compiled by academics. Environmental policymaking linked to the dam appears to be a less controversial research issue (albeit not entirely without sensitivity) than the resettlement. Under Zhu Rongji's tenure, criticism was possible in the state media targeting the lack of pollution control and clean-ups in the reservoir area, as well as insufficient local funding for such efforts. Another sign of more openness surrounding environmental issues in the reservoir area is the ongoing activities of one Chinese environmental NGO—the Chongqing Green Volunteers Federation. This NGO has been given the leeway to collaborate with the Chongqing municipal government on lessening urban wastewater and garbage flowing into the reservoir.⁴

The protection of the environment has been one of the top national policies for several decades in China, which automatically raises pollution control and ecological protection issues to national-level attention and promotes greater political openness around "green" issues. The main reason for this development is the restraint that environmental problems and the depletion of natural resources put on economic growth. The elevation of environment on China's national agenda over the past decade has been positive for the Three Gorges environmental policymaking and led to increased funding for environmental clean-ups in the reservoir area in 2001.

Weeding through Propaganda and Pursuing Interviewees

Although the central dam project authorities organized an information apparatus to report on the official policy and to set up news media campaigns and herald progress on the dam, obtaining reliable information other than official material on this controversial dam project is difficult. Over the years I collected mounds of Chinese-language newspapers, reports, and yearbooks

(albeit usually hand-picked) peasants. The Chinese interviewees often required I submit a set of questions, which led to initial fears many would only provide stock answers with little elaboration. I was therefore pleasantly surprised that many interviews developed into loosely structured conversations delving into issues beyond the approved set of questions. As expected, officials were careful about their statements, while academics were very open and frank about their own views.

While it may have been easy to attribute Zhu [Rongji] with considerable power to shape the policy, it is harder to substantiate the actual procedures for decision-making regarding the Three Gorges project.

as well as articles in scientific journals.⁵ One of my heaviest pieces of archival material was the *China Three Gorges Construction Yearbook* (*zhongguo sanxia jianshe nianjian*)—first published in 1995 by the Three Gorges project authorities—which presented the official version of developments in most of the areas linked to the construction of the dam project, including resettlement and environment. Despite the propaganda purpose and generally glowing reports in the *Yearbook* and newspaper articles, they are nevertheless useful as they contain recent policy announcements, laws and regulations, official figures, meetings convened, and speeches by China's leaders.⁶

It was however, necessary to supplement the official information with additional sources in order to obtain a broader picture of the process. Articles in academic journals provided me additional and even critical analysis of the challenges and possible remedies for the dam's resettlement and environmental processes.⁷ While newspaper articles in the 1990s focused more on positive reports, academic articles were more critical and discussed actual problems as well as measures to solve them.

Clearly interviews also were needed to supplement the rather biased primary source data in order to begin understanding the political processes surrounding the project and obtain a more diverse view on the resettlement process. Being able to speak Chinese as well as having extensive knowledge of China, was of course a great advantage. I interviewed representatives from the Three Gorges resettlement bureaus at the national, provincial and local levels (e.g., the China Yangtze Three Gorges Project Development Corporation [TGPD],⁸ Chongqing municipal government, and Chongqing Environmental Protection Bureau), officials in ministries and commissions, as well as academics, journalists, and

In interviews I learned quickly the importance of carefully choosing terminology. For instance, one day in the initial part of the fieldwork period I was discussing the questions raised during the day's interviews with an academic friend. After listening to my account of a mediocre interview, my friend strongly suggested I avoid using the word “decision-making process” (*juce guocheng*) during interviews, as it carried a political flavor and was an unfamiliar expression that was not easily understood by most Chinese. I was advised instead to use the term “history” (*lishi*), which I did in following interviews with success. Besides word choice, an equally important issue was preserving the anonymity of the interviewees. While interviewees rarely requested anonymity it was nevertheless an unspoken understanding that due to the controversy surrounding this project, the interviewees would be anonymous. I also made this clear at the beginning of each interview. By keeping the promise of anonymity I was able to build up trust with researchers and officials during my several years of research and to show my respect to them as well as to good friends who had provided the initial contacts.

Confidence in Findings

The interviews, which I undertook over several years, provided me with valuable information to supplement the official information, and have been important in obtaining an impression of the project developments. Nevertheless, one may also consider the objectivity of the interviewees, and any potential hidden agenda. Not surprisingly, scientists in general were more open than officials in giving their views about issues related to resettlement and the environment. Taking the controversy of this project into consideration, and the potential danger of being too frank about the problems,

both scientists and officials (possibly with a few exceptions) most likely gave me a more optimistic assessment of the resettlement and environmental situation. Scientists may also be biased, as many depend on government-supported research for a living. Nevertheless, the information provided through interviews did reflect the controversies raised in the articles published in scholarly journals, which gave me some indication of developments, albeit not necessarily the whole truth.

Although Zhu Rongji's attitude towards the dam project and his actual influence in the resettlement process was difficult to verify, in the dissertation I concluded that Zhu's role in the resettlement decision-making process was crucial. Interviewees, be they officials or researchers, were quite consistent in their views of Zhu's role in the resettlement policy change. This information was then matched with the information about Zhu in both Western and Chinese literature. Thus, these two sources in combination with the coverage in the state media after Zhu became chairman of Three Gorges Project Construction Committee (TGPPC)⁹, provided basis for concluding his importance in shaping the resettlement policy change.

While it may have been easy to attribute Zhu with considerable power to shape the policy, it is harder to substantiate the actual procedures for decision-making regarding the Three Gorges project and in China in general. Among China watchers, there is debate on how decision-making actually is taking place within the Chinese bureaucracy. Despite contending theories, many studies indicate that the nature of decision-making in China is changing, and the power to make decisions has become increasingly fragmented. The role of ideology in decision-making clearly is diminishing and think tanks and the increasingly open news media are becoming important providers of information. Taking these trends into consideration, it has been possible to suggest plausible ways of decision-making for the Three Gorges project resettlement policy change. My thesis highlighting the role of the top leadership and the power of an increasingly diverse set of actors is somewhat supported by the recent Nu River dam debate in China. In response to proposals to build thirteen dams on one of China's last wild rivers, Chinese NGOs, news journalists, and researchers launched an anti-dam campaign that led Premier Wen Jiabao to call a temporary halt to dam building.¹⁰

Recommendations

Regarding recommendations from the study, one key conclusion was that it is important to acknowledge

China's efforts in identifying resettlement practices. The Chinese national government initiated extensive systematic measures for preventing impoverishment of relocatees, which is unparalleled in many other developing countries. However, many problems still exist in the Three Gorges project, due to the sheer size of the resettled population—which is unprecedented in a water conservancy project even in China—and lack of checks on local governments. Furthermore, the controversy of the project hinders a rational discussion of the difficulties encountered.

Chinese national authorities understand the need to reconstruct the livelihoods of relocatees and have been praised by the World Bank for thorough planning in resettlement projects as well as for taking advantage of resettlement as an opportunity to develop economically. High-level policymakers have, however, placed little emphasis on the *social* impacts from resettlement. One important conclusion from my research is that the Chinese government needs to find ways to raise the social aspect of the resettlement to a higher level than at present in the Three Gorges project. Instead of suppressing protests, the government needs to respond to them in order to avoid even greater social disruption.¹¹ One major step in stemming protests would be for the government to acknowledge that resettlement has social costs; in particular the hardships caused when families and friends are split and ancestral land must be abandoned. One important contribution in this regard would be the establishment of a law on the protection of people's rights and interests in reservoir-induced resettlement. The new Environmental Impact Assessment Law, which anti-dam activists used in their Nu River protests, underlines the potential utility of the creation of some kind of social impact assessment regulation for government projects.

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ENDNOTES

¹ Dai Qing, a former journalist in the *Guangming (Enlightenment) Daily*, was lobbying to have the dam stopped in 1989. Following the crackdown on the student demonstrations on June 4th, Dai

Qing publicly resigned from the CCP. She was subsequently detained for nearly one year due to her outspokenness against the Three Gorges Dam and the publication of *Yangtze Yangtze*.

² A book based upon my Ph. D. dissertation was recently published on 9 April 2004: Heggelund, Gørild. (2004). *Environment and Resettlement Politics in China: the Three Gorges Project*. Hampshire, UK: Ashgate Publishing.

³ For information on the newer anti-dam campaigns see the International Rivers Network web page <http://www.irn.org/programs/china>; and a recent article in *The New York Times*: http://www.irn.org/programs/nujiang/index.asp?id=041304_nyt.html

⁴ The group also works with schools and communities in Chongqing to help raise awareness of sustainable consumption and recycling in the city. The group also conducts its own monitoring of environmental protection of forests in the Three Gorges Dam area.

⁵ Newspapers such as the *People's Daily*, *Enlightenment Daily*, *China Three Gorges Project News*, and *Beijing Qingnianbao* (Beijing Youth Daily). In addition, the Internet has simplified collection of information from China, and has been an important tool for obtaining information. Information from press agencies has been useful, such as the *xinhua she* (New China Press) and *zhongxin she* (China News Agency).

⁶ Other annual reports exist related to the environment, such as the Bulletin on Ecological and Environmental Monitoring

of the Three Gorges Project on the Yangtze River (*changjiang sanxia gongcheng shengtai yu huanjing jiance gongbao*), which is the annual environmental report for the dam project compiled by ministries and institutes, published by SEPA.

⁷ Some examples are Reform (*gaige*), Strategy and Management (*zhanlue yu guanli*), Resources and Environment in the Yangtze Basin (*changjiang liuyu ziyuan yu huanjing*), Population Research (*renkou yanjiu*).

⁸ Located in Yichang, Hubei province, the Three Gorges Project Development Corporation (TGPDC) is the project proprietor and responsible for all the construction of the dam. TGPDC allocates all construction and resettlement funding related to the project after the activities are approved by the Three Gorges Project Construction Committee.

⁹ The TGPC is the highest policy-making body under the State Council established for the project and is headed by the Premier.

¹⁰ For one of many stories on this announcement by Wen Jiabao see: Jim Yardley. (2004). "Beijing suspends plan for large dam" International Herald Tribune (Thursday, April 8). [On-line]. Available: <http://www.irn.org/programs/nujiang/index.asp?id=041304_ihtnyt.html>

¹¹ Perhaps this insight is being accepted by top leadership, for in the case of the Nu River dams Wen Jiabao cited the need to prevent more "social disruptions" in halting the dams and carrying out more careful environmental impact assessments.

Ecosystem Governance in a Cross-border Area: Building a Tuman River Transboundary Biosphere Reserve

By Sangmin Nam

The Tumen River Area, where the borders of China, North Korea and Russia converge, is a globally important reservoir of biodiversity—a unique refuge for numerous species that survived the Quaternary glacial period over 1.6 million years ago. The river area's relatively undisturbed terrestrial ecosystem provides habitats for over 50 species of mammals and 360 species of birds, many of which are found nowhere else in the world. The Tumen River Delta, a vast wetland complex with over 30 freshwater lakes and brackish lagoons, also serves as the critical northern end of a major migratory path of the East Asian-Australian Flyway, supporting 200 species of migratory birds including 34 globally endangered species that are listed in the IUCN Red Data Book. Protecting this area is challenging not

only because the riparian countries view it as a peripheral area not worthy of conservation investment, but also because China has been politically very cautious about multilateral talks on transboundary environmental problems. China's hesitancy is understandable as it is often the source of most of the degradation problems.

Dwindling Numbers of Siberian Tigers and Far Eastern Leopards

While conserving the area's ecosystem as a whole is important, efforts to protect some endangered keystone species are imperative—two top priorities are the Siberian (or Amur) tigers and Far Eastern leopards. The number of Siberian tigers, one of the five living subspecies of tiger and an internationally endangered subspecies, is

estimated at about 400, most of which live mostly on the Russian side in Primorsky. While their numbers have been stable during the past decades, humans have caused many tiger mortalities. However, the Far Eastern leopard's fate is even more threatened than that of the Siberian tiger. With only an estimated 40 to 50 in the Tumen River Area, this leopard is one of the rarest subspecies in nature and ranked on the list of critically endangered species by the IUCN. Although hunting leopards has been banned since 1956, the destruction and curtailment of habitats by development and logging have resulted in the serious decline in their numbers. Protecting a safe habitat is a critical condition for the Far Eastern leopard's survival because its natural habitat is only in the lower reaches of the Tumen River while the range of Siberian tiger extends much further into the north of the Russian Far East. The two species also face serious threats of poaching in the Russian territory near the border to China and illegal trade of their products between China and Russia. No effective administrative systems and transboundary collaboration mechanisms exist to keep these wild tigers and leopards safe.

Tumen River Area Development Program, NGOs, and the Environment

The main challenge to protecting the many threatened species in the Tumen River Area is how to govern the single bioregion, which is divided by three different sovereign territories. It is only since the mid-1990s that the region's governments and international organizations have been discussing efforts on protecting the endangered species and their habitat. See Box 1 for an overview of multilateral and bilateral efforts to promote conservation in this area.

