Foreword

Jennifer L. Turner, Editor

Over the past year, the scope of publications and meetings within ECSP's China Environment Forum has expanded significantly. In addition to our regular meetings in Washington, DC, we held one conference in Hong Kong (April 2001) with green NGOs from Greater China and a meeting in Tokyo (March 2002), in which we brought together cooperative aid agencies, researchers and NGO activists to discuss the potential of U.S.-Japan cooperation in promoting sustainable development in China. Two other publications came out in 2002—the bilingual proceedings from the Hong Kong forum and *Crouching Suspicions Hidden Potential: U.S. Environmental and Energy Cooperation with China*. Despite the growing diversity in our activities, our work still centers on China's environmental challenges and the scope and effectiveness of U.S. governmental and NGO environmental and energy initiatives in China.

We are pleased with the variety and depth of the feature articles in *China Environment Series* Issue 5. In the opening article, Elizabeth Economy highlights the potential environmental threats within China's "Go West" campaign, which is designed to raise living standards in the largely impoverished western region of the country and more tightly integrate the border autonomous regions of Tibet and Xinjiang with the rest of the country. Philip Andrews-Speed, Xuanli Liao, and Roland Dannreuther examine how China's growing energy needs, combined with its limited domestic energy resources, make the country an important player on the international energy stage. They argue that China's expanding energy interests do not necessarily pose a threat to its Asian neighbors or the West—instead these new interests can be used as an opportunity to integrate China into existing and new global and regional institutions. Jessica Hamburger presents a comprehensive overview of the pesticide challenges posing health and environmental threats in China. Despite the small number of promising government and international projects to reduce pesticide residues in food production in China, the Chinese government, she argues, needs to take bolder and more decisive steps to free Chinese farmers from the "pesticide treadmill" and improve the safety of its food. Fengshi Wu's exploration of GONGOs (government organized nongovernmental organizations) in China reveals that in the environmental sphere some GONGOs are developing new missions and building international and grassroots networks in ways unforeseen by the government.

In our second year of soliciting commentaries and notes from the field we gathered a rich collection of musings from individuals in NGOs, universities, research centers, and multilateral organizations. Jih-Un Kim opens the commentary section with reflections on the water problems in Shanxi. Two other commentaries evaluate conservation activities in China—Lawrence Glacy examines more broadly the nature reserves throughout China and Ou Xiaokun reflects specifically on the progress of The Nature Conservancy's Yunnan Great Rivers Project. Improving energy efficiency is addressed from two different angles as well—Robert Watson and Barbara Finamore relate some of the innovative efforts by the Natural Resources Defense Council to promote energy-efficient buildings in China, while Pam Baldinger discusses the potential of energy service companies to facilitate the adoption of energy-efficient technologies in Chinese factories. Since environmental NGOs are a relatively new phenomenon in China, it is not surprising that they continue to be a popular theme with our authors. Kenji Otsuka explains the value of networking with new environmental NGOs in China, while Jane Sayers notes how some Chinese NGO activists are utilizing mass campaigns to promote their green work. Timothy Hildebrandt reflects on both the potential and limited role for NGOs in assisting Beijing in greening the 2008 Olympics. Wen Bo contributes for the second time to the *China Environment Series* (in Issue 2 he authored "Greening the Chinese Media") to recount his trip to Xinjiang searching for environmentalists and insights into ecological problems in this remote region of China.

In addition to all of the diligent contributing authors, I wish to express my gratitude to a number of people who helped pull *China Environment Series* Issue 5 together. Although he jumped into the process halfway through, Timothy Hildebrandt has been a stellar managing editor, full of enthusiasm and witticisms. Fengshi Wu, who has just completed her one-year internship with me, has gone above and beyond the call of intern duty in her editing and writing work in this issue. Liang Sun, Naomi Greengrass, and Tina Chu-yun Liu helped keep the publication moving forward with their sharp-eyed copyediting. Richard Thomas was once again the creative brain behind the design and layout of the publication. The continued support and encouragement from the rest of the ECSP staff, the Asia Program, and others around the center have been invaluable. While this publication was made possible by a

generous grant from the W. Alton Jones Foundation, I also wish to acknowledge the wonderful support the ECSP China Environment Forum has received over the past year for meeting activities and other publications from the Japan Foundation's Center for Global Partnership, U.S. Environmental Protection Agency, U.S. Department of Agriculture, and the David and Lucile Packard Foundation.

ECSP REPORT 8: JOHANNESBURG AND BEYOND

What are the crucial issues for sustainable development? Why have the linkages between population dynamics and environmental degradation still not penetrated mainstream policymaking? Is there a future for environment and security research? The new edition of *Environmental Change and Security Project Report* addresses these questions by concentrating on issues for the August 2002 World Summit on Sustainable Development in Johannesburg, South Africa and beyond. To receive a copy, please email ecspwwic@wwic.si.edu.

Commentaries

What is to be Done at Johannesburg?
Issues for the World Summit on Sustainable Development

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Population, Poverty, and Vulnerability: Mitigating the Effects of Natural Disasters
George Martine and Jose Miguel Guzman

Migration, Population Change, and the Rural Environment
Richard E. Bilsborrow

The Future of Environmental Security

Security and Ecology in the Age of Globalization
Simon Dalby

In Defense of Environment and Security Research
Richard A. Matthew

Special Reports

Fire and Water: Technologies, Institutions, and Social Issues in Arms Control and Transboundary Water-Resources Agreements
Elizabeth L. Chalecki, Peter H. Gleick, Kelli L. Larson, Arian L. Pregenzer, and Aaron T. Wolf

Book Reviews

Colin Kahl on *Violent Environments*; James D. Nations on *Sacrificing the Forest*; J. Ann Tickner on *Gender, Peace, and Conflict*; Leslie Johnston on *Resource Wars*, and many more.

Plus: Official Statements on Environment, Population, and Security Issues
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The Alataw Mountain Range in Xinjiang (Photo: Wen Bo)

China's Go West Campaign: Ecological Construction or Ecological Exploitation

By Elizabeth Economy

China's "Go West" campaign is designed to raise living standards in the largely impoverished western region of the country and more tightly integrate the border autonomous regions of Tibet and Xinjiang with the rest of the country. The campaign harkens back to Maoist, and even Imperial, approaches to development and national security, embracing large-scale infrastructure projects and mass mobilization efforts. Traditionally, these grand-scale campaigns wreaked havoc on the natural environment. However, China's leaders are betting that by embracing "ecological construction" as one of the major tenets of the Go West campaign, they can avoid the environmental excesses of their predecessors and protect the already fragile ecology of the region. Early indications, however, are that the substance of the Chinese leaders' commitment to environmental protection is lagging far behind its rhetoric, raising serious concern among Chinese experts and environmentalists as to the environmental and economic future of the West.

As China's leaders seek to establish a balance between economic development and environmental protection, a key testing ground for their commitment to the latter will be the process of the "Great Opening of the West" (*xibu dakaifa*). Launched in March 2000, the "Go West" campaign is designed to "reduce regional disparities and eventually materialize common prosperity" ("China's Premier," 2000) by developing six provinces (Gansu, Guizhou, Qinghai, Shaanxi, Sichuan, and Yunnan), five autonomous regions (Guangxi, Inner Mongolia, Ningxia, Tibet, and Xinjiang), and one municipality (Chongqing) in western China.[1] (See Map 1)

The Go West campaign follows a long tradition of grand-scale campaigns designed to develop the Chinese economy and unify the country. Its centerpiece is a series of large-scale infrastructure projects, such as the Qinghai-Tibet Railway; the West-East gas pipeline from Xinjiang to Shanghai; massive afforestation projects; and water management ventures on the upper reaches of the Yangtze and Yellow rivers. The stated purpose of the campaign is not only to equalize living standards between the interior and coastal regions of the country, but also to integrate more tightly with the rest of the country politically troublesome regions such as Xinjiang and Tibet.

Traditionally, such development campaigns have wreaked havoc on the natural environment, contributing to wide-scale soil erosion, flooding, and desertification. The Go West campaign, however, embraces "ecological and environmental protection and building" as one of its six major tenets[2] and China's leadership reiterates frequently its commitment to protect and even improve the natural environment in the West, even as it promotes rapid economic development. Yet many within China appear to question the substance of the government's commitment. Increasingly, regional officials, as well as experts from throughout China, are voicing their alarm at the potential environmental costs of the government's campaign. Already, the region suffers from extensive ecological degradation—soil erosion, desertification, and water scarcity pose serious threats to people's welfare as well as to the future economic development of the region. For example, nearly 25 percent of China's land is desert, and of that, 90 percent is located in the western region (Liu, 2001).

Whether China's leaders can successfully integrate environmental protection with economic development in the Go West campaign remains to be seen. While early signs are not promising, pressures from both the international community and domestic actors may yet persuade the government to rethink its campaign approach.

The Campaign Tradition

Mobilization campaigns in China often have served a dual purpose of consolidating power and developing the economy. Generally, they have had dramatic and often devastating consequences for the environment. The first

Map 1. "Go West" Region

emperor of the Qin dynasty (221-206 B.C.), for example, united six states and formed the first centralized state in Chinese history, an accomplishment that historians of China laud to this day. The emperor and his officials also constructed major irrigation works and canals to promote economic development and to assist in the centralization of the state (Hong, 1997). Yet, the reality of state building as it was executed placed an enormous burden on both the natural environment and on the people of the time. As Qu Geping and Li Jinchang (1994, p. 17) detail:

> Unification by military force killed more than a million people and lay waste to 13 cities. Deaths related to hunger and displacement outnumbered those related to battle. After unification, large-scale construction detracted from other productive activities, leaving people with little respite. About 400,000 people helped build the Great Wall. Another 500,000 guarded mountains and suppressed riots. And 700,000 build the E'fang Palace and Qin Shihuang's tomb at Lishan Mountain (site of the Terracotta Warriors)....Although unification of the Qin was a great contribution to history, its rulers extorted taxes and forced military service on the people. The population of the Qin fell to below 20 million. Construction efforts during this period caused large-scale environmental degradation to forests and other natural resources. The poet Du Mu of the Tang dynasty approved of unification and the glory of E'fang, but lamented

deforestation: 'Six states conquered, the world was united…with Shushan Mountain bare, E'fang Palace rose to glory.'

Through the centuries, such campaigns denuded forests and degraded land to the point that devastating flooding of the Yellow and Yangtze rivers became commonplace, Qu and Li (1994, p.25) note; "[c]ultivated areas and cities of the Han and Tang dynasties in the north and northwest were literally submerged by sands during the Ming and Qing reigns," and there were large-scale population migrations engendered by resource degradation and scarcity.

While individual leaders and officials in ancient times displayed knowledge and understanding of the environmental consequences of their development practices, for the most part their attitudes and policy approaches reflected a desire to understand but then overcome nature in order to utilize it for man's benefit.

Mao Conquers Nature

China's more recent history, in particular the campaigns during the tumultuous period of Mao Zedong's leadership during the 1950s to early 1970s, reflects an even more aggressive approach to campaigns than in ancient times and an explicit understanding of the environmental havoc Mao's development campaigns wreaked. As historian Judith Shapiro (Shapiro, 2001, p.8) notes:

> The Mao-era effort to conquer nature can (thus) be understood as an extreme form of a philosophical and behavioral tendency that has its roots in traditional Confucian culture. State sponsored resettlements and waterworks projects; extensive and excessive construction of dikes for land reclamation, political campaigns to change agricultural practices, and environmentally destructive land conversions in response to population shifts can be found in imperial times.

Indeed, Mao forswore even the pretense of maintaining a respect for nature. China scholar Rhoads Murphey has described Mao's conception of nature as such: "Nature is explicitly seen as an enemy, against which man must fight an unending war, with more conviction and fervour and with a brighter vision of the ultimate results than even the Darwinian-Spencerian West held" (Murphey, 1967, p.319).

In 1958, Mao's belief in the ability of man to conquer nature and his desire to achieve great power status came together in the launching of the Great Leap Forward, a mass-mobilization campaign designed to catapult China into Communism and surpass the industrial achievements of Great Britain and the United States. While the most devastating result of the campaign was certainly the starvation of tens of millions of Chinese, the environment also fell victim to the irrational practices embraced during the Great Leap Forward campaign—skyrocketing pollution from backyard iron and steel furnaces; the destruction of forests, wetlands, lakes and rivers from huge land reclamation projects to increase grain production; and great losses to local ecosystems from massive infrastructure development and specious scientific experiments.

Just five years later, Mao initiated a second "revolution," the Cultural Revolution, with equally devastating consequences for the country and the environment. The Cultural Revolution brought a renewed emphasis on grain production to the exclusion of forestry, animal husbandry and fisheries. Forests and pastures were destroyed; lakes were filled; and man-made plains were cultivated to grow grains. One such grain-growing campaign—to expand the amount of cultivated land in northern Manchuria and Xinjiang—was "bound to fail since nothing could really be done to lengthen the north Manchurian growing season or ameliorate its soils, except at prohibitive cost"(Murphey, 1967, p.330).

As Qu Geping commented about this period, "[t]he few environmental regulations in industry, agriculture, and urban constructions were repudiated and negated as bourgeois and revisionist restrictions. Cases of environmental and ecological damages rapidly increased to a terrifying degree"(Qu, 1991, p.213).

Campaigns in the Reform Era

China's post-Mao leadership has condemned the excesses of Mao's campaigns. Yet in the first decades of reform, China's leaders emphasized large-scale infrastructure projects such as the Three Gorges Dam to develop the economy and advanced a "get rich quick" mentality that largely ignored environmental protection. In so doing, China's reform era leaders have arguably produced as much harm to the environment as any of Mao's determined efforts to conquer nature.

More recently, President Jiang Zemin, Premier Zhu Rongji, and others within the Chinese leadership have replaced the notion of "conquering" nature or ignoring environmental protection for the sake of development with the ideal of integrating environmental protection with economic development. Still, there is little evidence at the early stages of the Go West campaign that this ideal

has in actuality been incorporated into the campaign. Instead, the initial thrust of the campaign has been to develop the economy and consolidate the border regions of the country. Environmental protection has been addressed largely through a series of secondary campaigns to afforest the region, clean up the water, and ban logging. Here, too, preliminary evidence is that the campaign framework is largely inadequate and even inappropriate for the environmental protection needs of the region.

The Nature of Opening the West

China's West, as defined by the Go West campaign, encompasses approximately 5.4 million square kilometers and a population of 285 million people (56 percent of the land and 23 percent of the population of the country). While the region is rich in natural resources—including gold, oil, natural gas and coal—much of it is difficult to access. Moreover, unlike the coastal provinces, the region remains poorly connected to the outside world, and infrastructure within the West is weak. Approximately 90 percent of the 80 million Chinese estimated to live in poverty resides in western China (Browne, 2000). Guizhou, one of the poorest provinces in China, boasts an average per capita income only 8 percent that of Shanghai (Smith, 2000).

In order to exploit the potential wealth of the region and raise local standards of living, Beijing has aggressively courted overseas business and aid agencies, as well as investors in China's wealthy coastal provinces and Hong Kong. Within the Go West campaign, the Chinese government seeks investment and aid for infrastructure needs in the region in areas such as: telecommunications, railways, airports, electric power grids, and the $15 billion West-East gas pipeline from Xinjiang to Shanghai that is targeted to transport 12 to 20 billion cubic meters of natural gas annually beginning in 2007.

The Chinese government's development goals also are designed to quell political challenges in the West. The western region of China presents a potential political challenge to Beijing in that the West has the highest proportion of non-Han minorities in the country, including 20 million Muslims, as well as Tibetans and other ethnic minorities (Browne, 2000). Despite a massive influx of Han Chinese since 1949 to both Xinjiang and Tibet, Uighurs and Tibetans outnumber Han in both regions.

In some ways reminiscent of the Qin Dynasty's efforts to unify the country through major public works projects, China's leaders today view the Go West campaign as essential to their solidification of control over border regions such as Tibet and Xinjiang. According to the Chinese leadership, the campaign is the "fundamental guarantee for us to foster national unity, to maintain social stability, and to consolidate the borders" ("Top Chinese leaders discuss," 2000). General Chi Haotian, in a ten-day swing through the region in May 2001, discussed the vital role of the development drive in "consolidating national defense and realizing the country's long-term security and stability"(Plafker, 2001, p.9).

In meetings with party officials from Tibet, Hu Jintao, the likely successor to Jiang Zemin as Chairman of the Chinese Communist Party, also stressed the importance of "stability as a premise" for economic development, noting, "In the new situation, it is inevitably required by the stability of the overall situation of the whole country to maintain the stability of Tibet. Herein lies the fundamental interest of the people of all nationalities in Tibet and the guarantee for Tibet's development. We should unswervingly safeguard unification of the motherland and oppose separation with a clear-cut stand" ("Hu Jintao on Development," 2000).

Such obvious plans to "colonize" further the region already have become problematic for Beijing. In 1999, a proposed Chinese-World Bank plan to resettle 58,000 Chinese farmers onto fertile lands historically inhabited by Tibetans drew international opposition from those who claimed that ethnic Chinese would swamp the culture and autonomy of the resident Tibetans (Philips, 1999). After initially approving the resettlement loan, the World Bank later withdrew its support when an independent committee criticized the plan heavily for failing to protect ethnic minorities and subjecting them to a "climate of fear" by not guaranteeing confidentiality when consulting their views on the project (Reynolds, 2000).

Xinjiang, too, has been an area of special concern for the Chinese leadership. It is the site of frequent bombings, protests, and even riots by separatists and independence advocates. Over the past five years, the Chinese government has repeatedly arrested and executed those suspected of fostering separatism either through armed or intellectual pursuits.[3] Especially in the wake of the terrorist attacks against the United States on September 11, Beijing has reiterated its commitment to routing out "terrorist activities" in Xinjiang in order to ensure the success of the Go West campaign. Just one month after September 11, Zhang Guobao, vice-chairman of the State Development and Planning Commission (SDPC) stated that "[t]errorism would be purged in the Muslim-dominated Xinjiang province in order to provide a stable investment environment," specifically citing a concern over the potential sabotage of large-scale energy projects (Chan, 2001, p. 9).

Investment Challenges

To finance the tremendous infrastructure and development needs of the Go West campaign, Beijing seeks significant external support. It already plans to use more than $6 billion raised from treasury bonds to finance various infrastructure projects, including "building roads, railroads, and schools; boosting public security; expanding law enforcement; renovating irrigation projects; encouraging tourism; (and) protecting the environment" ("China's west," 2001). However, the Chinese government desperately desires the involvement of the international business community, which currently is based overwhelmingly in the coastal region.

The response of the international community to China's Go West campaign, thus far, has been fairly muted. The World Bank and Asian Development Bank each already have targeted at least $1 billion to assist China in its efforts. In addition, several high-profile western companies are stepping up to the plate to expand their presence in the West. Motorola, for example, has participated in a joint venture in Sichuan since 1995 and recently pledged approximately $80 million to establish a software research and development center. Moreover, a Japanese and French consortium has put on line the first wholly owned build, operate, and transfer (BOT) water treatment plant in China in Chengdu, Sichuan. Although conceived well before the onset of the Go West campaign, if the plant manages to be profitable, other international investors undoubtedly will be attracted to the region ("Water plant litmus," 2001). Nevertheless, from an environmental perspective this water treatment plant raises some concern. Consortium officials have acknowledged that they could not guarantee the purity of the water reaching the public. They could not control the pipe quality nor could they prevent wastewater from entering the distribution pipes, which had a 40 percent leakage rate ("Water plant litmus," 2001).

Much of the rest of the international community remains skeptical. The head of the British Chamber of Commerce has stated frankly, "Specifics are needed as the hinterland is a big place"(Kwang, 2000). Even the 71 CEOs from Hong Kong, who spent ten days traveling to Xian, Beijing, and Chengdu during May 2001, were hesitant to commit more than $30 million to the endeavor. An editorial in one Hong Kong newspaper noted the "poor fit" between the expertise of the Hong Kong businesspeople and the development needs of western China ("Delegates Can Sow," 2001).

Critique Within China

Within China, the Go West campaign has stirred substantial controversy on several fronts. Some Chinese scholars doubt the practicality of the campaign as currently configured. Chinese economist Hu Angang, for example, has articulated several factors that he believes will limit the efficacy of the campaign ("Economist calls," 2000):

- China's past economic development policies (such as the Ninth Five-Year plan) have not curbed the growing economic disparities between the coastal and interior provinces;
- The restructuring of the global economy also has weakened the comparative advantages of China's western regions in agriculture, energy, and raw materials;
- Western China's relative advantage in resource exploitation has become eroded because the supply of raw materials currently exceeds demand within China's domestic market; and,
- China's entry into WTO will offer great opportunities to the coastal region, but create more challenges than opportunities in the western region.

In light of these challenges, Hu suggests that human rather than physical capital needs should be restructured first in order to expand job opportunities, provide poverty relief, lower the birth rate, and improve population quality in the West.

Other Chinese scholars have stepped forward to support the program, although they stress the importance of the government adopting a new approach to campaign politics, one in which the role of Beijing is substantially diminished. Chinese Academy of Social Sciences Professor Wu Jinglian, for example, argued in an interview with a group of reporters that "We are already at the doorway of having a market economy; we should use the methods of market economics to open the West" ("Xuezhe Weiyuan," 2000). Or, as Dong Fu articulated in the same interview:

> The Go West campaign is the first big change in China's regional development strategy. The campaign must have new thinking and new strategy….The investment demands of the West are relatively big, as a result the campaign should also receive help from the NGO and foreign sectors. Otherwise, this is going to be a very difficult road. Without policy support, the development of the West would take a very long time. These policies, such as preferential policies for tax collection and personnel, should be produced within a short period of time. If this does not happen, people will be content to stay in the

> eastern regions, where they are comfortably situated….Next, the development of the West must be focused. The West of China covers such a huge area, and many areas are barren. The money would disappear like salt being mixed into water; it would disappear in a flash. So the development of the western regions should be focused on key areas, key industries, and key projects. We should focus and open up these areas.

Yet Dong also raises a point of central concern to many others that the ecological environment of the West is extremely fragile and economic development in the region "must take into account the protection and improvement of the environment" ("Xuezhe Weiyuan," 2000). Indeed, China's western region already has suffered severe ecological degradation from rampant deforestation, mining, overgrazing, and plowing of cropland. The litany of damage to Tibet is telling, for example:

- Up to 40 percent of the old growth tropical and subtropical mountain forests have been clear-cut and shipped east;
- Many rare plant and animal species in Tibet have become extinct as Chinese officials have exploited them for foreign markets;
- Grasslands have become degraded as the demand for meat has led to overstocking of yak, goat, and sheep and the loss of Tibetan traditional herding and grazing practices; and,
- Mining also has contributed to degrade the land, with only 20 percent of China's mines boasting satisfactory environmental safeguards ("The Scorched Earth," 1992).

Xiao Zhouji, Professor of Economics at Beijing University, has echoed Dong's call for caution when developing the West:

> The development of the West must completely respect the protection of natural resources and the environment. The illegal logging and development of forestland in the West is a constant occurrence. Soil erosion is serious, and desertification is intensifying. The plundering and exploitative nature of mining is a very deep lesson. Therefore, as we develop the West, we must pay attention to protection of the environment, protecting the resources, maintaining the ecological balance, and promoting sustainable development ("Xuezhe Weiyuan," 2000).

In their speeches and reports, China's leaders have been careful to cite "ecological construction" as one of the five major tenets of the Go West campaign. Xie Zhenhua, director of the State Environmental Protection Administration (SEPA), has stated, "In the process of developing the West, environmental protection programmes must be considered in general development plans; new environmental sacrifices must be avoided" ("China: Checking pollution," 2000).

Despite the leaders' repeated assurances that environmental protection is a top priority in the Go West campaign, many Chinese environmentalists continue to express doubts. On 7 March 2000, *China Environment News*, a SEPA-run newspaper, published several articles critical of the "western development craze." One of the articles pointedly noted that China's western region suffers from "widespread soil erosion, low agricultural productivity, water shortages, and water quality problems," and that "irrational development could cause significant ecological damage"(U.S. Embassy, Beijing, 2000). A recent conference on the role of the non-state sector in the development of China's West was also noteworthy for the skepticism voiced. One conference participant—a researcher from the Sichuan Academy of Social Sciences—complained that Beijing had failed to consult scholars from the West, and described the campaign as "western exploitation, eastern development." She also feared that any real attempt at "ecological reconstruction" would harm those already struggling, noting that in Yunnan, the four million farmers who had restored their land to forest and grass had now relapsed into poverty (Fu, 2001).

Not noted publicly, but widely acknowledged privately, is the concern among many environmentalists that SEPA is not included within the 22-agency leading group charged with developing the Go West campaign. Without the direct input of SEPA at every stage of the planning process, many fear that the necessary comprehensive approach, integrating appropriate environmental, conservation, and efficiency technologies with development plans, will not occur. At least one leader of China's nascent environmental NGO movement has pledged to raise the issue of SEPA's inclusion to the Chinese leadership.

Concern over the apparently low priority Beijing has attached to environmental protection in the Go West campaign is compounded by an additional concern over the policy approach China's leaders have adopted to address the region's environmental challenges. In discussing environmental protection in the West, China's leaders are proposing environmental campaigns to address

much of the challenge, including: afforestation campaigns, bans on logging, and campaigns to clean up local rivers and lakes.

Environmental Campaign Woes in the Reform Era

Since the death of Mao Zedong, China's top leaders have frequently used environmental campaigns to bring pressure to bear on local officials on a full range of macro-environmental threats: deforestation, desertification, as well as water pollution and scarcity. However, these campaigns suffer from a number of shortcomings:

(1) Such campaigns tend to be highly politically charged with significant investment up front but little follow-through past the stated target of completion;
(2) Central government officials rarely consult local officials to engage them in the campaign; and,
(3) Environmental campaigns often do not employ the best policy approaches, technologies, or incentives to change behavior.

Despite the leaders' repeated assurances that environmental protection is a top priority in the Go West campaign, many Chinese environmentalists continue to express doubts.

Logging Bans

Recently initiated environmental campaigns in the West already are encountering significant difficulties in implementation and suggest that this approach is unlikely to resolve the future environmental challenges engendered by the Go West campaign. In 1998, for example, after devastating floods of the Yangtze River, Premier Zhu Rongji announced a ban on logging for huge swaths of western Sichuan Province. Since that time, the ban has been extended to 17 provinces, autonomous regions, and municipalities. Reports regarding the progress of the ban to date, however, are conflicting, suggesting that many local officials are ignoring the ban. According to one report, logging reductions in Manchuria, Inner Mongolia, and Xinjiang have led to layoffs of 740,000 wood workers. Moreover, from 1997 to 2000 China's timber production plummeted 97 percent (Pomfret, 2001). According to this same report, Chinese loggers have offset the losses from the ban by clear cutting wide swaths of forest in Burma. In addition, toward the end of 2000, the State Forestry Bureau announced a ten-year campaign to crack down on illegal logging and the central government has allocated $11.6 billion to fund this effort. By 2001, the Chinese State Forestry Bureau reported that it had already pursued 2.2 million cases involving the destruction of forests over the past five years ("China makes stable," 2001).