Transboundary cooperation on biodiversity was boosted not as the result of strong environmental awareness or governmental initiative in the region, rather by the creation of a regional *economic* program—the Tumen River Area Development Program (TRADP)—and environmental activities of international multilateral organizations and nongovernmental organizations (NGOs). TRADP, the Northeast Asia's first multilateral development program, was officially launched in late 1995, but is today no more than symbolic attempt at collaboration. This multilateral program, comprised of China, Mongolia, Russia and the two Koreas as member countries, aimed to build the area into a trade hub and economic cooperation center for Northeast Asia. Many planners anticipated this program would change the geographical face of the Tumen River from a non-

populated, less developed area to a vibrant economic zone.

This nascent economic collaboration—which represented the first time any cooperative mechanism was created in the Tumen River Area—highlighted the lack of cooperation among these riparian countries on environment and social issues in this richly biodiverse river basin. The potential for economic development and the void in environmental collaboration in the Tumen River Area drew international attention, leading to the rapid growth of various governmental and nongovernmental activities in the environmental sphere. This international concern was the catalyst that pushed the China, Russia, North and South Korea, and Mongolia to adopt the 1995 Memorandum of Understanding (MOU) on Environmental Principles Governing the Tumen River Economic Development Area and Northeast Asia. This MOU called upon the countries to undertake joint efforts to mitigate adverse environmental impacts that might be caused by economic activities in the Tumen River Area. On the basis of the MOU, the five governments compiled an Environmental Action Plan through two workshops in 1997 and 1998. However, TRADP's shrinking role after the Asian financial crisis that began in late 1997, the low catalytic capacity of its Secretariat, and little environmental interest of the member countries prevented implementation of the Environmental Action Plan.

A few years after the Asian financial crisis, TRADP's member countries tried to reinvigorate this development program by carrying out a project to prepare a Strategic Action Plan (SAP). The SAP project—which ran from mid-2000 to 2002 funded with \$5 million from the Global Environment Facility—helped diagnose and compile information on the environmental situation in the Tumen River Area, and facilitated interactions of various stakeholders across national boundaries. The project also produced a draft SAP, which as of early 2004 was still not formalized, as China and Russia were still calculating the costs and benefits of its implementation. In the eyes of the Chinese government, signing the SAP means the formal acceptance of China's responsibility for pollution and biodiversity destruction. In addition, an organizational conflict between the Chinese State Environmental Protection Administration (SEPA), which felt it should be the SAP signatory body, and the Ministry of Foreign Trade and Economic Cooperation, the principal national partner of the SAP project, became a critical factor delaying China's formal endorsement.

In the vacuum of effective intergovernmental actions

Box 1. Timeline of Multilateral and Bilateral Environmental Activities and Agreements in the Tumen River Area

1992-1995: Under the auspices of UN Development Programme (UNDP), China, Mongolia, Russia, South and North Korea held a series of meetings to create a multilateral development project in the Tumen River Area.

1994: UNDP produced the first brief report on the environmental situation in the Tumen River Area.

1995 (December): The five countries endorsed the launch of the Tumen River Area Development Program (TRADP), and adopted the Memorandum of Understanding (MOU) on Environmental Principles Governing the Tumen River Economic Development Area (TREDA) and Northeast Asia.

1996: UNDP and the five countries started to prepare a project proposal for a Strategic Action Plan in the Tumen River Area, which was to be funded by the Global Environmental Facility (GEF).

1997: UNDP produced the environmental report: *Preliminary Transboundary Analysis of Environmental Key Issues in the Tumen River Area, its Related Coastal Regions and Its Northeast Asian Hinterlands*.

1997: A summit meeting of China and Russia resulted in an agreement to cooperate on tiger protection in border areas.

1997-1998: The five countries held two meetings of the Working Group on the Environment, and created a project list to act as an Environmental Action Plan. However this plan was not implemented. During the winter between 1997 and 1998, the first Sino-Russian joint survey and census of the Far Eastern leopard and the Siberian tiger and their habitat in the Tumen River Area was undertaken.

2000: A GEF-funded program, "Preparation of a Strategic Action Programme and Transboundary Diagnostic Analysis for the Tumen River Area, and its coastal and related Northeast Asian Environs," dubbed the TumenNET project, finally commenced after official approval of the GEF in 1999.

2002: The TumenNET project was finished in September producing the Strategic Action Program document, which has not been signed by the governments of China and Russia as of March 2004.

on protecting the key animals of the bioregion, NGOs have played substantial roles in species conservation. (See Box 2). NGOs such as WWF, Tigris Foundation of the Netherlands, Hornocker Wildlife Institute and the Wildlife Conservation Society of the United States have acted as the main sources of technical and financial resources for the Russian side where the local government's capacity in the management of protected areas had fallen considerably since the collapse of the Soviet Union.

The Hornocker Wildlife Institute initiated a catalytic NGO project on transboundary conservation cooperation by conducting the first Sino-Russian joint animal survey in the winter of 1997-1998. The survey uncovered considerable wire-snare poaching of ungulate species (such as deer) being done by Chinese villages near the border. This poaching significantly impacts the leopard and tiger population because it substantially depresses their prey populations. NGOs have also been major contributors to the establishment of China's Hunchun Nature Reserve in Jilin province, which borders Russian protected areas in Primorsky Krai. NGOs have helped protect tigers

in the Hunchun reserve by providing policy and technical assistance, as well as financial resources to Jilin province, particularly to communities near the reserve. The small successes of these NGO environmental protection initiatives and cooperation among the riparian states have indirectly laid the groundwork for discussions of a more ambitious plan to protect the Tumen River Area—a transboundary biosphere reserve.

Move Towards a Transboundary Biosphere Reserve

Despite a high and long wire fence marking the boundary, tigers and leopards freely cross between China and Russia. They also roam in and out of North Korea across the Tumen River. However, the politically sensitive borders are still hostile to people, which deters nature reserve employees in protected areas in both China and Russia from closely monitoring animal and ecological conditions along the border in the mountains. This lack of monitoring has given local poachers and illegal traders free range to use the border

area as their sanctuary to trap leopards and tigers and the prey upon which they depend.

A renewed effort to discuss the challenge of protecting endangered tigers and leopards in the border region began in 2001 when the Korean National Commission for UNESCO organized the second workshop of the Ecopeace Network of Northeast Asia in Yanji City, located in the Yanbian Korean Autonomous Prefecture of Jilin province. This workshop brought NGOs from Northeast Asian countries, as well as officials and NGOs from the Tumen River Area together for the first time. Many participating NGOs and government officials agreed the border region could only be protected through institutionalized cooperation, which led to the proposal to create a transboundary biosphere reserve (TBR).

During the workshop, participants from both Chinese and Russian parts of the Tumen River area reached a consensus on the need for collaborative actions to mitigate transboundary environmental problems. In particular, the workshop resolution recognized biodiversity conservation as a priority issue for joint action. Many participants saw the TBR concept as a practical method of undertaking such joint actions, which

led them to make a formal request to UNESCO to help facilitate necessary activities towards the creation of a TBR in the Tumen River Area.

The concept of a biosphere reserve (BR) is not new to the countries in the Tumen River Area. UNESCO launched the idea of such reserves in 1971 to promote and demonstrate a balanced relationship between people and nature under UNESCO's Man and the Biosphere (MAB) Program.¹ Currently the number of designated Biosphere Reserves in China, Russia and North Korea is 21, 26, and 1, respectively. These three countries and other Northeast Asian countries (Mongolia, Japan and South Korea) have been operating the East Asian Biosphere Reserve Network (EABRN) since 1994 in order to share information on BR management and undertake cooperative activities. Although EABRN is the most active regional environmental mechanism in Northeast Asia, a TBR in the Tumen River Area had never been actively envisaged, in great part because of the potential political challenges in bringing the area's countries together. In fact, only six TBRs exist in the world, which reflects the political difficulties in creating such a transboundary institution.²

The workshop's call for a TBR led the Korean

Box 2. The Role of NGOs in the Tumen River Area

NGOs have been extremely important actors in the environmental governance of the Tumen River Area by carrying out activities in two contexts: (1) within the Tumen River Area Development Program (TRADP), and (2) with outside formal international mechanisms. Examples of two strategies NGOs employed during the mid-1990s included:

- NGOs such as the Pacific Environment and Resource Center (PERC) of the United States and Friends of the Earth-Japan acted as "external watchdogs" to ensure that TRADP would become an environmentally sound program promoting sustainable development as promised by UN agencies.
- PERC and Hornocker Wildlife Institute worked as "operational agents" of international organizations, by undertaking various on-the-ground projects sponsored by UNDP and the Tumen Secretariat. The role of the NGOs not only helped international organizations actualize their intended activities, but also brought about legitimized space for NGOs in formal river basin governance in the area.

A more important aspect of NGO performance in the Tumen River Area was the operation of NGOs promoting local-level environmental governance. For example, international NGOs such as Tigris Foundation, Wildlife Conservation Society, and WWF collaborated with local NGOs and research institutes to execute their own biodiversity conservation programs. Some notable programs that were independent of (but complemented) UN initiatives include: (1) creating ecological conservation programs, (2) operating anti-poaching teams in collaboration with the government, (3) creating compensation schemes for farmers who lost livestock to tigers and leopards, and (4) undertaking capacity-building activities for local stakeholders of protected areas. Through these programs, NGOs acted as diffusers of information and knowledge, as well as providers of financial resources for local actions. Nevertheless, NGOs also have faced limitations. Specifically, NGOs were able to work only on the issue of biodiversity and operate only in Russia. The NGOs did not pursue issues of water pollution or undertake projects in the Chinese area, which sorely needs NGO and grassroots activism. In the Chinese region of the Tumen River Area, the lack of NGO counterparts and political restrictions, as well as weak human and financial resources restricted the sustainability of international NGO activism.

Box 3. China's Hesitancy in Multilateral Environmental Initiatives

While China has been an active member of regional environmental initiatives, it is often hesitant to fully participate in these multilateral activities. For instance, China tried to reduce the institutional level and activity scope of the Acid Deposition Monitoring Network in East Asia (EANET) when it became an intergovernmental program in 1998 by opposing the development of an emission inventory and numerical models of long-range transport of acid deposition. China also opposed a Northeast Asia Subregional Program of Environmental Cooperation (NEASPEC) project dealing with transboundary air pollution, and a Northwest Pacific Action Plan (NOWPAP) activity plan on marine pollutions from land-based sources. In addition, the Chinese government also demanded that the Transboundary Diagnostic Analysis of the TumenNET project to include a statement indicating that the results of the analysis were not official but simply the personal opinion of researchers, although the government had officially undertaken the project. In regards to the Mekong River Basin Commission China has maintained simply an observer status, which means it is not obligated to undertake actions mandated for the commission is member countries.

National Commission for UNESCO in early 2002 to start a feasibility study on establishing such a reserve in the lower Tumen River Area. The main aim of the feasibility study project was to prepare a TBR proposal that included: (1) guidelines for transboundary cooperation, (2) potential institutional mechanisms, (3) establishment procedures, (4) zoning plans, (5) a draft Biosphere Reserve nomination form, and (6) and recommendations on a TBR implementation action plan and fund mobilization.

The feasibility study and the project to form the TBR, however, initially faced various political hurdles—one of the largest being the cautious position of Chinese central government agencies such as SEPA and the Chinese Man and the Biosphere (MAB) National Commission for UNESCO. The TBR project required clear support from China's MAB National Commission to be conducted smoothly and to produce politically meaningful outcomes. However this commission did not commit itself to the TBR because it did not receive the political approval from key high-level agencies in China.

Throughout all regional environmental cooperative efforts, China has been extremely cautious of bilateral or multilateral actions that might commit the country to long-term political or financial duties to protect the environment outside its borders. Chinese officials involved in such cooperative efforts are hesitant to even employ the term “transboundary” in cooperation projects, as they do not want the country to be officially recognized as a source of pollution of a neighbor's territory. Even more important is the wish to avoid any situation that might interfere in China's sovereignty to pursue economic development. See Box 3 for some other examples of China's hesitancy in transboundary environmental initiatives.

The Chinese have exhibited similar hesitancy vis-à-vis the Tumen River TBR initiative, which delayed the

official launch for months. Finally the TBR project began without the participation of the China's central government agencies. Without the formal endorsement by all national governments, the TBR project could only move forward as a results-oriented action plan for a TBR proposal. Within this new, “informal” action plan, UNESCO, NGOs, and provincial governments, took a new approach, focusing on bottom-up, instead of top-down activities—first mobilizing local stakeholders' understanding and interests within the TBR before trying to attract political support from central government agencies. This approach also was derived from the lessons from previous intergovernmental activities in the Tumen River Area, which mostly alienated local stakeholders, leaving feeble local capacities in environmental knowledge and management.

From mid-2002 until early 2004, international and local NGOs, as well as local governments in the border region have undertaken activities laying the groundwork for a true TBR in the Tumen River Area, including: (1) awareness-building and field diagnostic meetings, (2) national technical meetings, (3) a regional workshop, (4) national subprojects, and (5) mapping of ecological, economic and social conditions. At the end of October 2003, officials from Jilin (China) and Primorsky (Russia) provincial governments, staff from nature reserves in both parts of the Tumen River Area, and experts from domestic and international NGOs gathered together at a regional workshop in Hunchun, Jilin. The consensus reached at the meeting was more than originally expected. Officials from both Chinese and Russian provincial governments expressed their strong support for creating a TBR. Both provincial governments saw activities leading to the TBR creation as a crucial avenue to promote local cooperation across the border, to attract international attention to their protected areas, and to protect endangered animals. This breakthrough led workshop participants to agree on

meaningful outcomes to push forward the project's process. The outcomes included:

- Promoting local stakeholder understanding of various methodologies for biodiversity conservation in the transboundary areas;
- Opening windows of opportunity for information exchanges and field activities between various stakeholders across national boundaries, as well as within a country; and,
- Gathering and sharing information and materials on the ecological situation and state of conservation efforts in the Tumen River Area.