Such statistics showing the success of logging bans and crackdowns are, however, contradicted by other reports of flagrant disregard for logging restrictions. Indeed, with entire local economies dependent on the timber industry and well-known collusion between local authorities and business to undermine central regulations, it would be surprising for such a ban to elicit such a dramatic change in such a short time. An investigation conducted by the State Forestry Bureau in late 1999 found that officials in many localities were ignoring the ban and issuing permits in excess of their authority. As a result, logging in many areas exceeded legal limits by more than 150 percent (U.S. Embassy, Beijing, 2000). The UN Food and Agriculture Organization statistics also indicate virtually no decline in Chinese timber production during the 1997 to 1999 period. Chinese environmentalists, apparently not convinced of the success of the logging ban, have voiced their concern that at the current rate of timber production, China's forests will be completely depleted in about ten years (Pan, 2001). Moreover, without supporting social policies, such as a social security system for the approximately one million lumberjacks who will be left jobless, many are likely to return to their previous jobs (Jiao, 2000).

Afforestation Campaigns

Even afforestation campaigns, with their long history in China, have been plagued by inappropriate technology, poor oversight, and a failure to provide appropriate incentives for rural citizens, local governments, and businesses to change their behavior. In discussing the massive afforestation projects in Shandong, the Yangtze River Basin, and across China's northern provinces during the late 1980s, one survey by the Northwest Institute of Forestry in Xian revealed that "[h]alf of the reported national afforestation claim was false, and the survival rate of planted trees was no higher than 40%" (Smil, 1993, p.61). Planting trees too close together, poor forest management, and planting trees without consideration

for the viability of the tree species in the local landscapes all have limited the efficacy of past tree planting campaigns.

In 2000, too, the government called on the people to counter the challenge of desertification, announcing a $725 million campaign to prevent and control desertification by adding new grassland and forest and increasing the vegetated area throughout the northwest. In some cases, resettled farmers and herders were directed to change the source of their livelihood from agriculture to tree planting. Zeng Peiyan, SDPC chairman and head of the government office in charge of the campaign has suggested Beijing would offer grain from "overflowing warehouses" to encourage peasants to abandon farming on marginal land and plant trees ("PRC to build," 2000). Yet the plans as articulated provide few details as to future assistance for out-of-work farmers or herders (Browne, 2000). Moreover, despite the promised assistance some regional officials have already complained that Beijing has not come forth with the funds for these mandated reforestation efforts. In Inner Mongolia, the Deputy Party Secretary claimed that Beijing has supplied neither the people nor the financial assistance necessary to reforest his region, which is already 60 percent desert. He has therefore called upon local business people to "invest in saving their homeland" (MacLeod and Lijia, 2001).

Even close to Beijing, where the desert is only 110 kilometers away to the north, villagers are unclear how to respond to the government's slogans that call for them to "grow trees, stop farming hilly land, and confine livestock in pens to prevent ecological disaster." Already subsisting on little more than $50 per year, the response of one villager, Zhou Qingrong, to the tree planting and anti-desertification campaign was telling: "How can we make a living if we do that? Already we don't even have enough money to buy oil or salt"(Liu, 2000).

Water Pollution Control Campaigns

The "Three Rivers and Three Lakes" (*sanhe sanhu*) campaign to clean up the Liao, Huai, and Hai rivers and the Tai, Chao and Dianchi lakes also has encountered significant difficulty. Government reports in 1999 touted the measures taken by the Kunming government in Yunnan Province to clean up Dianchi Lake:

> The Kunming city government banned the sales and use of detergent, which contains phosphorus, which was discharged into the Dianchi Lake valley. It also closed down more than 20 enterprises found to be responsible for pollution. A project to dredge the bottom of the lake is also going on smoothly and should be completed by April this year ("Yunnan lake," 1999).

Environmental Protection Bureau (EPB) officials in Kunming, however, report very different results from the clean up campaign. One official noted that the lack of sufficient progress on cleaning up the lake is because the sheer magnitude of the pollution problem is overwhelming:

> Over the years, lots of industrial wastewater has been emptied into the upper section of Dianchi Lake. As a result, the lake's purification ability is very weak. No matter how much dredging we do, there will still be pollutants in the water. Because of years of abuse, the ecosystem is very fragile. Blue algae blooms are common.[4]

Equally problematic is that Kunming EPB officials have no means of preventing the polluters from continuing to pollute. As one official noted:

> While the EPB has banned phosphorus detergent and are also promoting the use of natural fertilizer, this program has not really gotten off the ground. This is an area where we would like NGO help. Farmers have been opposed to the natural fertilizer, so there has not been any progress. They [the farmers] need to be educated…I would estimate that approximately 70 percent of all waste discharge into [Lake Dianchi] comes from chemical refineries…the most problematic polluters are state-owned companies. We cannot take [such companies] to court.[5]

The difficulties encountered by a variety of environmental protection campaigns suggest that while campaigns are useful for garnering official attention and mobilizing public support for a particular environmental challenge, they have little chance to address the problems in a meaningful manner. Campaigns emphasize a crisis mentality and grand sweeping gestures, seemingly at the expense of careful planning, long-term investment, and closely monitored implementation. The inherent weaknesses of environmental campaigns and their poor track record suggest that Beijing may need to rethink its approach to the Go West campaign in order to foster better environmental protection in the region.

THE PATH FORWARD

At first blush, Beijing's development of the Go West

effort fits squarely in China's tradition of development and unification campaigns, with all of their attendant challenges for the natural environment. However, China's current leaders also appear to be poised to take advantage of their new understanding of the relationship between environmental protection and economic development and reorient their approach. Some key areas of possible new focus are highlighted below.

Stronger bureaucratic support. The integration of environmental protection with economic development in the Go West campaign demands stronger bureaucratic support at both the centeral and local level. Such support might involve the establishment of an inter-provincial coordinating committee on environmental protection. Many of the vast infrastructure projects included in the Go West campaign cross not only municipal but also provincial boundaries. Within the leading group charged with overseeing the campaign, an oversight committee on environmental protection would be invaluable in ensuring that environmental considerations are incorporated into the development process.

Greater role for SEPA. The importance of including SEPA in the leading group coordinating the Go West campaign seems clear. Not only will this help ensure that "ecological construction" becomes more than a rhetorical phrase but SEPA's inclusion also will empower local environmental protection bureaus throughout the West as they seek to fulfill their mandates of environmental impact assessments, as well as monitoring and reporting on local enterprises' environmental practices.

Stronger incentives for clean industries and strengthening rule of law. The Chinese government should develop a system of incentives to promote sound environmental practices in the Go West development projects. China's leaders are currently in the process of developing a new package of incentives to entice international investors to the West. Instead of stressing preferential tax policies as they had originally planned, for example, the leaders have solicited input from the international community and are now focusing on enhancing transparency and rule of law. Even as the rule of law continues to be an issue of concern to international business in the coastal region, it is of even greater concern in the less integrated West. As one international official stated during The Western Forum of China 2001: "Policymakers have to focus on developing an even more transparent and consistent framework based on the law. They need to foster a more even playing field and remove barriers for those wishing to enter. They also need to improve the protection of private property rights and introduce greater fairness, transparency and consistency in the taxation of private firms"("Helping firms," 2001).

Enhancing the legal and administrative environment for international investors undoubtedly will have positive derivative consequences for environmental protection. Better enforcement, for example, will help ensure that companies adopt environmental best practices and do not attempt to skirt or evade China's environmental protection laws. However, the Chinese government also could go further to invite international and domestic environmental experts, as well as NGO leaders, to develop the policy framework and specific economic incentives necessary to ensure that as investment is encouraged, environmentally responsible projects receive priority.

Adoption of new environmental technologies. Finally, existing infrastructure in the West needs to be upgraded to support the implementation of new environmental technologies and practices. The potential of improved environmental practices suggested by the widespread entrance of international firms into the China market—such as that of the joint French-Japanese water treatment center—will not be fulfilled unless the basic infrastructure also is strengthened. The benefits of a state-of-the-art water treatment system are significantly diminished if polluted water may re-circulate and scarce water is lost due to high leakage rate in the pipes. Thus upgrading existing infrastructure to support environmentally and technologically advanced systems should be a primary goal of local officials.

Throughout Chinese history, the campaign mentality often has yielded disastrous consequences for the environment. As many of China's scholars and environmental advocates already have suggested, the time has come for China's leaders to formulate a new approach. Adopting these measures in the initial stages of the Go West campaign will help China transform the campaign from yet another potentially environmentally devastating economic development campaign into a showcase for the thoughtful integration of environmental protection with economic development.

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research presented in this piece. She can be reached at: eeconomy@cfr.org

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Endnotes

[1] For the purposes of this paper, and following current usage in China, the phrase "the West" will refer to these 12 areas targeted in the Go West campaign.

[2] The other five tenets are: (1) speeding up infrastructure construction; (2) strengthening agriculture's position as the basic industry; (3) adjusting the industrial structure; (4) developing tourism (especially in the western region); and (5) developing science and technology education and cultural and public health work (PRC State Council, 2000).

[3] While the international community, and the United States in particular, may be sympathetic to China's fear of terrorism in Xinjiang, President Bush has clearly signaled that the U.S. will differentiate between ethnic separatist movements and terrorism.

[4] Interview with Kunming EPB official, Kunming PRC, June 2000.

[5] Interview with Kunming EPB official, Kunming PRC, June 2000.

Research on Environmental Management in China, Stanford University

Since the mid-1980s, Leonard Ortolano (ortolano@stanford.edu) and his Ph.D. students in the Environmental and Water Studies Program at Stanford have been researching issues of environmental management in China. Work in this research group combines methods from engineering and social sciences and involves extensive fieldwork to understand how policy implementation actually takes place in China. The monograph, *Environmental Regulation in China*, by Xiaoying Ma and Leonard Ortolano (2000) provides a sample of recently completed work. Ongoing doctoral projects are outlined below.

• ***Japan's Cleaner Coal Technology Transfer to China: Organizations, Technology, and Policy Implementation*** (Stephanie Ohshita—stephio@stanford.edu)
Ms. Ohshita is examining the transfer of cleaner coal technology from the world's largest bilateral donor of environmental aid—Japan—to the world's largest consumer of coal—China. She focuses on policy implementation and analyzes the alignment of interests among government organizations, technology providers, and technology adopters. Her research highlights how environmental technology transfer can take place when interests converge and resources are leveraged across public-private networks. Her work also points to the need for additional incentives that can encourage the widespread diffusion of cleaner technologies during current enterprise reforms in China.

• ***Enforcement Of Water Pollution Control Regulations at Small-Scale Industrial Enterprises In Shanghai*** (Mara Warwick—mara.warwick@stanford.edu)
In recent years, pollution from millions of highly dispersed small-scale enterprises located in rural and peri-urban areas has been a key source of environmental degradation in China. Ms. Warwick analyzes the enforcement of environmental regulations at small-scale enterprises in the peri-urban areas of Shanghai. She investigates the quality of data being collected by the lowest level of environmental agencies: the district environmental protection bureau and the township environmental protection office. Her work reveals inadequacies in information flow and explains these shortcomings by looking at incentive structures and interaction between environmental authorities, enterprises, and citizens.

• ***Implementing Cleaner Production Programs in Chinese Cities*** (Hongyan He—hyhe@stanford.edu)
Over the last decade, China shifted its national pollution control strategy away from traditional "end-of-pipe" waste treatment toward cleaner production (CP) strategies. Many countries have tried to promote CP within industries, but China is unique in attempting to employ city-level CP programs. Ms. He is examining the content of these programs in several cities (Taiyuan, Nantong, and Suzhou) and analyzing the degree to which they have encouraged enterprises to engage in CP. Her analysis seeks to distinguish the influence of city-level CP programs from the effects of other factors, such as regulatory and market forces.

• ***Controlling Pollution from Vehicles in Chinese Cities*** (Cheng Chang—chch@stanford.edu)
In an effort to address the growing problem of transportation-related air pollution, major cities in China have strengthened their vehicle emission control regulations and implemented vehicle inspection and maintenance programs. Mr. Chang is examining vehicle emission control in Beijing and Shanghai, looking at not only the tailpipe controls but also at numerous other measures—including car registration fees, mass transit investments, and land use planning—that affect total emissions from motor vehicles in urban areas. He aims to evaluate the influence of these measures on mobile source emissions.

• ***The Role of Environmental NGOs in Protecting China's Environment*** (Jiang Ru—jru@stanford.edu)
Environmental NGOs have played an increasingly prominent role in protecting the environment in China. Mr. Ru is conducting a survey of 38 national and provincial environmental NGOs to learn about the strategies and activities of these organizations, as well as the interactions between NGOs and the Chinese state. To further understand the role of NGOs in China, Mr. Ru also is conducting three case studies involving NGOs in specific environmental protection efforts: the giant panda in Sichuan Province, the golden monkey in Yunnan Province and the Tibetan antelope in Qinghai Province.

Searching for Energy Security: The Political Ramifications of China's International Energy Policy

By Philip Andrews-Speed, Xuanli Liao, and Roland Dannreuther

China's growing energy needs combined with its limited domestic energy resources dictate that the country will become a player of growing importance on the international energy stage. The government has recognized the need to address a range of energy security issues but has yet to develop a coherent policy. China's policy has emphasized 'strategic' means to enhance security of energy supply rather than market mechanisms. The international components of this policy have contributed to China's increased diplomatic and economic involvement with energy-rich countries, especially in Asia. Examination of specific policies relating to Xinjiang, Central Asia, Russia, and the Middle East shows that decision-making is driven by a complex interplay of political, diplomatic, and economic factors. China's expanding energy interests need not necessarily pose a threat to the West or to its Asian neighbors—instead they can be used as an opportunity to integrate China into existing and new global and regional institutions.

In the late 1980s China was one of the world's largest net exporters of oil outside OPEC (Organization of Petroleum Exporting Countries). Imports accounted for less than 5 percent of annual oil consumption. On the eve of the Gulf War, oil imports were rising rapidly, but less then 3 percent of China's total annual supply was from the Middle East. It is no wonder that China could coolly abstain from the United Nation's Security Council motion that sanctioned the U.S.-led military action against Saddam Hussein. A decade on, China is set to become one of the world's major net importers of oil. Now some 30 percent of its oil needs are imported and more than 40 percent comes from the Gulf. Would China abstain from a UN vote under similar circumstances today?

The year that Saddam Hussein invaded Kuwait also saw the collapse of the Soviet Union. What had been a monolithic and threatening block along the northern and western borders of China became transformed into a collage of states offering a spectrum of diplomatic and economic opportunities. The last five years have seen the emergence of energy as a key plank of economic and political relations between China and its new neighbors. If the coming 20 years see the completion of even half of the projects under discussion, a new interdependence will have been created where only isolation and distrust existed before.

These developments have their roots in China's decreasing ability to provide its energy needs from domestic sources. The requirement to import energy is set to grow for the foreseeable future and, thus, China is certain to become an even more important player on the international energy stage. From this follows the question of whether or not China's increasing energy needs pose a threat to the international community.

Nearly ten years have passed since China's oil companies made their first forays into overseas investment and five years since China began to seek energy opportunities in Central Asia and Russia. The common challenge for all China watchers observing these changes in China's energy policy is to understand what is happening within the black box of political decision-making at the highest levels of the Chinese government. In the absence of direct information, it has been necessary to await the accumulation of a few years of empirical evidence in order to begin unraveling the complex interaction of political and economic decision-making that shaped China's energy strategy.

This paper first analyzes China's evolving approach to enhancing its security of energy supply and then examines the interaction of energy policy and foreign policy in a number of case studies. The geographic focus of the study is continental Asia: Russia, Central Asia, and the Gulf. The reasons for this are fourfold:

- Most of the world's remaining supplies of oil and gas lie in these regions;
- Direct pipeline connections are possible from Russia and Central Asia;
- The major future growth of oil and gas imports to

China is likely to be from these areas; and,

• The geopolitical impact of China's involvement in the energy sectors in continental Asia is likely to be greater than in most other parts of the world.

The Roots of China's Energy Security Concerns

Energy security is commonly understood as "the availability of energy at all times in various forms, in sufficient quantities, and at affordable prices" (UNDP, 2000). While it has some drawbacks, we shall base our account on this definition of energy security because we believe it is adequate and appropriate to examine the rationale behind China's energy strategies.[1] This section reviews the domestic roots of the Chinese leadership's energy concerns, which lie primarily in the imbalance between the current and projected domestic supply and the demand for energy.

The Growing Imbalance Between Supply and Demand

The potential vulnerability in the balance between energy supply and demand in China has its roots not so much in an absolute shortage of domestic primary energy resources, but rather in the mismatch between these resources and the nature of the growing demand for energy.

China is blessed with substantial resources of primary energy. It has the third largest reserves of coal in the world, a very large potential for hydroelectricity, and significant (but far from world class) reserves of oil and natural gas. At first glance it would be easy to deduce that China should have no energy security problem. However, such a conclusion would ignore a number of fundamental drawbacks in China's natural energy resource endowment.

Though coal has historically accounted for more than 70 percent of China's primary energy consumption (Sinton and Fridley, 2000), most of the country's coal is concentrated in the north of the country, far from the centers of demand. Much of the coal is of relatively low quality and a shortage of water in the main mining areas results in a low proportion of coal being washed. The consequent high levels of air pollution in China's towns and cities have been well documented (e.g., Smil, 2000; World Bank, 2001).

China's hydroelectricity resources also are geographically concentrated, found mainly in the center and southwest of the country. The last ten years have seen a massive program of investment in large-scale dams, of which the Three Gorges project is but the grandest. Whilst hydroelectricity can clearly make a substantial contribution to China's energy security, it has a number of severe limitations, for example the large size of capital

Table 1. China's Production, Consumption and Net Import of Oil and Gas

	2000	2010	2020
Oil (mmt)	*Actual*	*Estimate range*	*Estimate range*
Production	162	155-170-195	130-175-200
Consumption	227	270-300-350	350-400-550
Net Imports	70	75-150-230	130-250-400
Gas (bcm)	*Actual*	*Estimate range*	*Estimate range*
Production	28	55-65-75	95-110-130
Consumption	27	65-90-120	100-150-220
Net Imports	0	20-30	44-55-100

Sources: British Petroleum, 2001; Cordesmann, 1998; Downs, 2000; International Energy Agency, 2001; Jia et al., 1999; Medlock and Soligo, 1999; Zhou and Zhou, 1999.
mmt: millions of metric tons
bcm: billions of cubic meters

investment and long lead times, as well as the substantial social and environmental costs and risks.

China was self-sufficient in oil for more than 20 years from the early 1970s, when onshore production was established from a number of fields in northeast China, until the mid-1990s, when the rapidly rising demand finally overtook the static levels of domestic production. Despite the relatively generous endowment of oil in the ground, China's oil production is constrained by two key parameters: first, nearly all the oil has an intrinsic high cost of production, for geological reasons; and second, most of the "easy" oil has already been produced and production from the largest fields has reached a plateau or is already declining.

Natural gas always has accounted for less than 3 percent of China's primary energy consumption. The recent drive to enhance the use of natural gas has led to a spate of substantial discoveries. While huge reserves have been announced in the Chinese press, most of these gas accumulations suffer from the same geological problems as the oil fields and most lie in the far north and northwest of the country. These features will raise the cost of production and transportation. Despite these drawbacks, China continues to bring these discoveries to market as rapidly as possible, in part to mitigate the environmental impact of excessive coal use.

The Future Growth of Oil and Gas Imports

The need for oil products for road transport is the single most important factor driving China's increasing demand for oil, and this will continue to be the case in the short-term—say ten to fifteen years. A consensus among international and Chinese researchers indicates that annual oil demand is likely to rise from the present level around 200 million tons to 300 million tons by 2010, and to at least 400 million tons and possibly more than 500 million tons by 2020. (See Table 1).

Oil. It is widely accepted that China's domestic production of oil will reach a plateau in the next ten years, despite a sustained campaign over more than ten years to substantially increase output. Most projections for oil production levels in the year 2010 vary from 155 to 195 million tons per year, compared to 160 million tons in the year 2000. By 2020 production may fall below the level of 2010 unless major new discoveries are made.

A number of forecasts of net oil imports in the year 2010 made by non-Chinese specialists lie close to 150 million tons, which is similar to the predicted level of crude oil production in China at that time. Thus, China would be importing some 40 to 50 percent of its oil requirements, compared to about 30 percent in the year 2000. Chinese estimates of net imports are substantially lower and range from 75 to 130 million tons. The absolute quantity of oil imports would almost certainly continue to increase during the following decade and could exceed 250 million tons by the year 2020—a level on par with Japan's current oil imports.

Natural gas. Since the mid-1990s the Chinese government has placed great emphasis on developing a domestic gas market. Forecasts of China's domestic production of natural gas show a considerable jump from 28 billion cubic meters in the year 2000 to 60-75 billion cubic meters by 2010 and more than 100 billion cubic meters in 2020. (See Table 1)

Gas consumption is expected to rise substantially from current levels just above 27 billion cubic meters to 75-100 billion cubic meters by 2010 and 100-200 billion cubic meters by 2020. Any forecasts of future gas consumption have to be closely tied to the availability of developed reserves, either domestic or overseas, and of transport infrastructure, either pipelines or liquefied natural gas (LNG). In addition, distribution infrastructure and gas-consuming appliances must be in place, for while oil consumption does not have such great infrastructure requirements, natural gas consumption is dependent on the infrastructure being in place.

The limited number of published projections places China's level of gas imports at 20-30 billion cubic meters per year by 2010 and double this amount, or more, by 2020. These projections are consistent with one major import pipeline being operational by 2010 and a second ten years later. The LNG project currently under construction in Guangdong Province has a planned capacity of 6.5 billion cubic meters by 2010. Unless China has some major political economic crisis, this LNG infrastructure will almost certainly be built. The main question is whether these projects will be built rapidly enough for these forecasts to be met.

Threats to China's Energy Security

Events that can threaten the energy security of a petroleum importing state may be classified into two categories (see Table 2): (1) events that are of global impact, and (2) events that impact a specific country or region.

Global Events

Disruptive global events are of concern to all oil and gas importing countries. The most common of these is the policy discontinuity caused by OPEC policy decisions

Table 2. A Working Classification of "Energy Security" Events

Classification	Event
Global Events	
Policy discontinuity	Reduction in output by producers, producers raise prices
Fundamental discontinuity	Global shortage of production capacity
Force majeure disruption	Civil unrest, war, deliberate blockage of trade routes
Export disruption	Export cut-back by main exporters
Embargo disruption	Embargo by importers of a specific exporting state
Domestic Events	
Embargo disruption	General embargo of specific importing state, embargo of a specific importing state by a specific exporter or transit state
Logistical disruption	Accident or terrorist destruction, especially along transportation infrastructure
Local market disruption	By monopolist local suppliers, by pressure groups, or through government mismanagement

Source: This classification was expanded and modified from work by Horsnell (2000).

on output levels that are driven by a desire to raise or lower international crude oil prices. Such discontinuities are almost certain to occur every few years until better information on production and stock levels is available (Horsnell, 2000). The impact of such discontinuities is a relatively sudden and unpredictable change of oil prices.

A long-term failure throughout the world to invest in production, transportation, or processing capacity could result in an absolute shortage of supply of energy with respect to the global demand. This fundamental discontinuity is the most serious energy security threat facing the world today. Such an event would have a substantial impact on the economies of energy importing countries, particularly transition economies like China, and on the global economy. The shortages created by this failure to invest could create negative impacts that may last a number of years whilst the necessary capacity is constructed (Horsnell, 2000).

The remaining three events in the global category (e.g., *force majeure*, export and embargo disruptions, see Table 2) cover a variety of disruptions in or around the major oil and gas exporting states. Most of these types of events have their roots in political maneuvers, either of importing states or of exporting states (Horsnell, 2000). These kinds of disruptions are unlikely to have a sustained detrimental impact on importers, for two reasons: (1) either because the interests of the party causing the disruption are being damaged, or (2) because alternative methods or trading and transport can be found (Lichtblau, 1994). In addition, a limited number of states (such as Saudi Arabia) have surplus production capacity and can rapidly raise output in times of crisis (Asia Pacific Energy Research Center, 2000). Only a major global or regional war could disrupt oil and gas supplies for more than a few months (May, 1998).

Domestic Events

What have been classified as domestic events (see Table 2) have the potential to cause much more damage to an importing country's energy supply than global events. These domestic events fall into three categories: (1) embargoes of various types, (2) physical disruptions, and (3) market disruptions.

A general embargo of a specific importing state, if effective, could bring a country to its knees very quickly. However, we believe that the probability is extremely low that a large number of states would agree to such an embargo and that this blockade would be effectively

implemented, especially in the case of a large country with a long coastline such as China. Again, such an event is only likely in a major regional or global war.

More probable than a general embargo is the deliberate disruption of an export flow by an exporting state or by a transit state. Such an action only has any meaning if applied to a pipeline rather than to shipping from a specific source. Ships can be diverted but pipelines are immovable. The exporting and transit states along a pipeline have some political leverage over the importing state. This leverage can be used to disrupt flows in the short term in order to increase the exporting or transit country's bargaining power in some political or economic negotiation with one or more of the other states involved. A disruption of this type is likely to be short-lived because the interests of the disrupting state also will be affected in respect to lost revenue—nonetheless such pipeline disruptions may be frequently used against China. Specifically, in the future, China could be susceptible to such threats from Central Asian states and Russia, as well as from Mongolia if any import pipelines run across this country.

Accidents and, to a lesser extent, terrorism, are endemic on some long-distance oil and gas transport routes, be they pipelines or sea-lanes. Good management of pipelines and shipping lanes could reduce the frequency and impact of accidents. Though persistent terrorist attacks on pipelines raise the cost of transport, sufficient monitoring and quick repair minimize interruptions in oil and gas flow. Petroleum pipelines from Central Asia are likely to be exposed to such threats, both within the Central Asian states and within the far northwest of China.

Events in the world over the last two years have highlighted a new source of energy supply disruption in the developed countries, but one which is not new to developing and transition economies—that is the disruption of local energy markets as has been seen in California. Such disruptions may have many causes, for example pressure groups, government mismanagement, and monopolist behavior. In China such threats could take the form of: (1) the deliberate restriction of energy supply by a state-run or private sector energy monopolist; or (2) a badly designed or poorly implemented program privatizing energy supply industries. Besides under-investment that leaves some areas underserved in terms of energy supply, there have not been major local disruptions in the flow of energy to Chinese consumers.

From this brief survey we conclude that domestic threats to energy supply may be just as important as those with a global origin. Indeed, in developing and transition countries the domestic threats may greatly outweigh the international ones. In the case of China, international events currently only pose a potential threat to oil supply. But, when gas imports commence, these supplies too will be at the mercy of external threats. Within China, the production and the transportation of all forms of energy are susceptible to a range of domestic disruptions.