As the feasibility study project nears completion, it becomes clear that most local stakeholders in both Jilin and Primorsky want to help create the first TBR in Asia. At this stage, two ways are possible for the establishment of a Tumen River TBR: (1) make the central authorities of both China and Russia fill out a nomination form for a TBR together and apply for the creation to UNESCO, or (2) create a separate BR in each country and combine them as a TBR later when the political situation is more supportive. If BRs were independently established on both sides of the Sino-Russian border in the Tumen River Area, they could still act as an informal TBR until the official establishment. Regardless of which strategy is chosen, success remains in the hands of authorities in Beijing. Relevant authorities in Moscow already released letters of their support for a TBR, but Beijing still waits for the right moment to signal their intent.

In light of the Chinese central government's hesitancy, officials of the Jilin province and Hunchun Nature Reserve are first trying to upgrade the provincial level reserve to the state level, which will facilitate the reserve's nomination for a BR later. At the same time, local stakeholders in both China and Russia are preparing practical and cooperative activities for two BRs or a TBR. In parallel, the local stakeholder project team is attempting to invent workable options for the central government of China.

Having constructed a meaningful avenue for most major stakeholders to meet and to shape their common goals, it is crucial to keep transboundary activities alive after the feasibility study project's completion in mid-2004. In addition, persuading North Korea to join transboundary activities and become a member of a TBR remains as an important task, as its territory has considerable value as a part of the potential reserve. Currently, North Korea is hardly involved in multilateral environmental activities in Northeast Asia, but it appears rather receptive to activities on biodiversity issues. Thus, there is hope to see North Korea participate in later activities even though it declined the initial invitation.

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ENDNOTES

¹ As the BR is rooted in a UNESCO program, the creation of a Biosphere Reserve requires UNESCO to approve an application submitted by a country's National Commission for UNESCO.

² The existing transboundary biosphere reserves are the: Tatra in Poland and Slovakia (1992); Krkonoše/Karkonosze in Czech Republic and Poland (1992); Vosges du Nord /Pfälzerwald in France and Germany (1998); the Danube Delta in Romania and Ukraine (1998); the Eastern Carpathians in Poland, Slovakia and Ukraine (1998); and the West Region in Benin, Burkina Faso and Niger (2002).

Navigating Peace: Forging New Water Partnerships

U.S-China Water Conflict Resolution Water Working Group

By Jennifer Turner and Timothy Hildebrandt

In 2002, the Wilson Center's Environmental Change and Security Project received a grant from the Carnegie Corporation of New York to create three water working groups to promote policy research and the exchange of ideas in three areas: (1) balancing water as an economic and social good; (2) future of conflict and cooperation over scarce water resources, and (3) water conflict resolution in the United States and China. ECSP's China Environment Forum has been responsible for the third water working group. In November 2003 the U.S.-China Water Conflict Resolution Water Working Group traveled to China and met with a diverse collection water experts from the government, NGO, academic, and legal communities in Beijing. A summary of these meetings is presented below.



FLOODING THE COURTS?

THE GROWING ROLE OF ENVIRONMENTAL LAWYERS IN RESOLVING WATER CONFLICTS IN CHINA

Private law firms only emerged in the People's Republic of China in the 1980s as Deng Xiaoping's regime pushed for the creation of a strong legal system to support economic reforms and international investment. While corporate and contract law practices developed quickly, private lawyers specializing in environmental law have only recently emerged as pollution disputes have grown. In the working group's first meeting they met with two lawyers from the Beijing Zhongzi Law Office—**Sun Junbao** (vice director and partner) and **Xia Jun** (lawyer)—who outlined the growing environmental law profession and discussed new initiatives by China's nascent commercial law firms to promote the practice of environmental law, particularly the new phenomena of lawyers pulling together class action suits of pollution victims to press for compensation in courts.

Promoting Professional Environmental Lawyers

In 1999, the Zhongzi Law Office and the Beijing University Law Institute joined together to form the first Environmental Law Institute in China, which is jointly overseen by the State Environmental Protection Administration and the Ministry of Trade. In May 2001, the Environmental Law Institute filed a report suggesting that the Ministry of Justice fund an All China Lawyers Association Environmental and Natural Resources Committee. The report was approved and

the committee received funding in October 2001. The committee members come from 11 provinces and are made up of: (1) environmental law specialists, (2) senior lawyers who previously specialized in corporate law and recently converted to environmental law, and (3) lawyers interested in environmental law. Since being created the committee has set up satellite offices in Beijing, Guanxi, and Chongqing. The mission of this committee is to:

1. Participate in the legislative process of the National People's Congress (NPC);
2. Provide environmental law information and advice to policymakers, corporations and individuals; and,
3. Cooperate with international organizations to gather and exchange information on environmental law—for example the committee assisted the American Bar Association in providing environmental training to lawyers and other stakeholders in five Chinese cities.

There has been growing interest among Chinese lawyers to participate in this Environmental Law Committee, for this area of law is seen as a new hot "market" for litigation. Notably, Chinese lawyers do not demand fees in the early stages of a case—however if they win they receive slightly less than 20 percent of the settlement (plus expenses), which is lower than their U.S. counterparts who usually earn closer to 30 percent of the settlement.

Private Class Action Cases

Mr. Xia Jun discussed a contentious inter-provincial water pollution conflict in Bohai Bay (Hebei province) in which the Zhongzi Law Office successfully helped a large number of pollution victims win compensation for damages. The problem began in October 2000 when seven paper mills and two machine plants discharged highly toxic industrial wastewater into a small Hebei river that flows into Bohai Bay. These wastewater emissions decimated shellfish farms 100 kilometers along the coast. The fishers initially tried to pursue mediation with the factories, but encountered many difficulties, so instead turned to suing the factories in the Tianjin Maritime Court in 2001.

After the Tianjin Maritime Court received an estimate of damages from the Ministry of Agriculture and heard initial arguments, the court deemed that the burden of proof was on the nine defendants. Some of the defendants argued their wastewater had met the state emission standards, which meant they should not be responsible for any damages. They also argued since many factories operate along the river, the plaintiffs could not prove the nine defendants were solely responsible for the pollution. The defendants also alleged that the victims were illegally raising fish, so they have no rights to demand compensation for an illegal operation. While some factories contended they had discontinued production during the pollution period, court investigations revealed that the local government issued fake documents trying to prove the factories were not in operation. In the end the court was not convinced by the defendants' arguments of innocence and thus ruled all nine were jointly liable to pay the victims 13 million Yuan.

When the defendants appealed to a higher Tianjin court it also supported the lower court's decision, but suggested that the one factory meeting national standards should pay a slightly lower penalty than the others. This was the first time a court ruled a factory emitting less than the national standards was still partially responsible for pollution. This case set an important precedent, which could help future water pollution victims press cases against groups of industries emitting below set standards.

As of December 2003, the Tianjin Maritime Court was still trying to enforce the ruling, ordering some factories to discontinue highly polluting production. The drop in production caused some factories to close or to be auctioned off, which has led some factory workers and managers to protest or withhold payment to the plaintiffs.¹

Pondering Suits Against Government and Mediation Options

The existence of a lawsuit is often evidence that responsible government agencies are not doing their job of protecting water resources. However, local government agencies overseeing industry or water resources cannot be sued in China. Some Chinese scholars and legal experts have suggested citizens be permitted to bring suits against government agencies, but such a change will not come anytime soon. Notably, Chinese law not only protects governments from suits, but it also makes it very difficult for governments to sue companies. Local monitoring agencies can only issue fines to polluters if they exceed pollution standards. While upper-level governments sometimes close polluting plants in highly publicized cases these plants may quietly be reopened by local governments that are dependent on their tax revenues.

In China, most pollution control regulations stipulate that victims of pollution should first go to administrative agencies (often the local environmental protection bureau) and request mediation, although mediated settlements create only voluntary and not binding obligations.² While they are legally obligated to mediate, administrative agencies rarely are willing to do so due to pressures from the local government. Administrative agencies often avoid the obligation to mediate by asking the polluting factories if they want to move straight to litigation, which they usually do.³ Some Chinese scholars suggest there should be an independent third-party arbitration organization in China for pollution and other civil disputes as there is for business disputes, but such an organization is unlikely to be created in the near future.

Chinese lawyers rarely participate in mediation because they do not earn fees as they do for litigation. Moreover, mediation cases do not usually provide large amounts of compensation to pollution victims. Sun Junbao noted one exception when several years ago the Ministry of Agriculture mediated a case and successfully enforced compensation of several hundred thousand Yuan to the pollution victims.

An NGO Empowering Pollution Victims

In 1998 **Wang Canfa**—a law professor at Beijing Politics and Law University—set up a unique NGO that aims to help empower pollution victims in the courts. Through a broad range of activities the Center for Legal Aid to Pollution Victims (CLAPV) aims to: (1) raise consciousness of environmental law and rights of the public, (2) improve the capacity of administrative

agencies and judicial bodies that preside over environmental conflicts, and (3) promote enforcement of Chinese pollution control laws. CLAPV has no full-time staff and instead depends on 95 volunteer members—ranging from law professors, teachers, graduate students and lawyers—to do research work, advise lawmakers, and help pollution victims.

CLAPV focused its initial efforts on providing information to pollution victims on their legal rights by opening a legal advisory hotline and offering periodic free consultation services on a busy Beijing shopping

aquaculture to be 5.60 million Yuan and damage to the wild fish population was nearly twice as high at 11.6 million Yuan.

The local government in Jiangsu province required that the residents and the factories mediate the problem, but the factories ignored the order. The fishers were angered by this lack of response, so they dumped truckloads of dead fish at the factory gates. Because it was summer, the smell from the fish permeated the entire city and local police clashed with the fishers trying to force them to remove the rotting fish.

The smell from the fish permeated the entire city and local police clashed with the fishers trying to force them to remove the rotting fish.

street. The center also tries to use the news media to increase the public's understanding of environmental laws and rights of pollution victims. One of the center's other main activities includes helping pollution victims file lawsuits. Since 1998 CLAPV has brought 51 cases to court with more wins than losses. While assisting individual victims is core to CLAPV's mission, since 2001 they have also held training sessions for 190 environmental lawyers and 90 judges to enhance their capacity to handle environmental cases. Since many of CLAPV's members possess strong legal backgrounds, they have been able to advise Chinese lawmakers about improving environmental legislation.

CLAPV's Trans-boundary Water Pollution Case

Wang Canfa believes that environmental mediation is a great concept and sometimes has helped two government entities find a solution to cross-border pollution problems, but in cases of individual pollution victims versus an industry mediation has not been very successful. Thus citizens only have the option to file cases in the court. However, as he illustrated in one case study, getting to court can be difficult for individual citizens.

CLAPV is currently engaged in a cross-border water pollution case centered around a reservoir in Jiangsu province where 67 residents sued upstream polluting factories located in Shandong province. In September 1999 and June 2000 two particularly large pollution incidents sparked conflict between the Jiangsu fishers and the Shandong factories. Wastewater emissions from factories in Shandong killed 2,830 cage boxes of fish that belonged to 97 fishers in the reservoir. A study by the Ministry of Agriculture estimated damages to the

The local government in Shandong immediately called their counterparts in Jiangsu asking them to encourage the belligerent fishers back home with the promise the factories would fix the water problem as soon as possible. After a year of negotiations and mediation the two governments could not even agree on real losses or compensation, thus the fishers decided their only route was to sue the factories. However, these fishers had been completely impoverished by their loss of livelihood so they could not afford the fees to take the case to court.⁴ Luckily CLAPV came to help them with these fees and find them pro bono lawyers for the case.

Similar to the Hebei case discussed above, the defendants argued that although fish were killed, their wastewater met national emission standards and was therefore legal. They also argued that because the river went through three cities and nine counties, they were not responsible because any number of thirty factories could have been responsible. In addition the defendants pointed out that the reservoir was built for water retention and they could not be responsible for damaging illegal fish farming. The plaintiffs countered this last point with the fact their local government had long encouraged the development of fishing in the reservoir. Moreover, studies indicated the harmful wastewater could only have come from the two factories owned by the defendants. While often un-enforced, according to Chinese law even if factories meet national standards, they are still responsible for damage caused by their emissions. The court ruled that the factories should pay 5.6 million Yuan to victims and 480,000 for court fees. The defendants appealed to Jiangsu higher court, which six months later supported the

lower court's ruling.