China's Measures to Enhance Energy Security

Measures Available

A government of an energy-importing country may invest in a number of measures to enhance the country's security of energy supply. These may be categorized either: (1) as measures to reduce the probability of a supply disruption, or (2) as steps to minimize the impact of supply disruptions or price rises (See Table 3). In simple terms, these measures may be characterized as reflecting a "strategic" or "market" approach to energy security. Long-term measures to reduce the probability of disruption also may be either strategic or market, but most long-term measures to are strategic in nature.

The strategic approach to enhance energy security would combine state-sponsored economic measures with political initiatives. Economic measures would include direct government participation in both enhancing domestic energy production and investing in overseas sources of energy. Political links with energy exporters would be of great importance, especially if supported by a range of economic measures such as aid, inward investment, and sales of key goods. Governments pursuing this approach might not be overly concerned about the cost of implementation compared to the probability and impact of the disruptive event.

The market approach would, in the extreme case, rely on national and international energy markets and would seek to reduce the risk of disruption by improving the efficient functioning of these markets. The last twenty years have seen a tendency for the world's largest economies to prefer a market approach for long-term measures to energy security (Mitchell, 2001). Thus recent reports on energy security issued by the U.S. government, the European Commission, and the Asia Pacific Energy Research Center have emphasized: (1) liberalization of domestic energy markets, (2) promotion of investment in new capacity, and (3) improved flow of information (Morse and Jaffe, 2001; National Energy Policy Development Group, 2001; Asia Pacific Energy Research Center, 2000; European Commission, 2001). The cost to the respective governments of establishing such markets should be relatively low.

Whether their supply-side focus is strategic or market driven, most governments also consider demand-side mechanisms to reduce vulnerability to supply disruptions. These may include: (1) enhancing energy efficiency, (2) seeking substitutes for oil, and (3) promoting public transport. (See Table 3). The mechanisms used to implement these measures to a great extent will depend on the nature of the domestic energy markets. Market mechanisms may be appropriate in a liberalized energy market, but a regulatory approach will be needed where the energy sector remains controlled by the government.

These long-term strategies to enhance energy security, whether based on markets or strategic mechanisms, should be supplemented by measures to address the short-term impact of an actual supply disruption or a price spike. The key steps are to establish emergency storage and to draw up an emergency response plan. Implementation of long-term energy strategies takes time, money and careful consideration of a number of issues (Asia Pacific Energy Research Center, 2000). With insights into measures that countries can adopt to enhance energy security, we now turn to specific strategies of China's energy security policy.

China's Energy Security Policy

To date, the Chinese government has not produced an official public document outlining its policy for enhancing the security of energy supply. Indeed it can be reasonably claimed that a coherent energy policy in any form is lacking (Andrews-Speed et al., 1999). Therefore China's approach to energy security has to be deduced from its plans and actions. Over the past decade, China's four main policy objectives in the energy sphere appear to have been:[2]

- Maximize domestic output of oil and gas;
- Diversify the sources of oil purchased through the international markets;
- Invest in overseas oil and gas resources through the Chinese national petroleum companies, focusing on Asia and the Middle East; and,
- Upgrade and expand the infrastructure to bring this overseas oil and gas to Chinese markets.

Table 3. Strategic and Market Measures to Enhance the Security of Energy Supply

	"Strategic" Approach	"Market" Approach
Supply-side economic measures to reduce the probability of disruption in the oil supply	• Control through state companies • Self-reliance • Investment in domestic and overseas production and transportation	• Liberalize energy markets • Integrate with international markets • Encourage domestic and international investment in production and transportation
Demand-side economic measures to reduce the probability of disruption in the oil supply	*Use administrative measures to:* • Increase energy efficiency • Adjust transport policy • Diversify transport fuels	*Use market measures to:* • Increase energy efficiency • Adjust transport policy • Diversify transport fuels
Measures to reduce the probability of disruption in the oil supply	• Enhance political links with energy exporters • Outward investment and aid to energy exporters • Use military force	• Promote the efficient functioning of international energy markets
Measures to reduce the impact of disruptions to the oil supply	• Strategic storage • Oil sharing • Emergency response procedures • Fuel switching • Surge capacity	

Maximize domestic output. China's efforts to increase the domestic output of petroleum have met with mixed success. Whilst new discoveries of oil are barely managing to replace the production of existing reserves, a vigorous campaign of gas exploration has yielded new discoveries which can provide the platform for the development of an extensive domestic natural gas market.

Diversify sources. The 1990s saw China making a strategic shift in its sources of oil imports. In the early 1990s more than half of this trade came from the Asia-Pacific region, mainly Indonesia and Malaysia. As China became a net importer of oil it deliberately sought to raise the proportion of imports from the Middle East and other regions such as Africa and Latin America. Since 1997, China has established long-term supply arrangements with Gulf states such as Saudi Arabia, Iran, Oman, and Yemen. Despite the evident diversification that has been achieved, in effect China has swapped dependence on one region, Southeast Asia, for dependence on another, the Gulf. A newly planned oil pipeline from Russia, and a more speculative one from Kazakhstan, could somewhat counterbalance this over-reliance on the Middle East.

Invest overseas. Since the mid-1990s official and academic documents in China have proclaimed the virtues of China's petroleum companies investing in overseas oil exploration and production in order to secure supplies of crude oil, which could then be refined in China. The first projects in the early 1990s were generally far from China and had the character of experiments. Only in the late 1990s did sizable commitments start to be made, the largest of which were in Kazakhstan and Sudan. At the heart of this strategy lies the recognition that a belt of untapped oil and gas reserves in Russia, Central Asia, and the Middle East surrounds China. In all three regions, considerable potential exists for further discoveries especially in Central Asia and eastern Russia, which are relatively lightly explored.

With the exception of the petroleum resources in the Middle East, all this oil and gas production could be delivered to consumers in central and eastern China via pipeline. For this reason Chinese investment activity has been focused on Central Asia and Russia. Oil from the Middle East and other remote regions could be shipped directly to China along a supply chain that could be under Chinese management from start to finish. Together these pipelines and shipping routes would, supposedly, substantially reduce China's exposure to disruption in the international markets and from military blockades.

Improve delivery infrastructure. As part of the strategy to enhance the effectiveness of the energy sector, the Chinese government for several years has been spending substantial sums of money on upgrading and expanding the domestic transportation networks for coal and electrical power. A key objective is to have a completely interconnected national power grid by the year 2010.

These four key energy policy objectives clearly indicate the Chinese leadership's preference for a strategic approach to enhance energy security. Despite concerted efforts to pursue the above four policy areas, little sustained progress has been made on implementing other proposals to enhance China's security of oil supply, such as: (1) constraining the demand for oil; (2) deregulating the internal oil markets; and (3) putting in place emergency response measures.

The Chinese government has taken few steps to constrain growth rate of oil demand, despite recommendations to do so through conservation, efficiency, and substitution. Political pressures and high international oil prices have constrained the government's plans to impose higher taxes on transport fuels and thus consumer prices for gasoline and diesel are arguably too low to encourage savings or the use of more fuel-efficient vehicles.

Further evidence of the low prioritization for market strategies is that in China progress in liberalizing the energy sector has been hesitant. In 1998, the Chinese government carried out a major restructuring of the government agencies and of state companies in the energy sector, as well as set up a mechanism to ensure that domestic oil prices more closely reflected international market prices. However, these measures resulted in little genuine liberalization of the domestic energy sector (Andrews-Speed et al., 2000). Most energy production, transportation, and supply are controlled by companies owned by the state at different levels of government, which resist losing control of their lucrative monopolies. Energy prices still are set or constrained by government agencies, as are import and export quotas.

The Chinese leadership also appears to have neglected to put into place contingency measures to cope with a sudden disruption of oil supplies, despite calls by Chinese academics and policy advisors to do so. In June 2001 the Chinese government announced plans to develop a strategic oil reserve of 6 million tons by 2005 and 15 million tons by 2010. These quantities amount to barely more than one month of projected net oil imports and fall far short of earlier proposals to build the reserve at almost twice this rate.

This review of China's energy security policy has shown that the government has placed the greatest emphasis on three of the policy objectives: (1) maximizing domestic production of oil and gas, (2) diversifying sources of imports, and (3) investing in overseas production. As will be shown in the next section, these steps have been accompanied by a deliberate policy to enhance political and economic links with oil and gas exporting states. This combination of measures is characteristic of a "strategic" rather than a "market" approach to energy security. Moreover, the current policy for enhancing the country's security of energy supply may be reasonably characterized as *ad-hoc* and incomplete (Manning, 2000).

CHINA'S INTERNATIONAL ENERGY POLICYMAKING

The aim of this section is to examine China's involvement in the international energy arena in order to reveal the interaction between energy policy and foreign policy. We begin by reviewing the identity and presumed priorities of the institutions involved in these two key areas of policymaking. We then present four examples of major policy decisions and their subsequent implementation, in Xinjiang, Kazakhstan, Russia, and the Gulf. Each example shows a different balance of energy policy or economic concerns and foreign policy or political concerns. Xinjiang is included in the analysis because the investment and security decisions involve both energy policy and foreign policy considerations, and energy policy toward Xinjiang has implications for China's involvement in Kazakhstan and Russia.

The Actors and Their Priorities

For the purposes of this analysis, the policy priorities of China's main actors will be grouped under just three headings: foreign policy, general domestic policy, and energy policy. Under foreign policy come such concerns as national security and sovereignty, China's regional influence and China's great power status in the world. The focus of domestic policy is political and social stability, for which sustained economic growth is required. Economic growth requires energy, and thus energy security is a key component of overall energy policy. A second dimension of energy policy, which is currently of secondary importance in China, is the profitability of Chinese energy companies. The main actors in China's international energy policymaking include:

- The top leadership of the Communist Party and government;
- The military;
- Key government departments and ministries; and,
- State petroleum companies.

The top leadership of the Party and government. All major policy decisions concerning domestic or foreign policy are discussed and endorsed by the very highest levels of the Communist Party and the government. The two key central government bodies are the Standing Committee of the Politburo and the State Council (Lieberthal, 1995). The former tends to be more concerned with political issues whilst the latter is heavily involved in economic matters. Decisions relating to international energy policy involve a complex range of domestic and foreign policy issues. Therefore, all major decisions concerning China's international energy policy require the support and confirmation from these two top leadership bodies. The foremost concerns of both the Politburo and the State Council are likely to be political and social stability, national security, sovereignty and international influence. Energy security *per se*, or indeed any aspect of energy policy, will only become a priority if a subordinate government agency has drawn it to the attention of the State Council.

The Chinese military. The role of the Chinese military—the People's Liberation Army (PLA)—is not only to protect China's national security, but also to ensure the Communist Party's leadership. Thus, the only field of great military influence is security policy (Swaine, 1997). The PLA's ability to affect China's foreign policy may well be greater under Jiang Zemin than under Mao Zedong and Deng Xiaoping, but this only becomes evident in crisis situations. Given that China possesses sufficient domestic energy resources to support the PLA in a major war, we consider that the military probably plays a relatively minor role in the formulation of international energy policy. However, the PLA may well be more involved at a later stage if there are expensive energy assets to protect, either on Chinese soil or overseas.

Key government agencies. A number of government agencies are involved in international energy policymaking. Those with a primary concern for energy supply include some departments of the State Development Planning Commission (SDPC) and the State Economic and Trade Commission (SETC). Together these two agencies formulate general economic policy and draw together the key components of energy policy (Lieberthal and Oksenberg, 1988; Andrews-Speed et al., 2000). Security of energy supply is a major concern to both SDPC and SETC, especially since China became a

net importer of oil. In addition SDPC is required to approve all major investment decisions and SETC has a range of day-to-day management responsibilities for the state petroleum companies.

Two other departments with a subordinate role to play are the Ministry of Foreign Affairs (MFA) and the Ministry of Foreign Trade and Economic Cooperation (MOFTEC). MFA plays a role in China's foreign policy process with mainly three functions: (1) to provide information to the top leadership, (2) to make decisions on routine foreign affairs, and (3) to implement the policies made by the top leadership. Prior to the reform era, MOFTEC played a minor role in setting China's foreign policy. However, following China's increasing interdependence with the outside world, and especially with China's efforts to enter the World Trade Organization (WTO), the importance of MOFTEC in foreign and energy policymaking has grown in recent years.

State petroleum companies. The final group of actors is the state petroleum companies. Though nominally subordinate and separate from the government, the state petroleum companies have considerable power and influence based on their importance to the national economy and near monopoly status. This power monopoly continues despite the 1998 government reorganization (Andrews-Speed et al., 2000) and their current status outside government departments or ministries. The main actor is CNPC, together with its partly floated subsidiary, PetroChina. Whilst both entities are under pressure to maximize their profits, this is likely to be more seriously enforced at the partially privatized PetroChina. Conversely, CNPC is more susceptible than PetroChina to government pressure to address issues concerning energy security. CNPC also plays the leading role in China's overseas petroleum investments.