While the fishers won the case, they then faced another major hurdle in pollution cases—enforcing the decision. In this case the factories refused to pay and the plaintiffs asked the court to enforce the judgment. In June 2002, the Jiangsu provincial court had to ask a Shandong court to force their province's factories to pay the penalties. To avoid running into local protectionism, the Shandong provincial court asked the regional railway court to enforce the penalty.⁵ This court did not take action for six months, which led the fishers in Jiangsu little choice but to take to the streets again and apply to demonstrate on Tiananmen Square. The application to demonstrate in Beijing brought this conflict to the attention of central government officials, who then implored the local and provincial governments in Jiangsu and Shandong to solve this problem. The railway court therefore agreed to meet with the victims, but after several months of continued intergovernmental haggling the courts still have not enforced the settlement. While CLAPV has been breaking legal ground to resolve water conflicts, as the next section illustrates, a small number of Chinese NGOs have begun to empower citizens in the area of water management.

NGO ROUNDTABLE IN BEIJING

During the study tour in Beijing, the China Environment Forum gathered some key environmental NGO activists for a roundtable to discuss the growing power of civil society groups in China and their role in promoting greater citizen voice in water management and protection issues.

China's Atypical NGOs

Li Lailai (Institute of Environment and Development) kicked off the NGO roundtable discussion with the observation that in China the concept “nongovernmental organization” embodies a broad range of organizations—legally registered NGOs; government-organized nongovernmental organizations; NGOs that obtain registration as businesses; and informal, unregistered grassroots activist organizations. This great variety of green groups is a result of the difficult NGO registration process, which has led some green activists to favor registering themselves as a for-profit business. This business registration option gives green groups more operational freedom, but is simply too costly for most environmental groups. Consequently, the vast majority of new green groups are operating illegally in China as small, *ad hoc* community groups,

volunteer or Internet organizations. While such “illegal” organizations are often so small the government does not close them down, they do face difficulties in gaining legitimacy in the public's eye and in retaining staff due to low salary and lack of benefits. Thus, it is difficult for these illegal groups to become stable organizations. Even legal green NGOs have their own limitations, for many lack mechanisms for transparency in terms of operations and accounting, which hinders their ability to obtain international funding, a crucial source of support for such organizations.

Li Lailai maintained that these different social organizations are part of a new phenomenon based upon significant, yet incremental institutional change in China, which is fueling the drive towards a mature civil society. Although the lack of legal status may limit their capacity, green NGOs still play an important, albeit unique role in furthering environmental ideals in the country by concentrating their efforts on public advocacy not lobbying politicians. For example, they organize environmental education campaigns for the general public and students, set up stakeholder dialogues around watersheds, and inform journalists of environmental injustices or corrupt local governments. As the following speakers in the roundtable illustrated, however, green activists in China are starting to test the political waters by undertaking stronger advocacy to influence policymakers—most notably in helping to get the public involved in implementing China's new Environmental Impact Assessment Law as a means of halting ill-conceived dams.

NGOs Building Citizen-Government Collaboration

The Chinese government's “Go West” development campaign—an effort to spread the economic success of the east to poorer inland regions—has the potential to detrimentally impact water resources in western China. Both central and local governments tout water diversion and hydropower development projects as key infrastructure development to invigorate economic development in the west. However, these large-scale infrastructure projects also pose a serious risk to the poor, often marginalized citizens who have made a living off of local watersheds. Through his Yunnan-based NGO Green Watershed, Yu Xiaogang is engaged in small-scale, participatory watershed management to deal with the problems posed by growing, unchecked development in western China. Yu maintained that community-based, NGO involvement encourages both good governance and local empowerment.

Green Watershed's primary project area is an ecologically diverse and multicultural area in Lijiang, where in recent years increased development and government intervention in the area has taken a toll: In nearby mountainous regions, logging bans have decimated one of the few local industries and increased the poverty rate. In addition large-scale water transfer projects draining a lake and wetland area have created a booming tourist industry in Lijiang city, but have decimated the upstream regions, where citizens lose an average 500 Yuan a year due to flooding and insufficient water resources. In the water transfer project area there was an unforeseen domino effect: Villagers who normally made a living in the agriculture sector were forced to begin fishing. Not surprisingly, the marked increase in fishing led to severe over fishing. With fewer fish in the ecosystem, migratory waterfowl soon left the area in search for sufficient food. Moreover, the destruction of the wetland also meant fewer jobs in the village, which made it necessary for younger villagers to move to large cities in search of work; many young women have found their only opportunity for work in the underground sex industry. In response to the ecological destruction the local government chose to simply ban fishing rather than address the core problems created by the water diversion—a decision made without involvement of all the local stakeholders.

Under the auspices of a Mekong Upper Basin project sponsored by two international NGOs—Oxfam America and International Institute for Rural Reconstruction—Green Watershed has attempted to involve all relevant stakeholders, give citizens voice, and help resolve the many problems facing residents in Lijiang. Constructive dialogue involving citizens, local, provincial and central governments, Yu insisted, is crucial for achieving true sustainable development. At the heart of this multi-stakeholder project was the creation of watershed development committees, which included participants from several levels of government, wetland protection bureaus, fishery associations, and villagers. In addition to devising strategies to reverse environmental degradation and better manage water resources, the committee addresses issues of food and livelihood security, as well as methods of building local citizen capacity for environmental protection.

Beginning in 2000, Yu reported that his NGO has participated in a number of capacity building activities. The project has gone to great lengths to encourage women to participate in decision-making and take a more active role in the economy. Yu proudly discussed the successful construction of a road to

connect upland villagers previously cut off from other lowland areas. Though they have had great success involving local residents like never before, Yu also outlined some potential challenges in the future. Yu reported that initially the central government was quite interested in their work. More recently, however, officials have begun to pressure the group to roll back its projects. According to Yu, the Ministry of Water Resources (MWR) has been given the green light to lead a 200 million Yuan investment in further dam building in western China. The stakeholder advocacy promoted by Green Watershed would likely get in the way of this development and the MWR and dam construction companies would rather not deal with them. While the Chinese government has recently touted its adoption of an Environment Impact Assessment Law as a way to empower citizens in infrastructure development projects Yu believes that this law is not enough, as it does not include a social impact component. While he admitted that government officials occasionally investigate Green Watershed, Yu believes that because his group is a domestic NGO, he has more latitude to do dynamic work than international NGOs, who are under even greater scrutiny.

Chinese NGOs Change

In some instances, green groups in China have become involved in environmental issues at the request of citizens, indicating a growing trust in NGOs. One of the more contentious environmental issues in China has been the recent proliferation of new dam construction. Lü Zhi (Conservation International, CI) recounted one particularly telling story about a group of Tibetan villagers who sent a letter to CI's Beijing office expressing their opposition to a dam slated to be built on what they considered a sacred lake. The villagers fears were not just rooted in superstition; they were concerned that the dam was planned too close to a volatile earthquake fault and worried that the dam would degrade their tourism-based livelihoods. CI staff and other Beijing environmentalists were spurred to action, beginning their work by sending a group of investigative journalists to survey the situation.

In addition to the initial concerns expressed by the villagers, the journalist team discovered that the dam was to be built on a protected scenic park. Evidently, during the approval process, neither the provincial government nor the State Environmental Protection Administration (SEPA) bothered to visit the proposed site—the Ministry of Construction that

managed the park had pushed for the infrastructure project. After making these discoveries, the NGO leaders began to organize media coverage on the project's ecological problems and called on central government officials to reevaluate the situation. Lü Zhi also gathered a group of twenty environmental experts to author a formal letter of recommendations, outlining legal and environmental problems posed by the dam project. Although the leadership has not responded, Lü Zhi believes this is not altogether a bad sign. She is somewhat optimistic that because the government has not rejected their claims, there is still hope for the project to be changed or cancelled.

The NGO community has also welcomed the increased independent role played by SEPA. In recent years, SEPA has taken a relatively active role at opposing the construction of dams on the wild Nu River. When some government agencies began the process to approve the first major dam on the river, SEPA surprisingly objected to the project. What is more, Lü reported that SEPA insisted its objections be expressly noted in official documents concerning the dam debate. To follow up, SEPA then held a meeting of experts and government officials. Lü participated in this atypical forum and was surprised at the candid discussions. Much of this new willingness to participate in the debate comes from farsighted individuals in the bureaucracy.

Domestic NGOs Green Watershed and Chinese activist academics, who have congenial relationships with the new media and government, are playing an increasingly important role in shaping environmental policies. While international involvement is sometimes helpful in funding or promoting knowledge transfer to China's NGO community, in regards to sensitive environmental issues Lü Zhi insisted it is much more effective for Chinese NGOs and activists to criticize China's policies and decision-makers than international organizations.

WWF-China

While best known as wildlife protection advocates in China, WWF-China is also active in water protection projects that bring diverse groups together to address threats to water ecosystems. Yu Xiaobo from WWF-China discussed how in March 2003, WWF-China launched a national task force on river restoration management, designed to give policy recommendations to provincial and central governments. Currently, the task force is focused on the middle reaches of the Yangtze River—with a particular emphasis on restoring the natural banks and wetlands. This work is part of a

broader "Living Yangtze River" project—a nine-year \$8 million project dealing with ecological preservation and restoration of the river.

BEIJING'S WATER CONFLICTS

While many southern cities in China suffer from the perennial threat of floods, northern areas have struggled with water scarcity for much of the history of the PRC. The massive Beijing municipality, covering 16,000 square kilometers, is one obvious example of one side of China's paradoxical water crises. With only 300 cubic meters per capita per year of renewable freshwater, Beijing is well under the water scarcity benchmark of 1,000 cubic meters. On average, 75 percent of Beijing's rainfalls occur during the summer months. The little water that does fall during the dry winter months disappears from high evaporation caused by strong winds.

Though these drought conditions have been the reality in Beijing's recent history, the situation was quite different during the early years of the PRC. Eva Sternfeld—Director for Research and Institutional Exchange at the China Environment and Sustainable Development Reference and Research Centre (CESDRRC)—reported that in the 1950s Beijing was beset with rain, which led the city to focus on flood control. One of the municipality's primary water suppliers, the Guanting reservoir was built for this very purpose. Yet, after several decades of diminished rainfall, and five years of full-blown drought, Guanting and the other major reservoirs such as the Miyun, have severely diminished water levels (in the case of Miyun, from a high of 4.1 billion cubic meters to only 600 million). Consequently, Beijing has increasingly relied on groundwater—causing the region's water table to drop dangerously low.

Increasingly acute water shortages and unchecked urban development within Beijing municipality have pushed the city to look towards other areas of China to satisfy its water needs. While small water diversions have been part of Beijing's history for hundreds of years, a grand-scale diversion project is currently underway—the construction of three canals to transfer water from the over-saturated south. Though Mao envisioned this scheme, it only received the official green light in 2001 to guarantee Beijing would have sufficient water for the 2008 Olympics. Sternfeld, and many other environmentalists, are concerned about the viability and ecological impact of this project. The quality of water transferred from the polluted Yangtze River is held in question. Moreover, many speculate that the

great distance will result in much of the water evaporating in the open canals. Some experts are similarly concerned that the transfer, while raising the water table, will simply increase salinization, making the increased groundwater reserves useless.

The south-north water transfer project also has the potential for causing inter-provincial conflicts. In Wuhan, for instance, local officials are concerned that diverted water will negatively affect their own currently sufficient supply. Other provinces are raising objections over the distribution of water; though Beijing is in dire

oriented water allocation system in China—they also, however, serve as examples of the difficulty in completely abandoning the traditional administrative system for water management.

In some rural regions of the country, individual farmers are involved in small pilot trials of water right transfers. Individual water transfer is not altogether new in China, as low-level trade occurred sporadically during the Qing Dynasty. The system being tested now, however, is more formal and institutionalized in nature. Wang interviewed one farmer in a test area of

The Jiang River is one area that has seen far fewer conflicts among neighboring provinces because of the newly introduced water transfer schemes.

need of water, so too are other dry cities. Many provinces are worried that Beijing, as the seat of government, will receive preferential treatment at their own loss, particularly in the agricultural sector. Sternfeld predicts that this water transfer project will only increase the instances of urban/rural water conflicts.

The biggest roadblock to solving Beijing's water problem is a lack of knowledge among the populous. Sternfeld does not believe that many urban citizens are aware of the severity of Beijing's water shortages or appear to care about the origin of their water drinking water. To deal with the problem, Sternfeld and her CESDRRC colleagues are preparing water saving guides to educate citizens. They also are working to convince local and central water bureaus to promote an open and honest dialogue with citizens as a first step to promote conservation.

CHINA'S WATER MARKET EXPERIMENTS

In China, one of the major causes of water scarcity stems from an unclear property right regime that has made water common property. According to Wang Yahua (School of Public Policy & Management at Tsinghua University), unclear property rights have led to low efficiency in water use. To be sure, water distribution in China is not a complete free-for-all, for administrative measures are employed to try to assure adequate and/or equitable supply across the country. Yet, as China begins to embrace a market-oriented economy and as administrative measures grow more costly, there is great potential for market measures to better control water resources. Wang profiled several case studies that reveal the beginnings of a more market-

Gansu province who received 800 cubic meters (m³) of water from the local water bureau. Under the water rights scheme, he was allowed to sell any excess back to other farmers; having employed water saving measures, the farmer was able to sell 200 m³ to a neighbor at 0.2 RMB per m³. The same farmer, in following months, needed extra water and was easily able to purchase an allotment from his brother. Wang noted that this individual transfer level not only assures enough water for all rural residents, but also reduces waste and offers the opportunity for farmers to collect some additional income.