The Case Studies

Xinjiang: The West-to-East Gas Pipeline

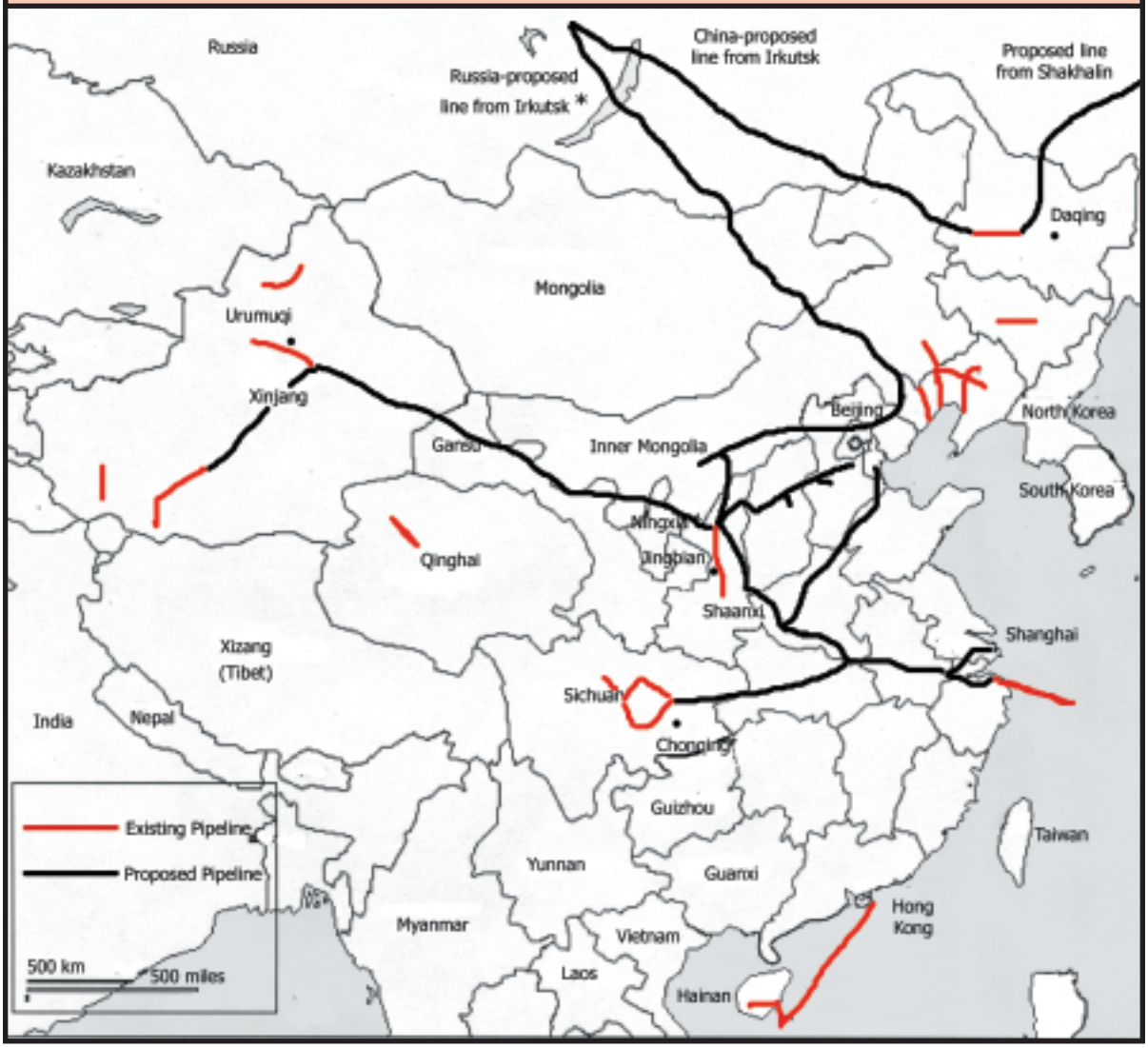
Over the past twenty years, CNPC, and latterly PetroChina, have made a steady series of oil and gas discoveries in the Tarim Basin, which lies in the southwestern part of Xinjiang Autonomous Region. However, the central government has shown no great enthusiasm to support the major investment needed to develop the Tarim Basin fields and to transport this oil and gas to the markets in the east of the country. The main reasons hindering such investment have been the high costs of exploration, development, and transportation, which make these reserves relatively uncompetitive. The government's decision in the spring of 2000 to go ahead with the "Develop the West" campaign and to include within it the west-to-east gas pipeline network from Xinjiang to Shanghai marked a sharp shift from the previous energy development priorities in Xinjiang. This shift in policy can most likely be attributed to a remarkable convergence of economic, political, domestic, and foreign policy interests.

Xinjiang has great political significance for the Chinese government leaders for two reasons. First, it borders the newly independent states of Central Asia where China wishes to have a presence in order to counter-balance the increasing U.S. influence in the region. Second, the large Muslim population poses a potential threat to Beijing's control over Xinjiang. Therefore the central government is liable to seize on any instrument that will project its influence and assert its authority in this remote and under-populated part of the country (Ferdinand, 1994).

The Develop the West campaign sprang from the central leadership's fear of the social and political consequences of the widening economic divide between the booming coastal regions of eastern China and the stagnating central and western regions. Xinjiang is clearly one of the targeted provinces and thus should benefit from these investments. At the campaign's core is a broad range of infrastructure projects, of which the west-to-east gas pipeline is just one. (*Editor's Note: For more details on the Develop the West campaign see Elizabeth Economy's paper in this issue of the China Environment Series*)

In addition to these political considerations, three energy-related factors probably helped to seal the decision to go ahead with the west-to-east pipeline (see Map 1 for information on completed and projected natural gas pipelines). First was the pressing need to bring on stream substantial supplies of natural gas to support the policy of promoting gas use in China. The first wave of supply could be sourced from the Ordos Basin of north China. The key question was whether the next wave of gas supply would be from east Siberia (the Kovytka field near Irkutsk), which is widely accepted to be potentially profitable, or from the less commercially viable Tarim Basin. Political and contractual problems, which promised to delay the former project and the greater security of supply from the latter project, have acted to swing decision-makers in favor of the Tarim Basin. Secondly, CNPC and PetroChina have lobbied the central leadership and key ministries hard to be allowed to recoup some of their 20 years of exploration investment in the Tarim Basin. Finally, by taking the west-to-east pipeline all the way to the coast, the Chinese government could

Map 1. China's Projected and Existing Natural Gas Pipelines



* This route may be used for natural gas or oil

Source: Dong Xiucheng and Jeffery Logan (2002). "Expanding Natural Gas Use in China: A Joint Sino-U.S. Research Reprt." Paper Published by Pacific Northwest National Lab and University of Petroleum-Beijing [On-line]. Available: http://www.pnl.gov/china

fairly claim that the Develop the West campaign was providing a direct benefit to the coastal provinces through the provision of clean energy.

This analysis shows that the decision to construct the west-to-east gas pipeline was not based on purely energy concerns. Energy security and the interests of state petroleum companies (e.g., CNPC and PetroChina) by themselves may not have provided adequate justification for going ahead with this major pipeline project. Consensus among the major actors could only be reached when the role of the pipeline could be set in a wider context of domestic, security, and foreign policy.

Kazakhstan: Oil Fields and Pipelines

After the collapse of the Soviet Union in 1991, China rapidly established diplomatic relations and signed a series of agreements on bilateral economic cooperation with the new states of Central Asia. In 1997 CNPC won the right to develop two oil fields in Kazakhstan and undertook to construct a pipeline to export oil eastwards to China. Six years on, little substantial progress has been made on any of these projects, which is symptomatic of the context in which these commitments were made. It is our contention that China's move into Kazakhstan's oil sector was driven as much, or more, by political

considerations than by energy concerns (Andrews-Speed and Vinogradov, 2000).

China's political and strategic interests in Central Asia spring from a number of intertwined fears. Xinjiang's Muslim minorities have strong ethnic and political links with the populations of neighboring states, especially in Kazakhstan which hosts groups active in supporting autonomy in Xinjiang. The Chinese government has devoted considerable energy to persuading the Kazakh government to discourage these groups (Burles, 1999).

Further security cooperation between China and the Central Asian states took two forms (Calabrese, 1999). First came a series of bilateral agreements in which China resolved long-standing disputes on the alignment of its borders with Central Asian states. Second was the creation of the "Shanghai Five" group (comprised of China, Russia, Kazakhstan, Kyrgystan, and Tajikistan), which aspires to enhance military cooperation and political stability in the region. In June 2001 with the inclusion of Uzbekistan, the group was renamed the "Shanghai Cooperation Organization" (SCO). Through these cooperative mechanisms China has sought to reduce the separatist threat, to enhance the security of its western borders, and to counterbalance growing U.S. influence in Central Asia

Kazakhstan has large proven reserves of oil and new discoveries are being made each year. The main problem is exporting this oil to markets thousands of kilometers away. The Kazakh government would therefore have been keen to make energy a key component of economic cooperation with China and to include an eastward-flowing pipeline in any framework agreement. Although investment in overseas petroleum resources was a key facet of China's energy security strategy in the 1990s and Kazakhstan was an immediate neighbor from whom oil could be imported directly by pipeline, the main obstacle to a pipeline has been the cost. An oil pipeline running 6,000 kilometers from Kazakhstan to eastern China makes little commercial sense, when the alternative is to buy from the international markets and have the oil delivered by ship to the coast. The decision to go ahead with the commitment to invest in two fields and to construct the pipeline was probably driven by two forces:

- Political and security concerns surrounding the region persuaded the top Chinese leadership to support the development of strong economic links between the two countries; and,
- CNPC expected to see substantial benefits flowing from the development of this overseas production as well as from the construction of the pipeline, which among other things would allow them to develop more of their marginally commercial oil fields in the Tarim basin.

A number of events and considerations have conspired to delay progress on these projects. First was the sudden fall of international oil prices in 1997 that made all petroleum investments in Central Asia look unattractive. Then came the reorganization of China's petroleum industry in 1998, which gave CNPC the opportunity to invest in a range of more attractive activities within China that had previously been off limits, such as oil refining and marketing and gas distribution. An increasing emphasis on the need to make profits further reduced CNPC's enthusiasm for its Kazakh projects. Finally, CNPC was becoming increasingly frustrated at the administrative and fiscal obstacles it was encountering doing business in Kazakhstan.

For these reasons it could be safely stated that by the middle of 2001 economic reality undermined politically driven enthusiasm. Thus, CNPC's investment plans in Kazakhstan were dormant and nearly dead. However, the events of September 11th have triggered a reevaluation and a growing prioritization of energy security by the Chinese leadership, who may yet decide that the current dependence on the Gulf for oil supplies is excessive and that the Kazakhstan oil pipeline should be constructed, regardless of the cost.

Russia: A Source of Oil and Gas

The last ten years have seen a remarkable improvement of relations between China and its erstwhile adversary, Russia. Facing the United States as the only superpower in the post-Cold War world, Beijing and Moscow regard themselves together as the only available counterweight against U.S. hegemony. The two countries established a "Constructive Partnership" in 1994, and then up-graded it into "Strategic Partnership" two years later. Arms sales continue to comprise one of the most significant activities in Sino-Russian strategic cooperation (Blank, 1997). In addition, the defense ministers from the two countries meet regularly and Russian defense scientists and technologists work within China's arms industry (Ferdinand, 1997). This rapprochement between China and Russia culminated in the signing of a treaty of friendship and cooperation in July 2001. In addition to geopolitics, national security and economics form the foundation of this partnership.

National and regional security is significant for Sino-Russian cooperation, especially in Central Asia and Northeast Asia. The participation of both parties in the

Shanghai Cooperation Organization reflects their common concerns with Islamic fundamentalism and potential instability in Central Asia. In terms of regional security, China and Russia have worked with the United States and Japan to reduce tensions in Korean Peninsula.

The economic component of this partnership, trade and investment, has developed at a slow pace, with the exception of the arms sales mentioned above (Rozman, 1998). Energy is the only sector that has the potential to provide prolonged and substantial mutual benefit. Eastern Siberia and the Russian Far East possess vast untapped accumulations of oil and gas, which are far larger than can be consumed by the declining local population. The nearest market for these fields is Northeast Asia, including Korea, Japan, and China (Paik, 1998; Andrews-Speed, 1998). But only China has the potential to provide a large market in the relatively near future. Oil and gas exports promise to address the desperate need for Russia to raise both its GDP and its exports, and to improve its balance of trade with China, as well as fulfill the desire of both parties to underpin their strategic partnership with economic cooperation.

Natural gas pipeline projects. In the long term, gas will be the main fuel to flow from Russia to China. (See Map 1) The Kovytka fields near Irkutsk have been under evaluation by British Petroleum (BP) and CNPC for more than five years, with the idea of transporting the gas by pipeline to northeast China. To the northeast of Irkutsk lie the potentially vast, by not fully proven reserves of the Sakha Republic. Additional sources of gas exist in the Sakhalin region (though these are currently not destined for China) and in west Siberia where a pipeline running into northernmost Xinjiang has been proposed. Despite the political desire for one of these gas projects to go ahead, little progress to develop them has been made. As mentioned above, these plans were overtaken by the decision to build the domestic west-to-east gas pipeline. However, the prioritization of the domestic pipeline did not preclude the involvement of Russia's Gazprom in the west-to-east pipeline, China's first long-distance gas transportation project.

Oil pipeline projects. It appears that little attention was paid to the possibility of constructing an oil pipeline from Russia to China until late 2000, when Russian officials and oil companies put forward suggestions for export pipelines from western and eastern Siberia. In July 2001, hot on the heels of the treaty of friendship and cooperation, an agreement was signed between Chinese and Russian parties to construct an oil pipeline. This would run from the oil fields of Angarsk—by chance also near Irkutsk in East Siberia—eastwards to the Daqing oil field in Heilongjiang Province in the far northeast of China. (See Map 1) Such a routing has a number of advantages to the Chinese parties: (1) This route avoids Mongolia and thus the risks that any pipeline runs when crossing third countries; and, (2) The pipeline will be connected directly into existing infrastructure at the Daqing field.