Wang examined an instance of larger, "organizational level" water transfers. Along the Yellow River in Inner Mongolia, a power plant was in need of water beyond its original 5 million m² allocation from the Yellow River Conservancy Commission (YRCC). While the plant could have installed an air-cooling system, which would eliminate the need for more water, the plant concluded that purchasing additional water from the local government would be more cost effective. Another illustrative example of higher-level transfers occurred between two cities in Zhejiang province. In China, it is not uncommon for the central government to demand that one water rich city or province transfer water to another where water is scarce. Yet, in Zhejiang one city, in need of water, was not willing to wait until a higher level of government forced another city to transfer water, opting instead to spend 200 million Yuan for 50 million m² of water from a neighboring city. The transfer—while not officially legal under the current water rights system—was a windfall for the two cities: One received clean water on their own

timetable, while the city with a surplus collected quite a bit of unexpected money.

Wang argued that market water transfers also have the potential to solve and prevent water conflicts. The Jiang River is one area that has seen far fewer conflicts among neighboring provinces because of newly introduced water transfer schemes. The river, which travels through several provinces, has been beset by problems of pollution and unequal distribution along its banks. After a major water conflict erupted between Hebei and Henan provinces in 1999, the Ministry of Water Resources (MWR) adopted new water allocation and trading schemes to solve previously impassable conflicts. Under the new inter-provincial agreements, water rich areas in the upper reaches of the Jiang River would be allowed to sell excess water to parched areas in the lower reaches. In one major transfer, the lower reaches paid 7.5 million Yuan for 15 million cubic m² of water. The two provinces viewed the transfer as a far more equitable solution, bypassing the central government. In the past, the central government's top-down solutions often have resulted in unfair plans benefiting one province, at great expense to another. On the Yellow River, for example, Shandong provincial officials approached the central government directly in hopes of finding a solution for their water shortage woes. Instead of engaging all the neighboring provinces in a dialogue to arrive at a fair solution for all parties, the government directly allocated water from an upstream reservoir that was intended for other provinces.

MWR is exploring additional strategies to employ new methods to solve water conflicts. For example, Wang Yahua reported that the YRCC is considering a plan that would store extra water in a reservoir as a "water bank." When water is needed, the needy province, county or city can pay for the user right. On a larger, and far more problematic level is the government's south-north water transfer project, which is very much centered on economics. For those provinces and cities along the transfer route, the more money they invest in the construction, in theory the more water they are to receive at its completion.

Based upon his extensive research, Wang concluded that though water markets are new in China, they are increasingly playing an important role to solve water conflicts. And while these markets are certain to develop further, because of the powerful water bureaucracy in China, administrative means of water allocation will not disappear anytime soon. Wang predicted instead that water markets will simply supplement the administrative allocation methods.

STATE ENVIRONMENTAL PROTECTION ADMINISTRATION AND WATER CONFLICT RESOLUTION

The Chinese State Environmental Protection Administration (SEPA) is becoming more involved in cross-provincial water pollution conflicts that have been growing in number and severity over the past two decades. China's first water pollution law in 1984 (revised in 1996) gave SEPA the role to regulate end-of-the-pipe pollution focusing on individual pollution violators. In response to the rapid drop in water quality and increase in water pollution conflicts, SEPA has expanded their focus on water to include pollution prevention, monitoring, and control at a basin level.

As part of their basin-level work SEPA is currently drafting and seeking provincial government input on a policy to address cross-provincial water conflicts. Many provincial government officials have insisted that SEPA needs not only to focus on water quality, but also on watershed monitoring and management. SEPA's efforts to more holistically manage water quality at the basin level was enhanced in the Tenth Five-Year Plan, which targeted three large lakes, three rivers, and two oceans for water quality improvements. Under this plan SEPA has been carrying out an extensive study to accurately assess water quality in these major water bodies and to identify the main sources of pollution in order to improve control measures and prevent further disputes.

In her many years in SEPA's Pollution Control Department, where she currently serves as the vice-director, **Liu Hongzhi** has been involved in many cases of inter-provincial water pollution conflicts along the Hui River and disputes between Zhejiang and Anhui provinces. In the face of growing inter-provincial water conflicts SEPA has: (1) experimented with creating collaborative working groups, (2) managed compensation solutions, (3) mediated inter-provincial water pollution conflicts, and (4) set up monitoring centers and hotlines.

Collaborative working groups. SEPA has made progress in managing water conflict between two cities in Jiangsu and Zhejiang provinces—Jiixin and Suzhou. SEPA held a joint meeting with the municipal governments to create a water pollution prevention team made up of government leaders from the legal, environmental, water, and urban construction departments in the two disputing cities. This team was set up to hold biyearly meetings and form smaller teams to monitor water pollution problems and implement pollution control measures in both cities. The teams also submit reports to SEPA on their progress in water pollution control. Since the joint meeting and teams

were established there have not been any large water conflicts and small conflicts are now quickly resolved through the new communication channels.

Managing and monitoring compensation. In addition to convening conflict resolution teams, SEPA has been involved in monitoring and managing compensation solutions between provinces. For example, after evaluating a water pollution conflict stemming from upstream emissions into the Yellow River by cities and factories in Shandong that caused hardships in downstream Hebei province, SEPA asked Shandong to provide three million Yuan to Hebei as compensation

resolution techniques. She related one U.S. example that made a deep impression on her—a major water pollution conflict between Oklahoma and Texas had to be settled by the Supreme Court, which ruled that Oklahoma must transport water to Texas that meets the latter state's water standards. Only recently has SEPA sent a major inter-provincial case to the courts in China—a highly contentious water pollution conflict between Shandong and Jiangsu provinces that could not be resolved by mediation. Neither province would accept a ruling of a local court, so China's Supreme Court is currently deliberating the case. Since this is

While citizens can sue a factory for negligence, [...] government agencies cannot be sued for poor enforcement of pollution control laws.

for the pollution damages. The compensation was paid by reallocating central government monies from Shandong to Hebei, which Hebei then used to compensate fishers who had suffered damage from Shandong's pollution. In another case, SEPA succeeded in pushing one polluting province to compensate another by simply threatening to hold back state monies. Such *ad hoc* punitive compensation schemes are becoming increasingly common in China, but the notion setting up regular payment for environmental services schemes—in which downstream provinces pay upstream provinces for protecting water resources—has not yet been introduced on a large scale in China. Two strategies to improve pollution control to limit conflicts have been central government loans and subsidies to finance wastewater treatment plant projects and central mandates that require local cities to finance projects. These top-down strategies have only partially improved the water quality situation. In the late 1980s, a mere 10 percent of urban wastewater in China was processed and today this treatment rate has only risen to 34 percent. In rural areas, however, far less wastewater is treated.

Inter-provincial mediation. Within all of China's seven large river basins economic growth has produced a growing number of inter-provincial water pollution disputes. Since SEPA cannot regulate all of these conflicts it chooses instead to regulate some of the most severe ones—to date SEPA has successfully mediated ten inter-provincial water conflicts. Liu Hongzhi acknowledged that SEPA must increase its capacity to encourage cooperation between provinces on water quality control problems, which is why she traveled to the United States in 2003 to examine various conflict

one of the first such cases to go to China's Supreme Court, it merits mention that the court does not have any legal precedence upon which to base environmental compensation regulations. Therefore the Supreme Court has requested that local governments establish some compensation regulations to help guide the ruling.

SEPA has set up a third independent party mediation system within the seven major river basins to regulate and oversee water management problems, but SEPA can only mediate water pollution issues. Other bureaus mediate other water conflicts—e.g., fishery bureaus mediate conflicts around fishing and water bureaus deal with water quantity conflicts. Clearly some conflicts cross these jurisdictional boundaries, which can lead to inter-bureau tension and obstacles in helping disputing parties find solutions.

While SEPA does have 40,000 environmental policemen to collect information, perform inspections, and conduct other monitoring activities, these numbers are not sufficient to monitor all water pollution problems. To collect pollution data in a more timely manner, SEPA has begun to set up automatic monitoring stations, which could prove very useful in resolving water pollution conflicts cases, which often suffer from inadequate water quality data.

Water pollution monitoring centers and hotlines. Liu Hongzhi maintained that it is not enough for SEPA to simply take water quality measures after the problem appears, therefore SEPA is considering ways of putting pressure on local government officials to push them to take more responsibility in managing water conflict issues. To assist local governments in this task SEPA recently set up a major water pollution monitoring

center. This center sends experts out to monitor and mediate water pollution incidents as soon as they are reported. SEPA staff responsible for water also has begun to issue reports to the news media about the water quality status of rivers, for they believe making this information more transparent can put pressure on the polluters to solve the problem.

Citizens also can use this information in the news media to take irresponsible factories to court for polluting local waterways. Another check citizens have on polluting industries or lax regulatory work is a hotline SEPA set up for citizens to report water pollution problems. If a call leads to a court case, the citizen who reported it can collect a reward. It merits mention that while citizens can sue a factory for negligence in a water pollution accident, government agencies cannot be sued for poor enforcement of pollution control laws. The one mechanism that does exist to push for good government performance in enforcing laws is the promotion system, which evaluates an official's job performance. However, environmental performance is rarely a criterion for job promotion, which SEPA's Minister Xie Zhenhua would like to change with the adoption of a green GDP.

WORLD BANK WATER USER ASSOCIATION PROJECTS

Irrigation accounts for over half of China's cultivated land and 70 to 80 percent of agricultural output. However, China's irrigation systems are plagued with a vicious cycle of problems—inadequate cost recovery and maintenance, declining infrastructure, management inefficiencies, falling output, water wastage, and low water fee collection rates. Not surprisingly the problems facing irrigation systems in China also are a source of increasing conflict among water users. **Richard Reidinger** (World Bank water expert) explained that the World Bank's irrigation projects in China have emphasized how better management and greater farmer participation are keys to breaking the vicious cycle of problems. Thus, the World Bank has worked for many years in promoting the creation of self-financing irrigation and drainage districts (SIDDs), in which farmers are organized into water users associations to better manage and limit conflicts in large-scale irrigation projects.⁶

Prior to Deng Xiaoping's agrarian reforms that sparked the creation of family farms, all irrigation systems were run by a collective that took water from the system and distributed it to the various villages and production teams. With the creation of the household responsibility system in the early 1980s

collectives were eliminated and there was no one in charge of distributing water for the irrigation systems, which led to many conflicts. The water user associations the World Bank began creating in 1995 on the North China Plain (in Shandong, Jiangsu, Anhui, and Hubei provinces) were created to fill this gap. One sign of the success of these pilot associations was when in 2000 the MWR issued a circular that stated water distribution should be done by water supply associations, which was the first time these water user associations were formally recognized by central government law.

ENDNOTES

¹ It is unclear if the fishers will ever see all the compensation—Sun Junbao believes they may only get 50 percent of what they are due. Generally in China successful enforcement of penalties depends on the amount victims demand—plaintiffs demanding smaller amounts tend to have a higher probability of winning cases and collecting the money. Large compensation cases are difficult, for example, Wang Canfa (law professor at Beijing Politics and Law University) recently won a case in Jiangsu province in which the plaintiff asked for one million Yuan but ultimately received only 500,000 Yuan.

² There is a People's Committee at every level of the Chinese government responsible for mediating conflicts, but administrative agencies may also be asked to mediate a case.

³ If agencies refuse to mediate the victim in theory has the right to make a formal complaint to the local or higher level of government.

⁴ Many fishers fled the area to hide from banks seeking repayment on loans, while others took children out of schools because they lacked tuition money.

⁵ In China courts are divided into two categories: regional and industrial, the latter courts sometimes are above pressures by localities in enforcing their rulings

⁶ For a through introduction to the World Bank water user associations see presentation by Spencer and Reidinger at: <http://www.worldbank.org/watsan/waterweek2003/18%20Water%20User%20Associations.htm>

Water Conflict Resolution in China

28 January 2004 China Environment Forum Meeting

Ma Jun, Sinosphere

Wang Xuejun, Beijing University

Yu Xiubo, Institute of Geographic Sciences and Natural Resource Research

By Timothy Hildebrandt and Jennifer L. Turner

Fast-paced and wide-reaching development is straining water resources around the world. With global demand at an all-time high, and supply at historic lows, fresh water is an issue in conflicts in many countries. While transboundary water conflicts such as those in the Mekong River Basin receive international press, most water conflicts receive little attention. The little heralded majority of water conflicts arise between citizens and local industries, or among provinces, counties, and cities. Such domestic water conflicts are increasingly common in China, which is doubly cursed: floods beleaguer southern provinces while droughts plague the northern regions. In response to water scarcity problems, the Chinese government still tends to focus on increasing supply, sparking major dam and water transfer projects. Such projects may only temporarily solve the water shortage and often create other problems or conflicts, such as in the case of the Three Gorges Dam, which led to the displacement of over 1.5 million people. Over the last twenty years as industrialization has boomed in China, water pollution problems between provinces have grown increasingly intense and defy peaceful resolution. The growing frequency and intensity of water-related conflicts are not only causing more human suffering, but also represent a threat to China's rapidly growing economy, making quick resolutions even more important.