Since the 1960s, Daqing has underpinned China's oil industry, but production has been on decline. It is both economically and politically advantageous that the oil imported from Russia will progressively displace Daqing oil in both pipelines and refineries in northeast China. Such an arrangement will prevent a rapid closure of these oil facilities, which would have created economic losses for CNPC and PetroChina and create an incremental unemployment burden for local and central governments. In addition, the use of existing infrastructure will reduce the lead-time and the capital investment needed for the project. Thus the first major cooperative energy project between Russia and China is not only consistent with the growing strategic partnership between these two states, but also addresses a number of specific political and security concerns of key government and top leadership actors in China.

The Gulf: A Crucial Source of Oil

China's relationship with the Gulf region, though currently of the greatest importance with respect to energy imports, is arguably the most straightforward to explain even given the number of countries involved. In simple terms, China's growing economic and political involvement in the Gulf is driven primarily by the desire to deepen relations with the world's major oil exporters and to contribute to the enhancement of political stability in a region which provides for more than 40 percent of China's oil imports.

China's attitude toward the Middle East has tended to resemble that of a disinterested bystander (Schichor, 1998). Despite a belated drive to establish diplomatic relations across the region in the 1980s and early 1990s, China's involvement was limited principally to the export of labor, manufactured goods and arms, and the import of limited quantities of oil. By the mid-1990s China had become a net importer of oil, and the Chinese government and state companies were taking steps to establish closer relations with the governments and oil companies in the Gulf region (Calabrese, 1998). Long-term supply arrangements were concluded with Saudi Arabia, Iran, Oman, and Yemen, and CNPC committed to field

development projects in Iran and Iraq. Sensitive to the ambitions of Gulf states to secure a foothold in the refining and marketing sector of East Asia, China agreed to the principle of Saudi Aramco.[3] becoming involved in joint ventures in China, though nothing has come of this five years on.

The Gulf's increasing importance for China's energy supply is necessarily accompanied by the Chinese leadership's enhanced concern with political and security dimensions of this turbulent region (Yang, 1998). Two issues are relevant to this discussion. First, China is becoming a more vocal participant in the global search for stability and peace in the region. On the one hand this reflects a requirement for uninterrupted supplies of oil and, on the other hand, China's increased involvement in the region is part of the overall ambition to counterbalance the U.S. and western primacy in the Gulf. Second, the Chinese government sees the Middle East as one potentially dangerous source of inspiration and assistance to Muslim separatists in Xinjiang.

China's increasing dependence on Middle Eastern oil has raised one more specter, that of the disruption of sea-lanes, either in the Gulf or in Southeast Asia. China is concerned that sea-lanes might be blocked either by local conflicts or by a deliberate embargo targeted at China. Conversely, some Western commentators have expressed the fear that China could use the need to protect sea-lanes as a front for aggressive expansion and projection of its blue-water navy. Two critical choke points lie on the route from the Gulf to China: the Straits of Hormuz and the Malacca Straits. Though no way exists to bypass the former, most of the world has a vested interest in keeping these straits open, and China can contribute little militarily to this effort. The Straits of Malacca could easily be blocked, by accident or intent. However, such an event would not be fatal, for only a few extra days sailing would be required of tankers en-route to East Asia.

In summary, China's involvement in the Gulf is driven principally by economic interests, of which energy is the most important. Most, but not all, of China's political activity derives from this increasing dependence on the region's oil supplies. Subsidiary facets of China's political engagement in the Gulf reflect the Chinese leadership's perennial desire to diminish the U.S. power monopoly in any key region of the world and to limit Islamic extremism within China's northwest region.

Conclusion

China's energy security policy is currently dominated by a limited range of strategic measures which are intended to reduce the probability of a disruption to oil and gas supplies. The major components of this approach are: (1) to maximize the production from domestic energy resources, (2) to invest in overseas petroleum reserves, and (3) where possible, construct infrastructure to transport this oil or gas to China. At the same time the Chinese government has diversified the sources of its oil imports, which has had the effect of increasing China's reliance on the Gulf. Little effort has been made to develop measures to reduce the impact of a disruption by constructing a strategic reserve or draw up comprehensive emergency response plans; nor has sustained progress been made in liberalizing the energy sector and in introducing market measures which might reduce the probability of disruption. However the events of September 11th and China's accession to WTO may well nudge the Chinese government to address these important components of energy security.

The international agreements and investments we have described in this paper have formed an important part of China's energy security policy since the mid-1990s. Despite the often hasty commitments to make large investments in development and transportation projects, actual implementation has been cautious. The examples of Xinjiang, Kazakhstan, and Russia show that major investment only proceeds if a wide range of political and economic considerations and interests have been satisfied. Some projects may or may not be commercially, but the Chinese government appears to take great care to ensure that overall net benefit flows to China. In the three cases highlighted above, the evaluation of net benefit included: (1) domestic politics and security, (2) foreign, economic, and energy policy, and (3) the specific interests of the state petroleum companies. Only in the Gulf case does the need to secure energy supplies appear to be the main driving force for China's involvement, and political questions have been relegated to a supporting role.

A critical question emerges from this analysis. Namely, does China's "strategic" approach to energy security and the intimate interdependence between its energy policy and its foreign policy pose a threat to the West? The realist view of China's energy policy would emphasize the threat and the increasing probability of conflict. Competition for scarce energy resources, China's need to defend overseas energy supplies and transport routes, the developing strategic partnership with Russia, and China's greater involvement in the Middle East all have the potential to threaten western interests.

A liberal "engagement" view would focus on the possibility that China's energy needs will instead draw the country into greater cooperation and interdependence with the rest of the world. Energy resources will not be

scarce as long as prices are sending the right signals to encourage investment in new production capacity. Conflict driven solely by energy need is most improbable. China is not like Japan 60 years ago, for it has substantial energy resources of its own, and the nature of energy markets has changed considerably over the past six decades. The newfound friendship between China and Russia could be a force for interdependence and for regional stability in Northeast Asia and Central Asia, and need pose no threat to the West. Finally, China's priority in the Middle East is for stability so that its energy supplies are not interrupted. China has no interest in acting as an *agent provocateur* in this sensitive region.

We tend to evaluate China's energy policy through the liberal lens, though we recognize elements of truth in the realist analysis. The challenge for the West is to help and encourage China to take a cooperative approach in the international dimensions of its energy security policy and to integrate its domestic energy markets with the international markets. China has already begun dialogues with two key international energy institutions, the International Energy Agency and the Energy Charter Treaty secretariat. In addition it is desirable that the nations of Northeast Asia develop their own regional institution for energy security management.

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ENDNOTES

[1] Two major drawbacks of this definition include: (1) the adjectives "sufficient" and "affordable" beg fundamental economic and political questions; and (2) it ignores the environmental dimension that has become increasingly considered to be an important aspect of energy security.

[2] For discussions on China's energy policy priorities see Yan and Yang, 1999; Zhou, 1999; Li and Li, 2000; and Chen 2001.

[3] Saudi Aramco is the major state-run oil company in Saudi Arabia.

Pesticides in China: A Growing Threat to Food Safety, Public Health, and the Environment

By Jessica Hamburger

Over time, pesticides tend to create more pest problems than they solve, causing increased crop losses as well as health and environmental damage. While Chinese farmers bear the brunt of illnesses caused by the country's growing reliance on pesticides, the world's consumers are also at risk. The Chinese government has banned some of the worst pesticides, but overall use continues to climb. Efforts to reduce pesticide use or even ensure quality control have been undermined by conflicts of interest inherent in the agricultural extension and pesticide supervision systems. Government agencies have pursued a variety of schemes to promote the production of food with little to no pesticide residues, but this work affects only a small proportion of the total food supply. The Chinese government needs to take bold and decisive steps to free Chinese farmers from the pesticide treadmill and improve the safety of its food.

Consumers around the world are used to seeing the "Made in China" label on everything from T-shirts to toys. What they may not know is that their fruits and vegetables are increasingly "Made in China" as well. More than likely, this produce contains the residues of pesticides that also are made in China. While Chinese farmers bear the brunt of illnesses caused by the country's growing reliance on pesticides, the world's consumers are also at risk. Globalization of the food industry spreads the risks of China's heavy reliance on pesticides, but it also creates incentives for China to minimize pesticide residues in food in order to maintain access to foreign markets. In this paper I will describe trends in Chinese food production and pesticide use and explore ways in which international investment, trade, and cooperation have influenced them. I also will put forward some recommendations for future actions within China and abroad that could contribute to more sustainable farming practices and the production of healthier food in China.

Food Production Trends in China

Chinese food production has surged over the last two decades. The increase in food supply has exceeded the growth of domestic demand, allowing China to raise living standards and reduce poverty. Chinese farmers also have burst onto the global food production scene, giving stiff competition to growers who have traditionally dominated world markets. However, China's entry into the strictly regulated food markets of Europe, Japan, and the United States will be constrained by the ability of Chinese farmers to reduce pesticide residues.

The huge advances in China's productivity began when Deng Xiaoping's pragmatic government began to free farms from agricultural communes and allowed them to partially privatize their agricultural production under the household responsibility system in 1980 (Zhou, 1996). The local government retained title to the land and farmers still had to produce and sell a certain amount of key crops (such as grain and cotton) to the government at low fixed prices. Once they had met their quotas, however, farmers could manage their land as they chose and produce vegetables and cash crops for sale on the free market. When market controls for perishable products were lifted in 1984 (Nyberg and Rozelle, 1999), Chinese farmers leapt at the chance to increase their income, and both sales and consumption of fruit, vegetables, eggs, and meat rose dramatically. The total output value of Chinese fruits and vegetables reached $42 billion in 2000 (FarmChina.com, 2000).

China's share of the world's agricultural trade has increased during the reform period, and the value of its agricultural exports reached $20.2 billion in 1997. Horticultural products—mostly fruits and vegetables—accounted for 31 percent of the total agricultural 1997 exports from China (Nyberg and Rozelle, 1999).

According to Chinese government estimates, exports rose to the point where China had captured one-third of the world's vegetable export market in 2000 (FarmChina.com, 2000). China increased its production of canned fruits, preserves, and fruit beverages by 50 percent between 1994 and 1997, and has become Japan's primary supplier of canned peaches (Johnson, 2001).

In the past, Chinese vegetables were exported only to Japan, Korea, Hong Kong, Macao, and Taiwan. Today, however, Chinese vegetable exports reach Southeast Asian and European markets and processed agricultural products, like apple juice concentrate, have made significant inroads into U.S. markets (FarmChina.com, 2000; Naegely, 1998). The recent surge in Chinese fruit and vegetable production has affected U.S. growers by edging them out of important Asian export markets. For example, Washington State's apple exports to Indonesia declined by 80 percent after China quadrupled its apple production between 1990 and 1997 (Naegely, 1998). California growers also face increasing competition with China for sales to Asian countries, which account for more than half of the state's agricultural exports (Johnson, 2001). California farmers even face competition from China for some fresh produce markets in their own backyard. For example, U.S. imports of Chinese garlic surged from 3 million pounds a year in 1992 to 64 million pounds a year—almost half the U.S. market at the time—in 1994, before being slapped with a huge anti-dumping tariff (Mendoza, 2002).

Threats to Sustainable Agriculture

Despite these production and export successes, Chinese agriculture still faces daunting challenges. The most urgent problem is the water table beneath the North China Plain, which fell by nearly 10 feet on average in Hebei Province in 2000, according to a study by Beijing's Geological Environmental Monitoring Institute (Brown, 2001). Farmers around Beijing now must drill down over half a mile to reach water. The government even is considering diverting water from the Yangtze River to parched farmland hundreds of miles to the north, a project that will cost tens of billions of dollars and displace hundreds of thousands of people (Brown, 2001). Desertification, salinization, soil erosion, overgrazing, and industrial pollution also constitute major threats to China's farmland. Fighting the loss of prime farmland to road and housing construction is another ongoing struggle for the national government, which has passed laws requiring farmland losses to be made up with expansion of farmland elsewhere. This expansion of farmland often has the unfortunate effect of bringing highly erodible forests and grasslands into production, causing further loss of farmland to erosion.

Also high on the list of agricultural woes is the contamination of farms and the environment with chemical fertilizers and pesticides. Excessive application of fertilizer has contaminated groundwater with nitrates and caused toxic "red tides" of algal blooms and eutrophication of lakes and rivers, while throughout China pesticides have killed the natural enemies of crop pests and poisoned farmers and consumers (Nyberg and Rozelle, 1999).