Recognizing the challenges of water-related conflicts, the China Environment Forum created a Water Working Group that brings U.S. and Chinese experts together to share lessons learned, discuss conflict resolution methods, and identify opportunities for cooperation. This project is part of *Navigating Peace: Forging New Water Partnerships*, a broader initiative by the Wilson Center's Environmental Change and Security Project that examines the role water plays in conflict and cooperation. At this meeting of the China Environment Forum, several Chinese members of the working group discussed their own experience with China's water conflicts and reflected on insights they

learned from study tours in Tucson, Beijing, and Washington, DC. They noted the differences and similarities of domestic water conflict between the United States and China and also contemplated some solutions that could be implemented in China.

A LONG HISTORY OF WATER CONFLICTS

Disputes over water have, in recent years, been an increasingly common occurrence throughout China. **Ma Jun** began his talk by quoting the director of the head Policy and Regulatory Department of China's Ministry of Water Resources Gao Erkun, who reported at a July 2003 meeting that from 1990 to 2002 over 120,000 water quantity conflicts had been reported to the ministry.¹ Ma Jun emphasized that water conflicts are not just born out of water scarcity issues, but also out of some of the government's large engineering projects that were originally intended to solve water shortages. While such projects may solve water scarcity problems, they sometimes produce conflicts around population resettlement or disputes on how the water should be used.

Water scarcity conflicts are by no means reserved for one group of the population or region of the country. Rather, the disputes sometimes are between provinces, government agencies, and even individuals and industries. In short, conflicts know no geographic boundaries and often have been spanning decades of the PRC's history.

Fighting over Scarce Water

Beginning as far back as the 1950s, a series of water conflicts has plagued villages along the Zhang River, which is in the Hai River Basin and flows between Hebei and Henan provinces. For centuries villagers on both sides of the Zhang River maintained friendly ties, in part because many became relatives through marriage. However, the relations turned sour in the late 1950s when the demands for water rose sharply. Under the guidelines of the Great Leap Forward, local people raced to build large and small water facilities to



Ma Jun

Credit: David Hawxburst

reported that in the early days of the conflict, villagers engaged in near-guerilla warfare, using explosives, guns, and cannons to retaliate against those who stole water. The conflict became relatively dormant in the 1970s but exploded again in the 1990s due to drought and growing water needs. In 1991 villages mortared each other and the next year one village sabotaged a water diversion tunnel, which fueled the resentment that led to mass clashes with many injuries several years later. By the end of the decade, the conflict reached a point where major explosions and mortaring resulted in the injury of nearly 100 villagers.

The resolution of the Zhang River conflict is quite complicated, for while the villages in the two provinces clash over day-to-day water needs, the disputes over water allocation are between counties on both sides, both of which pressure the Hai River Conservancy Commission (HRCC) for more water. Ultimately the provincial governments and the HRCC must find a way to fairly allocate water and resolve the conflicts, which after nearly 50 years of simmering and exploding are quite challenging. To meet this challenge the HRCC set up a special water management office just for the Zhang River, which is beginning to make some headway in calming parties and negotiating solutions.

Certainly, a great number of the conflicts take place the countryside, far from the central government's easy reach. However, Ma Jun stressed that cities are by no means immune from water conflict. Urbanites have

expand farming. One of the projects, the Red Flag Canal, which was dug through rocky mountains, became a national model when it was completed in early 1960s. People all over China went to learn from the experience of the Linxian County for creating a "milky way on earth" with their bare hands.

The other side of the story was not that rosy at all. In fact the Red Flag Canal and other projects brought not just water, but decades of fighting and bloodshed. Ma Jun

suffered from water problems, and thirsty municipalities have also often been the source of conflict. When Beijing was named the capital of the PRC in 1949, the city was able to rely on its existing reservoirs to provide water for the relatively small population. But rapid population growth forced the city to tap resources outside of its own river basin. Beijing city officials mandated that the neighboring city of Tianjin to forfeit the use of its main reservoirs (the Miyun and Guanting). Tianjin then had to build the Panjiakou reservoir to bring water from the Luan River, which is located in northern Hebei province.

To quench the thirst of huge cities like Beijing the government is taking drastic supply-side management measures rather than push strict water conservation. Beijing's reach to other basins has led to the 2002 decision to commence construction of huge water transfer canals from the Yangtze River. These canals are an untested and costly water transfer scheme that could produce conflicts between recipient cities in the north and supply regions in the south China. Moreover, smaller cities in the south could lose their own water. While the first planned canal is along the east coast, supplementing the existing Grand Canal, the second and third canal routes may displace large numbers of people.

Such relocation has been seen in record numbers as China has begun to fill the reservoir of the Three Gorges dam. This project specifically, and hydropower schemes generally, according to Ma Jun, are another major source of water conflict in China. While relocation on the scale of the Three Gorges dam will likely not occur again, Ma Jun speculates that China's energy needs will result in more hydropower projects, additional forced relocations, and ecological degradation, which could spark an upsurge in water-related conflicts.

Water Pollution Conflicts

Although water quantity is a major problem in the North, throughout China, water quality is increasingly the primary cause of conflicts over water. Ma Jun highlighted the example of the city Shengze in Jiangsu province, which is a center of China's textile industry, a historically high polluting sector. In the mid-1990s, factories in the city discharged an estimated 90 million tons of wastewater into rivers flowing south into Zhejiang province. This pollution caused serious damage to the aquaculture and fishing businesses in villages just across the border. Since provinces in China are of equal political standing and lack effective mechanisms

to mediate such conflicts, it is not surprising that after years of failing to pressure their provincial government to act and force Shengze to halt the pollution, the affected villagers in Zhejiang took the situation into their own hands. Locals spent nearly 120,000 USD for 8 bulldozers to fill and sink 28 boats loaded with cement and tens of thousands of sandbags, which created a dam in the 50-meter-wide river at the border. Such drastic measures are increasingly common throughout the Chinese countryside as pollution becomes a thorn in the economic side of rural areas. Economic losses in the villages in Zhejiang, for instance, ran to 6 million USD in 2001 alone. Health effects in the villages from the toxic pollution also caused much alarm with the rate of alimentary tract cancer rising by 58 percent from 1996 to 2002. Perhaps most shocking, Ma Jun noted that in one of the affected areas, no young men could pass the physical test required for military service in 2000.

Clearly, the present state (and grim future) of water conflicts makes resolution a top priority for the Chinese government. According to China's National Water Law (passed in 1988 and updated in 2002), interregional water disputes are supposed to be resolved through negotiation. If this negotiation fails the conflicts should then seek resolution through arbitration by government agencies at the next higher level. Disputes between individuals and companies are supposed to be resolved through mediation and litigation.

The Chinese government seems to acknowledge the necessity of water conflict resolution: the Minister of Water Resources employs 60,000 people to deal with water quantity conflicts alone. The State Environmental Protection Administration, which is responsible for resolving water pollution conflicts, is currently drafting and seeking provincial government input on a policy to address cross provincial water pollution disputes. Ultimately, it will be crucial for SEPA and the MWR to eventually unite in trying to resolve water conflicts, for water quantity and quality are often linked problems. Despite a tremendous commitment of staff, ad hoc administrative arbitration methods do not always work and local water and environmental agencies struggle to enforce judgments because of rampant local protectionism. Some disputing parties resent solutions enforced from above.

Instead of depending on administrative arbitration for water conflict resolution, some areas of the country are experimenting with centralized watershed management systems, which often assure more effective water allocation and regulation and could serve to

prevent conflicts in the first place. The Yellow River Conservancy Commission (YRCC) has been particularly successful in its efforts to begin managing the whole watershed and regulate water allocation. In the mid-1990s as the basin suffered from long-term droughts, extreme withdrawals by upper and midstream provinces left downstream provinces dry and the river did not reach the ocean for over 200 days a year. In the late 1990s when the YRCC began implementing watershed management measures all provinces were strictly limited in withdrawals and more water was allocated for in-stream ecological health—the river flow now reaches the ocean, in a steady, though tiny stream.

Though this management system has been effective it has not resolved all inter-provincial disputes in the basin. Ma Jun maintained that some of the river basin commissions in the eastern United States that give local governments, nongovernmental organizations (NGOs) and citizens a voice in influencing basin conservation strategies might be more appropriate in China. As he learned on the U.S study tour, it is more desirable to have a management system that is in the control of all relevant stakeholders and not a powerful, unwieldy government agency, as is the case in China. Reflecting on the working group's visit to Tucson, Arizona and the U.S. Institute for Environmental Conflict Resolution, Ma Jun was intrigued by the notion of third party neutral mediation, but acknowledged the difficulty of translating the system to China, as individual water rights have yet to be defined.

STRATEGIES FOR RESOLVING CONFLICTS IN THE YELLOW AND YANGTZE RIVERS

China is home to both the third and fourth longest rivers in the world—the Yangtze and Yellow, respectively. Taking into consideration the vast network of tributaries and great number of provinces through which these two great rivers pass, it is no surprise that water conflicts are plentiful within both basins. The threats such conflicts pose for economic growth and human livelihood makes water conflict resolution particularly crucial in these two rivers. In the last decade conflicts in the Yellow river stem from drought and overdrafts by the riparian provinces, while disputes in the Yangtze River arise from overzealous flood control and land reclamation which has destroyed the basin's ecosystem.

Over the past few years the Chinese government has begun to embrace the idea of integrated river basin management (IRBM) in laws and international assistance projects as a way to stem growing water

conflicts. Not surprisingly, the most ambitious studies and projects are taking place in the Yellow and Yangtze rivers.

Reforming Laws to Solve and Prevent Conflicts along the Yellow River

Stretching for 5,464 kilometers and flowing through eight provinces, the Yellow River accounts for 35 percent of China's total water resources and services some of the most economically prosperous areas of the country. In light of its economic importance and serious water conflicts the Asia Development Bank (ADB) joined with the legislative department of the Environmental Protection and Resources Conservation Committee, National People's Congress to create an international team of lawyers, policy experts, economists and engineers to evaluate the pitfalls of current river basin governance and identify solutions.

Wang Xuejun, who is a leading researcher in this Yellow River ADB study, noted the team did not just focus on the water shortage problems currently exploding in conflicts, but also smaller management and pollution problems that potentially will evolve into future clashes along the river.

The study scrutinized existing water management laws and practices at both the national and local levels and evaluated mechanisms for intergovernmental relations within the basin, with particular emphasis on the functions and power of the Ministry of Water Resources (MWR) and the State Environmental Protection Administration (SEPA). The contentious inter-provincial water disputes often remain unresolved due to the lack of clear legal mechanisms for brokering solutions between the parties and poor communication channels among the myriad of agencies involved in river basin issues. Notably, MWR and SEPA have long been embroiled in conflict over their roles to monitor and enforce water laws and regulations in China's river basins. In the Yellow River the two government agencies also do not coordinate or share the data each collects on water quality and quantity in the basin. At the local level, provincial protectionism and lack of transparency in the decision-making process for water quantity/quality management, as well as insufficient involvement of stakeholders in basin or sub-basin organizations are fundamental problems causing overuse and degradation of water that are sparking water conflicts.

The ADB team examined case studies on two types trans-jurisdictional pollution conflicts—those involving individual, village, or city disputes that crossed provincial boundaries and inter-provincial conflicts. The

former pollution conflicts are growing considerably fast in number and severity, particularly in the coastal areas of the Yellow River Basin. One coastal conflict the team investigated was between fishers in Changxing county of Zhejiang province and a chemical plant in Guangde county of Anhui province that had degraded the water in the trans-provincial section of the river. Most times in China when individuals or their livelihood is damaged by water pollution, victims must struggle to get the case heard in court—a time-consuming process that often results in rulings the court cannot enforce. On 22 March 2002 the fishers brought their demands for compensation to the Court of the Changxing County. While not usually the case in China, the court ruled in favor of the plaintiffs and the chemical plant was ordered to cover the economic losses (617,500 RMB) and the costs of the court (11,185 RMB). While the court did rule in favor of the pollution victims, ultimately if local authorities had enforced the water pollution control laws, the victims would have been spared suffering and the court case.

In terms of inter-provincial clashes over water pollution, sometimes a pollution crisis affecting multiple provinces does spark local cooperation and conflict resolution. For example, in July and August of 2001, continuous rainfall in Shanxi province breached several mine tailings dams allowing toxic tailings to enter the Qingzhang River, resulting in severe degradation of water quality and a threat to the Yuecheng Reservoir which is the drinking water source for two downriver cities in Henan and Hebei provinces. In this case, the three provinces of Shanxi, Hebei and Henan have enhanced communication in regard to the pollution of the Qingzhang River Basin, which enabled them to coordinate pollution prevention measures. Thus no further serious trans-jurisdictional water pollution incidents have occurred in this section of the basin. While the ADB team did discover some examples of cooperation, most inter-provincial disputes in the Yellow River defy resolution.

After examining the case studies and identifying central legal, management, and administrative problems, the ADB team offered legal and management recommendations for both provincial and national level governments. The team went so far as to suggest revisions of current laws and potential new legislation. Wang highlighted the considerable need for Chinese government agencies to more effectively enforce compliance. Better coordination between agencies and monitoring systems is crucial as well. The project proposed joint ministerial committees to successfully

resolve and prevent problems. To better deal with severe and sudden pollution, the team suggested the creation of an emergency response system. More generally, Wang believed that China could benefit from basin commissions adopting integrated river basin management systems, akin to some of those in the United States to which he was made familiar in the working group's Washington study tour.

Efforts at Ecological Restoration in the Yangtze Basin

The Yangtze is a powerful river that for centuries has subjected people in the basin to devastating floods. It is therefore not surprising that ancient and modern Chinese water managers have endeavored to control this fierce river. According to **Yu Xiubo**, the efforts to control flooding—particularly government-constructed dams—has created enormous natural and man-made problems in the middle reaches of the river. In addition to dams, farmers have build smaller dykes along the river—dykes which in places elevate the river 17 meters higher than the surrounding flood plain. These construction projects have left virtually no natural banks below the Three Gorges Dam.

Though these man-made barriers can serve the irrigation and flood control purposes of farmers in the short term, dykes also separate the river from small lakes that are scattered along the Yangtze. As a result of this physical disconnect, lakes are dwindling in size and reducing in number. Yu profiled the disturbing case of Dongting Lake that used to be China's largest lake at 6,000 square kilometers, but has now shrunk to half its size due to dykes and dams along the river. Hubei province was once known as the province of one thousand lakes. Yet, government projects in the 1950s, designed to increase cropland production and boost flood protection, have made the moniker meaningless. Today Hubei province is home to a paltry 80 lakes. Making the situation even more unfortunate, while the dams and dykes hold back floodwaters they have led to the subsequent loss of lakes and serious damage to the basin's ecosystem. According to Yu, the ecosystem in much of the Yangtze's middle reaches are for all intents and purposes, dead.

International NGOs with significant local involvement, like WWF-China, have resolved to inject life back into the Yangtze by employing the "living river" concept that has been used on the Rhine River. Some of the strategies used to revitalize rivers in Europe and the United States are more difficult in China. Thus the living river concept had to be modified to more appropriately fit the needs of China's unique case. Yu

noted that dam removal projects—which he recently learned about at the working group's visit with representatives from American Rivers' Dam Removal Project—are particularly difficult to consider in China for demolishing the great number and small size of dams scattered throughout the country would leave time and money for little else.

WWF-China has, however, begun a program that resolves to "make room for the lakes." Working with four different provincial governments to restore wetlands, this WWF-China project has resulted in 500-square kilometers of former cropland reborn as ecological diverse wetland. In addition, local communities are beginning to voluntarily remove dykes in an effort to reconnect lakes with the river. Yu admitted that the ecological restoration of even a small section of the Yangtze will not be done overnight. He insisted that all stakeholders must develop an overall vision for the river, and improve the communication with and education of the general public on the importance of this effort. More difficult, but all the more important, Yu declared that people must abandon the effort to fight the river and its regular floods and simply relocate. To encourage such a move, WWF has led demonstrations on alternative livelihoods that better mesh with sustainable development in Yangtze River Basin communities.

At the conclusion of the meeting, many audience members expressed an interest in the Chinese view of water conservation. On the whole, Chinese government officials and citizens—like those in the United States—do not pay close enough attention to issues of conservation, but are focused more on infrastructural solutions to secure more water. Ma Jun reported that people are just now gradually realizing that China has reached the limit of trying to manipulate the supply side of water and must tackle touchy issues of demand-side management. While some central and local water officials have raised the issue of conservation, Ma Jun noted that talk is difficult to translate into action. China must, he insisted, find ways to help the general public realize the need for conservation.

ENDNOTES

¹ Gao Erkun's full talk can be read in Chinese at: <http://shuizheng.chinawater.com.cn/zhxw/20030730/200307300017.asp>

eeBuildings: Sharing Strategies for Improving Building Energy Performance in Shanghai

In December 2003, **eeBuildings**, a U.S. Environmental Protection Agency initiative that promotes the efficient use of energy in buildings internationally, received welcome news from Mr. Tang Jian Ping in Shanghai. Mr. Tang is manager of one of the largest commercial property management companies in Shanghai, the Shanghai Hongqiao Economic & Technological Development Zone Property Management Company. He reported that in one year, he was able to reduce the energy consumption of the New Town Center, a fifteen year-old 27,000 square meter office building, by 15 percent. Mr. Tang attributed these major savings to a series of simple, low-cost building operational improvements he implemented after attending an eeBuildings-sponsored training event in January 2003. For eeBuildings, Mr. Tang's experience was evidence of the viability of the program's unique approach to reducing energy consumption in commercial buildings:

The fastest, least-costly, and most significant reductions in energy use can be achieved through improved management of building systems operations, using best practice techniques and the existing digital control system.¹

The eeBuildings Approach

eeBuildings is a voluntary market transformation initiative of the U.S. Environmental Protection Agency (EPA) that brings lessons learned from EPA's ENERGY STAR program to developing countries. In 2002 alone, ENERGY STAR helped nearly 12,000 organizations, representing more than 1.1 billion square meters of building space, save approximately 161 billion kBtu (47.3 billion kWh) of energy through voluntary investments in technologies and practices to reduce energy consumption. In China, eeBuildings is working directly with owners and managers of large commercial buildings to help them identify low-cost and no-cost measures that can immediately reduce building energy use, operating costs, and greenhouse gas emissions. As of January 2004, the program has trained 130 building owners and managers responsible for 135 large commercial buildings in Shanghai and documented local case studies, such as Mr. Tang's, indicating energy reductions of more than 10 percent due to selected no-cost and low-cost operational measures.

The eeBuildings approach is particularly suited to fast-developing countries that are interested in learning from U.S. experience and creating initiatives that will produce immediate, replicable results. This program's unique approach grew out of the following observations:

1. In the U.S., the most energy-efficient commercial buildings are, without exception, those with management and staff dedicated to superior operations and maintenance. They are not necessarily buildings with more efficient technology.
2. In China, there is little existing commercial infrastructure for delivering energy-efficiency services, such as the replacement and retrofit of existing building equipment.
3. Building owners are reluctant to make significant investments in energy efficiency, particularly with relatively new buildings.
4. Large commercial buildings in Shanghai and other Chinese cities often include relatively advanced building control systems that are seldom used to their full advantage. In addition, building managers are rarely trained in the most effective approaches for managing energy use.

In Mr. Tang's case, he reported that he understood the financial and environmental benefits of improving his buildings' energy efficiency, but he lacked information on what specific actions he could take to realize these benefits. At eeBuildings' January 2003 training event, he learned a number of best practice techniques to improve the energy performance of his building.

How Did Mr. Tang Reduce his Building's Energy Use?

Mr. Tang's first step was to use the U.S. EPA's Benchmarking Tool² to determine how much energy the New Town Mansion was consuming annually and if this was comparatively lower or higher than other similar Class A commercial office buildings. Based on an analysis of his energy performance benchmark score, Mr. Tang realized that his building was achieving better than average energy performance, but that there was

room for improvement. Furthermore, a close analysis of his energy bills indicated that approximately twenty-five percent of the building's energy was being consumed during non-operating hours. To reduce the amount of wasted energy in his building, Mr. Tang implemented simple, low-cost operational measures such as the following:

- *Optimized Lighting Schedule:* Re-programmed the Building Automation System (BAS) to control lighting operation time in public space, underground parking, equipment room, and other areas, on as-needed basis, instead of twenty-four hours per day, as previously.
- *Optimized Air Conditioning (A/C) Schedule:* Modified the air conditioning schedule to provide A/C from 7:00 AM to 7:00 PM on weekdays as opposed to fourteen hours per day on weekdays and on weekends. Tenants requesting air conditioning during off-hours were required to pay extra.
- *Coil Temperature Reset:* Based on a combination of outdoor temperature and air conditioner usage, reset the temperature of water leaving the chiller coil.
- *Hot Water Temperature Reset:* Reset the hot water temperature from sixty degrees Celsius to fifty degrees Celsius.

Within one year of implementing the above-described operational measures, Mr. Tang reduced the energy consumption of his building by 15 percent and saw his energy performance benchmark score increase by 16 points. If all Class A commercial office buildings in Shanghai were to achieve annual energy savings of fifteen percent, equivalent to Mr. Tang's, Shanghai property managers could save approximately 229 million RMB (\$28 million) annually and reduce carbon emissions equivalent to removing 70,000 cars from the road each year.

eeBuildings in 2004

eeBuildings is organizing a demonstration project showcasing the program's low-cost and no-cost approach. The project will focus on several high profile skyscrapers in Shanghai to document the opportunities for improving building energy performance through better management of building systems, using best practices and the existing control system. The project will involve collaboration between U.S. and Chinese experts. eeBuildings will also continue to support its international partnerships through training events, information exchange through its Web site (www.epa.gov/eeBuildings), and an e-mail newsletter to partners.

For more information, contact David Hathaway, Project Manager, ICF Consulting (dhathaway@icfconsulting.com, 202-862-1173) or Gary McNeil, Program Manager, EPA (mcneil.gary@epa.gov, 202-343-9173).

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¹ Digital Controls are also commonly referred to as Building Automation Systems (BAS) or Energy Management Systems (EMS).

² The U.S. EPA Benchmarking Tool (www.epa.gov/eeBuildings/Benchmarking) is an on-line tool that allows building owners and managers to compare their buildings' energy use with other similar buildings worldwide using a rating scale from 1 to 100, where 50 is average performance; The tool accounts for differences in building size, occupancy, operating hours, plug loads, climate, and weather and is intended for use with Class A buildings maintaining international comfort standards.

River Basin Governance in China

By Jennifer L. Turner

14-17 June 2004 the River Basin Governance Study Group—a China Environment Forum and Institute for Developing Economies initiative supported by the Japan Foundation's Center for Global Partnership—traveled to China for a second study tour. Most meetings were held in Beijing on the campus of Tsinghua University, where the group met with representatives from the Chinese government, NGO, and water research communities. The group also took a one-day trip to the nearby city of Tianjin to meet with the Hai River Basin Commission and the Tianjin Environmental Protection Bureau. Below is a short overview of key issues raised in the study tour sessions.



MINISTRY OF WATER RESOURCES

Ministry of Water Resources (MWR) officials met with the group to discuss the new Water Law and some of the major legal and bureaucratic obstacles to better river management in China. In terms of improving river basin governance, the new Water Law—passed in 2002—provides the seven major river basin commissions with more authority to allocate water. Thus far only the Yellow River Conservancy Commission (YRCC) has successfully exercised this authority to halt the serious flow cuts that began in 1998 when the river did not reach the sea for over 200 days. Today the YRCC not only divides the Yellow River among the basin's 9 thirsty provinces, but also allocates some water to environmental flows—an issue rarely considered in other major Chinese rivers.

Many rivers in China's arid north have suffered from considerable overdrafts—particularly during the past 20 years of rapid economic growth in China. One of the key institutional causes of water wastage in China has been the water rights regime that deems water the property of the state and all citizens—water is thus an open access resource. Since the late 1980s the MWR and its lower level agencies have struggled to create an effective water withdrawal permit system and increase water fees. Local governments have often undermined or ignored both of these policies out of fears that limiting water use will hurt the local economy. In recent years, however, a number of major cities have begun to increase water fees and install more water meters, which are key changes needed to slow the dangerous overdrawing of river resources. However, overall, when cities lack water they opt to tap new supplies rather than enforce conservation policies.

HAI RIVER BASIN COMMISSION

A day visiting the Hai River Basin Commission (HRBC) highlighted the great differences between Chinese river basin commissions and those in the U.S., Europe, and Japan. Chinese river basin commissions are merely extensions of the MWR and take a very top-down and narrow approach to manage the river basin (e.g., they have authority for water quantity management issues, but not for water quality or for convening stakeholders in the basin). Despite having the word “commission” in their title, HRBC officials noted that they do not have a commission made up of provincial or county stakeholders. In contrast, the Delaware River Basin Commission in the United States is governed by a commission made up of state and federal government members and contains many consultative mechanisms to bring in voices of communities and nongovernmental organizations (NGOs).

INTERNATIONAL RIVER BASIN INITIATIVES IN CHINA

Since strengthening river basin commissions has become a major goal of MWR, many commissions are working with international organizations to improve their capacity to manage their basin resources. For example: (1) HRBC is currently working with the World Bank on strengthening its management capabilities; (2) the Asia Development Bank (ADB) is currently collaborating with the YRCC and the National People's Congress to study institutional obstacles to inter-provincial and interagency cooperation in the Yellow River Basin; and (3) WWF-China, an international NGO with an extensive presence in China, has been working with basin

authorities, provincial and local governments, and communities to improve the management and restoration of lakes and wetlands in the middle reaches of the Yangtze River. This growing number of international river basin activities led the China Environmental Forum (CEF) and Institute of Developing Economies (IDE) to set up what became one of the liveliest sessions of the study tour—a roundtable with nearly 20 international donor and NGO representatives who are active in implementing river basin projects in China. The variety of international river initiatives in China offers insights into potential options for U.S.-Japan collaboration on river basin governance in China. Some of the key international initiatives are outlined below.

*World Bank*¹ In China the World Bank has been involved in two projects aimed at improving the capacity of river basin governance institutions:

- 1) In Xinjiang the World Bank undertook a challenging project to create a new river basin commission for the Tarim River. This project has established China's first truly "participatory" river basin management commission.
- 2) With \$17 million in Global Environment Facility grant money, the World Bank also has just begun a project on the Hai River Basin that aims to speed up integrated water and environmental management in the basin. The main challenge of this project is bringing together China's State Environmental Protection Administration (SEPA) and MWR to jointly undertake the institutional reforms necessary to establish mechanisms for water and environment departments to truly work together. The project also aims to improve the technologies to undertake integrated water planning (e.g., establishing a shared database, river coding stream, and remote sensing).

Besides the above "direct" river basin projects, for many years the World Bank has been creating water user associations to help manage major irrigation projects in China. Greater public participation in managing irrigation water could significantly improve water conservation in the agricultural sector, which is a major cause of depletion of river water. The World Bank teamed up with the UK's Department for International Development (DFID) and began a new water user association pilot project in the summer of 2004 in Gansu province. The World Bank is managing the

project, which will be steered by a committee that includes members from the major river conservancy commissions in China.

*UK's Department for International Development (DFID)*² Worldwide, DFID only works on poverty alleviation in partnership with developing country governments. In China, DFID's water work therefore has a strong poverty alleviation component and most of its work is primarily done through environmental education. DFID, together with the World Bank, is implementing a project aimed at supporting the reforms proposed in the 2002 revision of the Chinese Water Law. One of the key reforms in the new law is to empower river basin commissions. In addition, within the China watershed management project DFID and the World Bank are supporting the government in developing and implementing new approaches to soil and water conservation. Two other DFID/World Bank projects include: (1) Pro-Poor Rural Water Reform Project and (2) Lhasa Valley Water and Sanitation.

*China Council on International Cooperation for Environment and Development*³ The China Council for International Cooperation on Environment and Development (CCICED) is a high-level consultative body providing strategic consultation to China's State Council concerning environment and development issues. A CCICED task force on integrated river basin management (IRBM), focusing on the Yellow River, was officially launched in Beijing in March 2003. The overall objective of this task force, which includes considerable NGO participation, is to promote healthy river basins in China through better governance of water resources, biodiversity conservation, and ecosystem management by increasing information sharing, demonstration, and public participation. In addition to undertaking studies of IRBM in Canada, Germany, and the United States, the CCICED IRBM task force staff also worked with WWF-China on various case studies in the Yangtze River Basin.⁴ The research the IRBM team and WWF have conducted is being used to create a river basin conservation plan for the Yangtze. The plan includes a ten-year target for conservation on the river, which focuses on protecting animal species and habitats. The ideas in this plan will be shared with local and central government agencies, as well as community groups to solicit input for the final version they will present to the CCICED (The report in English is available on-line at: www.harbour.sfu.ca/dlam).

*The European Union*⁵ Poor regulation of heavy industries and agricultural runoff has made the Liao one of the most polluted rivers in China. Over-extraction of Liao and other rivers by industry and agriculture has meant 70 percent of the province's water needs must be met by groundwater. The low flow of the Liao and other water shortages has meant Liaoning province has 603 m² of water per person compared with the national average of 2,292 m². For over five years the European Union office in Beijing—with

work with the YRCC and environmental protection bureaus to create an action plan to resolve severe pollution problems upstream. In the Yangtze River the EU team will join with the World Bank to facilitate loans to poorer local governments to improve flood management mechanisms (e.g., control of soil erosion).

*Japan International Cooperation Agency (JICA)*⁶ In China, JICA's work is based in four priority areas: environment, policy reform, mutual understanding,

Despite having the word “commission” in their title, HRBC officials noted that they do not have a commission made up of provincial or county stakeholders.

support from the EU, Japan, and the World Bank—has been working with the Liaoning provincial government to create and implement a broad range of projects promoting sustainable river basin management in this highly stressed Liao River Basin. The EU and their Chinese partners are working to create an integrated framework for pollution control and water resource management by: (1) setting up pilot catchment water quality protection plans for one of the main reservoirs (Dahuofang Reservoir), (2) undertaking investigations of industrial water conservation and pollution, and (3) developing water quality models for the entire basin using GIS and decision analysis software. These project activities already have enabled the EU team to make basin plan recommendations on reforming water sector institutions and tariffs, which were adopted into the province's Tenth Five-Year Plan.

The EU office in China also has begun carrying out an interagency policy dialogue on creating plans and projects to protect the upper reaches of the Yellow and Yangtze rivers. In collaboration with China's Ministry of Commerce, MWR, SEPA, YRCC, and the provinces of Henan, Shanxi, and Shaanxi, the EU team will first set up dialogues, studies and exchanges on models for inter-provincial cooperation along major rivers in China. One potential model for Chinese provinces that will be studied is the EU water framework directive that brings countries in Europe together to coordinate river basin management issues. The EU team will work with central and provincial government agencies not only to design master plans and realistic action plans for protecting the upper reaches of the Yellow and Yangtze rivers, but also later implement them with community and NGO involvement. In the Yellow River the EU team will

and poverty alleviation. Among JICA's six environmental goals sustainable water resource use is one. Ongoing JICA projects related to water include a technical cooperation project in which Japanese experts are dispatched to train counterparts from China on issues such as: (1) human resource development for water resources projects, in which JICA aims to train more than 2,000 central and local government water bureau personnel; (2) model planning project for water saving measures in large-scale irrigation schemes; and (3) a water environment restoration pilot project in Lake Tai. In Xinjiang JICA is undertaking a development study of sustainable underground water in the Tulufan Basin. Moreover, JICA is working with the Chinese Ministry of Construction, MWR, as well as local and provincial governments to develop an instruction manual for promoting water saving in irrigation. JICA and its partners are beginning irrigation water savings pilot projects in Gansu, Shaanxi, and Hunan provinces. JICA is also undertaking two water studies: one for the prevention of landslide disaster in the Xinjiang River Basin in Yunnan province and another study on the development of a new water rights system.

*Japan's Bank for International Cooperation (JBIC)*⁷ In China, JBIC focuses on three target areas: environment, human resource development, and poverty alleviation in the western region. Since 1979, JBIC has made significant loan commitments to China. Over the last five years JBIC loans have averaged \$15 billion a year. JBIC does not have specific initiatives to support river basin management, but is involved in many water-related projects such as: (1) water supply projects in more than 20 large cities in China; (2) water pollution control projects supporting sewage plant

construction and expansion on three major river basins; (3) water saving irrigation in Xinjiang and Gansu; (4) deforestation on the Loess Plateau (in Shaanxi and Shanxi, and Inner Mongolia), in which one central project goal is to greatly reduce siltation of the Yellow River; and (5) multipurpose dams for flood control and water supply in Sichuan, Henan, and other provinces.

*Asia Development Bank and the People's University Environmental Financing Initiative*⁸ A team of environmental economics researchers from the People's University, led by Ma Zhong, has been working on various multilateral and national government funded projects investigating the public finance and management of Chinese river basins. They are engaged in projects looking at the environmental consequences and water management challenges from the construction of the eastern route of the South-North water transfer project and the Three Gorges Dam, as well as undertaking a project aimed at improving the financing of river protection in the Yellow River Basin. This latter project, which focuses on the Wei River, a tributary of the Yellow, is part of the Trans-jurisdictional Environmental Management project, funded by ADB (begun in 2003). This financing study is but one of four components studying transboundary problems on the Yellow River.

The People's University Environmental Financing Initiative aims to prepare legislation for China's State Council on these water control projects and issues. Ma Zhong noted that central government's environmental legislation is often too broad and general. Therefore, this research initiative aims to provide a more detailed technical background to better prepare SEPA and other agencies implementing financial reforms in the environmental protection sector. Ma Zhong discussed three issues from his team's river basin project work: (1) Wei River protection, (2) funding challenges, and (3) green taxes.

Wei River Project

The Wei River is the largest tributary flowing into the Yellow River from Gansu to Shaanxi provinces. In 2003 the Wei River experienced serious flooding, which in part stemmed from the downstream reservoir—Sanmenxia—that blocks the flow of the Wei. To resolve the flooding and sediment problems at the Sanmenxia dam, the government decided to invest 20 billion Yuan—the largest investment ever made in China for water protection efforts in a tributary.

When the Wei River area is not stressed with flooding problems, the water flow is quite low due to excessive withdrawals. The low water flow combined with few wastewater treatment facilities has made the Wei highly polluted—classified at the lowest grade five. In fact, the Wei River is the number one pollution source of the Yellow River.⁹ In examining the government's plans for the Wei, Ma Zhong's team discovered that money was not being earmarked for pollution control; instead the government is hoping to use money for infrastructure projects aimed at increasing the flow of the river by transferring water from the Hui River into the Wei River, thereby increasing the flows of both the Wei and Yellow rivers.

Thus, instead of addressing excess pollution in the Wei, government planners are just creating another problem, and potentially conflict, in a different river basin—the Hui, which is the water source for the central route of the south-north water transfer project. If the water is drained from Hui to Wei the amount of water for the north will be reduced. This funding priority also underlines the Chinese government's continued preference for water supply projects over the more complex water demand and conservation management measures.

In China, water pollution control has faced many institutional and financing problems. In industrial pollution control, many local governments hesitate to deal with pollution issues because they rely on revenue from the polluting industries. Moreover, Chinese municipalities lack a strong financing system to cover the cost of wastewater treatment plants.

Lack of Proactive Funding for River Protection

A general trend Ma Zhong and his team have observed in their research was that the Chinese government tends to be fairly reactive in its spending for environmental and other crises in China rather than proactively investing to prevent problems. For example, in 1998, China experienced severe flooding on the Yangtze due in great part to deforestation in the upper reaches of the river. Therefore Zhu Rongji decided to make huge allocations to support a major reforestation and flood control campaign. In 2003 the SARS outbreak led the government to funnel massive amounts of investment into the health sector. In 2004 fears of unrest in rural China due to the increasing wealth gap between cities and countryside led the government to appropriate massive amounts of resources to rural development. In short, there is no long-term view in the central government's expenditures because they are

constantly responding to disasters. Although industrial and municipal wastewater is severely degrading many rivers in China, the central government does not have any formal policy to cover even part of the costs for wastewater treatment plants. And local governments are unwilling to make the investment into wastewater treatment for it is viewed as a hindrance to local economic development. River basin protection in China thus suffers from lack of consistent government financing for wastewater.

While systems for downstream regions to compensate upstream areas for protecting watersheds are more common in Japan and the United States, some examples of payments for environmental services do exist in China. Specifically, the rich and thirsty province of Shandong in the downstream region of the Yellow River has offered to pay Inner Mongolia 6 billion Yuan for extra water. However, this deal will be hard to implement since three provinces separate Shandong and Inner Mongolia. Moreover, such water purchases are not officially legal in China.

Green Taxes

The team has been investigating how China might introduce green taxes to help promote water conservation. In October 2005 the team will be reporting their results of their environmental fiscal reform research to the State Council. The research initiative on environmental fiscal reform has been divided into three components: (1) policy review—summarizing existing body of domestic and international experience in green taxes, concentrating on two types of case studies: financing for pollution reduction and for protected areas; (2) poverty-environment study, focusing on irrigation water pricing, land conversion policies, and compensation for environmental services; and (3) health effects of air pollution.

ENVIRONMENTAL ACTIVISTS AND JOURNALISTS CHALLENGES DAM-BUILDING

A roundtable with Chinese journalists and NGO activists illustrated how these two groups are collaborating to promote stronger public participation in river protection. Specifically, in early 2004 some environmental activists learned about the Yunnan provincial government plans to build 13 dams on one of China's last wild rivers—the Nu River (*Nujiang*). NGO activists invited journalists to tour the area and gather information on the planned dams, which led to nationwide reporting on the potential damage these

dams could have on the environment and the livelihoods of local communities. Notably the journalists discovered these dams had not undergone the required environmental impact assessments. Key Chinese environmental activists joined together to hold meetings with government leaders in Yunnan and Beijing, as well as contribute to the public awareness campaign on the negative impacts of the dams. In the end China's Premier Wen Jiabao called a halt to the dams, which marks the first time a national environmental campaign has stopped a major infrastructure project. This growing openness for such activism indicates considerable potential for international organizations working with Chinese NGO in river basin protection and conservation.

ENDNOTES

¹ The information in this section draws from a conversation with Liping Jiang, a senior irrigation specialist who met with project participants at the World Bank Office Beijing on 17 June 2004.

² The presentation "DFID Water Sector Partnership in China" by DFID China Water Team on June 16, 2004 at Tsinghua University, Beijing, China.

³ The presentation "CCICED IRBM Task Force—a high level advisory body on IRBM in China" by Yu Xiubo & Li Lifen, IRBM Task Force Secretariat on June 16, 2004 at Tsinghua University, Beijing, China.

⁴ Case studies the IRBM and WWF have carried out in the Yangtze Basin include: (1) Xianghexi River Basin; (2) Lake Zhangdu River Basin to examine wetland and river basin management; (3) Minshan Mountain System to draw lessons from a landscape restoration project; (4) Lake Poyang where WWF has been working with local stakeholders (government, NGOs, and community groups) to devise an IRBM Action Plan; and (5) Danjiangkou Reservoir (upper Han River)

⁵ Drawn from presentation "Sustainable River Basin Management in the Liao River Basin" by Alan Edwards and Wang Yongli on June 16, 2004 at Tsinghua University, Beijing, China.