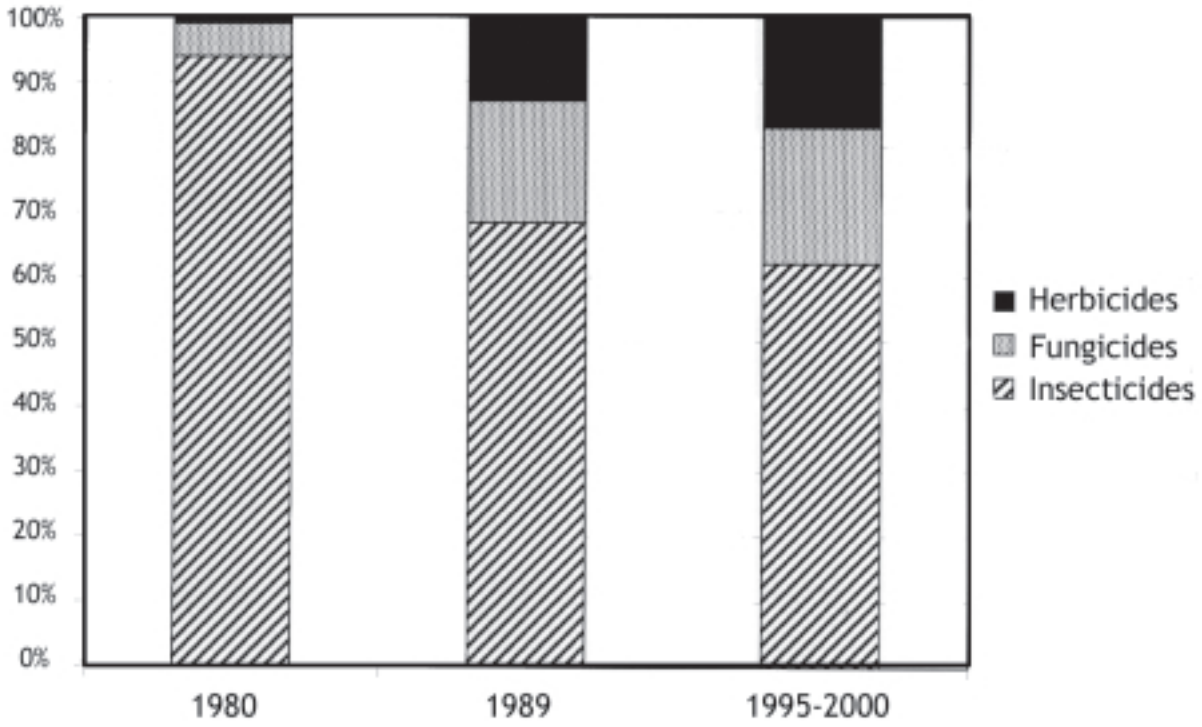
Over time, pesticides tend to create more pest problems than they solve, causing increased crop losses as well as health and environmental damage. While Chinese farmers bear the brunt of illnesses caused by the country's growing reliance on pesticides, the world's consumers are also at risk. The Chinese government has banned some of the worst pesticides, but overall use continues to climb. Efforts to reduce pesticide use or even ensure quality control have been undermined by conflicts of interest inherent in the agricultural extension and pesticide supervision systems. Government agencies have pursued a variety of schemes to promote the production of food with little to no pesticide residues, but this work affects only a small proportion of the total food supply. The Chinese government needs to take bold and decisive steps to free Chinese farmers from the pesticide treadmill and improve the safety of its food.

Potential WTO Implications

China's recent entry into the World Trade Organization (WTO) will pose new challenges and opportunities for food production, food security, and the Chinese family farm. Poor quality, high production costs, and limited processing capacity have put many Chinese agricultural products at a disadvantage compared with imports, which already had risen to $9.4 billion by 1999 ("China sees influx," 2000). WTO entry is likely to lead to a surge in cheap imports of wheat, maize, and soybeans, which could potentially throw millions of Chinese producers off the land. If domestic food production and rural incomes decline dramatically, however, the Chinese government is expected to increase investment in agricultural research and development to help farmers become more competitive (Huang, Rozelle & Zhang, 2000).

In terms of opportunities, WTO entry also may expand export potential for Chinese horticulture and livestock products, particularly if increased investment allows farmers to improve productivity and food quality. This expectation of exports could have health and

Figure 1. Types of Pesticides Used in China



Source: 1) Xiang R.J. and Kuang R.P. (2001) *Overview of pesticides issues in China.* Unpublished study, Kunming: Yunnan Entomological Society; 2) *Report on the status of the environment in China* (2000). Beijing State Environmental Protection Administration.

environmental benefits, since Chinese farmers face stricter enforcement of standards for maximum pesticide residue levels if they intend to export. In fact, the fear of export market rejection of their produce already is generating interest among some local government leaders in promoting schemes to reduce the use of the most toxic pesticides. For example, in 2001, new European Union (EU) regulations reduced pesticide tolerances for tea by 100 times, effectively excluding half of China's tea exports to the EU. This rejection caused more than $125 million in losses to farmers in Zhejiang. In response, local officials set up their own organic certification program for tea in order to recapture some of the EU market (Ma, 2001). As Chinese agriculture becomes more integrated into the global economy, China's pesticide residues are coming under greater international scrutiny, with potentially positive implications.

Pesticide Trends

China's problems with pesticide residues can be better understood by examining recent trends in Chinese pesticide production and use. China has become one of the world's largest producers and consumers of pesticides. Reliable statistics are difficult to find, but government sources report that pesticide production jumped from an estimated 230,000 tons (of active ingredient) in 1995 to 424,000 tons in 1999, with China exporting 147,000 tons of this total—an increase of more than 35 percent over the previous year (*AGROW*, 2000a). In 1999 pesticide imports were estimated at 48,000 tons (*AGROW*, 2000b). Chinese consumption of pesticides averaged 230,000 tons per year during the period 1995 to 2000 (*Report on status*, 2000). China Chemical International Consulting estimates Chinese demand for pesticides will reach 300,000 tons in 2005, and then climb to 350,000 tons in 2015 (AGROW, 2000a).

When China opened the door to foreign investment in its chemicals sector, multinational pesticide companies like AgrEvo, Bayer, DuPont, Mitsubishi, Monsanto, Novartis, Reilly Chemical, Rhone-Poulenc, Rohm and Hass Chemical, Rotam and Zeneca all moved in quickly.[1] These companies all have set up joint ventures and

foreign-owned enterprises in China to take advantage of a relatively cheap and unregulated location for pesticide production. Meanwhile, unauthorized Chinese pesticide companies have taken advantage of lax regulation to dump cheap, frequently counterfeit products onto the domestic market. Struggling to compete with these outlaw firms, China's established pesticide factories continue to churn out legal but highly toxic pesticides.

Pesticide use—which varies widely by region and farming system—is highest in China's wealthy, developed areas on the southeast coast, while poor areas, such as the northwest and southwest, use the least.[2] However, farmers in grain growing areas in the North China Plain who have been using pesticides for many years are increasing their applications in response to pests developing pesticide resistance. Pesticide use is highest in greenhouses, where the chemicals are applied at up to ten times the rate of application in fields, and often are mixed in lethal cocktails containing up to seven different pesticides (Kamp, 2002).

While consumption of insecticides exceeds that of herbicides and fungicides combined, herbicide use is growing quickly. In 2001, Chinese insecticide use increased by more than 10 percent over the previous year, while fungicide and herbicide use increased by 4.5 percent and 9.4 percent, respectively (Institute for Control of Agrochemicals, Ministry of Agriculture, 2001). (See Figure 1 for pesticide use trends since 1980)

Several factors have contributed to China's heavy reliance on pesticides. One is the government's historical role in promoting Green Revolution technologies and requiring farmers to produce high yields to ensure the country's food security. Although agricultural overproduction in recent years and China's entry into WTO have shifted the emphasis of government's food policy in many crops from quantity to quality, the legacy of pesticide overuse remains. Another factor explaining continued pesticide overuse is the widespread shift in crop type. When Chinese farmers regained some control over what crops they could grow under the economic reforms of the 1980s, many switched from grains to more pesticide-intensive fruits and vegetables and cash crops. Finally, as farm households began to earn more money by selling their produce in the markets and sending family members to work in the cities, substituting labor-saving herbicides and insecticides for hand-weeding and manual control of insects became a necessary and viable option.

Detrimental Impacts of Pesticides

Chemical Dependency

Like addictive drugs, pesticides can create initial benefits for the users. Pesticide sales agents and agricultural extension agents—who frequently have a personal financial stake in increasing sales—convince farmers to use ever more powerful and environmentally destructive chemicals to avoid crop losses. The result is a vicious cycle, with the toxic chemicals further eroding the farm ecosystem's natural resistance to pests and diseases. In the long run, pesticide dependence leads to increased crop losses, as well as health and environmental damage.

Many Chinese farmers abuse pesticides because agricultural extension agents have convinced them to abandon the traditional farming practices and have not taught ecological principles to guide the farmer's pest management. Most farmers know little about protecting the natural enemies of pests, such as predators and parasites. As a result, they often spray broad-spectrum pesticides, a practice that leads to secondary infestations of the original pest, because pests usually recover faster than their natural enemies. Broad-spectrum pesticide use also causes infestations of new pests that were previously kept in check by beneficial insects.

In the field, Chinese farmers often double or triple the dose of pesticides recommended by experts, either because they overestimate the potential crop losses (Huang et al., 2000) or because they believe the pesticides they are using may be fake (Hu et al., 1998). High levels of pesticide use inevitably cause pesticide resistance, as the stronger insects survive the spraying and give rise to the next generation of resistant pests, which can only be killed with even more toxic pesticides, if at all. By the late 1990s, many Chinese farmers already had reached the point of diminishing returns and were looking for ways to escape the pesticide treadmill. However, most of them lacked information about adverse effects of pesticides and alternative means of pest management.

Cotton farmers in the northwestern region of Xinjiang have paid the price of pesticide use and the resulting loss of natural enemies. In 2001 aphids and red spider mites attacked over one million hectares of cotton fields in the region. While drought and cold air coming from Siberia made the situation worse, the major cause of the severe pest outbreak was the use of highly toxic pesticides that killed beneficial insects ("China's biggest cotton zone," 2001). A local official in Shihezi City expected crop losses to climb to $85 million that year. See Box 1 for a case study of Hongxin Village illustrating more of the pitfalls of pesticide use in China.

Threats to Human and Ecological Health

Pesticide use also threatens human health in China. Experts estimate that 70 percent of pesticides used in

Box 1. A Survey of Hongxin Village—Ecological and Health Problems of Pesticide Use

In the mountainous Sichuan Province, two nongovernmental organizations—Center for Community Development Studies and the U.S.-based Pesticide Action Network North America (PANNA)—conducted a case study in Hongxin Village that illustrates the many problems of pesticide use in China (Lu and Hamburger, forthcoming). According to a survey of one hundred households taken in July 2001, pesticide and chemical fertilizer use in Hongxin increased rapidly and steadily between 1980 and 2000. Farmers in this small village began growing vegetables for sale on the free market in 1989. Initially, a market-oriented, chemical-dependent farming approach brought increased yields and profits. Farmers estimated that average annual incomes rose from 40 to 2000 Yuan between 1980 and 1990, while yearly pesticide costs rose from 10 to 100 Yuan per year during the same period. However, the pesticides also killed beneficial insects and farmers found themselves facing increasing numbers of pests that had previously been kept in check by predators and parasites. Particularly devastating was an infestation of a new vegetable pest, the leaf miner, which quickly became resistant to pesticides, forcing the farmers to switch to less profitable crops. Average farmer household income thus fell from a high of 4000 Yuan in 1995 to 800 Yuan in 2000, while pesticide expenses surged from five to fifty percent of farmers' income over the same period. Since ecological disruption and pesticide resistance had become severe, farmers in Hongxin taking the survey expressed interest in learning about ways to reduce pesticide use, but they had never received any training in alternative pest control methods.

The survey and study in Hongxin Village also revealed that many farmers had switched from highly toxic to less toxic pesticides over the last twenty years, but the use of highly toxic pesticides still was widespread. About 30 percent of the pesticides farmers in Hongxin were using at the time of the study fell within the "extremely or highly hazardous" classification as set by the World Health Organization. Yet, the farmers had a limited knowledge of how to reduce their exposure through the proper storage, handling, use, and disposal of pesticides. Although most farmers took at least one precaution—such as wearing gloves or a mask, tying a sheet of plastic around their waist while spraying, or washing their hands after spraying—these measures were minimally effective, as evidenced by the fact that many farmers had experienced skin irritation and dizziness after applying pesticides. Villagers reported that one man in the village had suffered from acute poisoning. In addition, easy access to these highly toxic materials had enabled six people in the village to use pesticides to commit suicide.

China are "highly toxic," accordingly to the Chinese government's classification system. Health effects are magnified when pesticides are used in ways that increase exposure, most notably when they are mixed by hand, applied using sprayers that allow pesticides to come into contact with the farmer's skin, or sprayed into the wind so they are inhaled. As is typical in most developing countries, most Chinese farmers lack protective clothing and equipment for pesticide application, because they are considered either too costly or uncomfortable to use during hot summers. Improper storage, handling, and disposal of pesticides not only contribute to direct exposure but also can lead to indirect exposure through contamination of drinking water and fish. Finally, the consumption of food containing high levels of residues can have immediate as well as long-term adverse affects on human health, particularly the health of children.

A small number of case studies provide some anecdotal evidence of the occupational health problems related to pesticides. In one case study that documented the health effects of pesticides, rice farmers in Zhejiang Province were interviewed and examined by a medical team (Huang et al., 2000). The tests measured levels of chemicals in the body that are known indicators of pesticide poisoning affecting various organs. The tests indicated pesticide poisoning of the liver, kidney and nerves in 22%, 23%, and 6% of farmers, respectively. There was a close relationship between pesticide use level and the level of liver function abnormality. Many of the farmers also had abnormalities in their blood. While eye problems, headaches, as well as skin effects and respiratory irritation from pesticides also were reported, farmers did not consider these problems important enough to see a doctor or take time off from work.

Aside from a small number of case studies, the health effects of China's excessive pesticide use are largely undocumented and existing reports contain widely varying estimates of annual poisonings and deaths. A

study published in 2000 reported that pesticide poisoning affected from 53,300 to more than 123,000 persons each year in China in the previous decade (Huang et al., 2000). The same study attributes about half of the poisonings to pesticide use in crop production. Moreover, in a "normal" year, about 300 to 500 Chinese farmers die due to improper use and overuse of pesticides in crop production. However, experts in Yunnan Province believe that this number is an underestimate, since over 100 farmers are killed each year by pesticide poisoning in Yunnan alone (Zhong, 2001). Another report estimates that pesticides accidentally kill approximately 10,000 people annually (Li et al., 1997). The statistics are complicated by the fact that many farmers, especially women, commit suicide by drinking pesticides. Chinese death statistics indicate that 250,000 people committed suicide each year during the 1990s, and drinking pesticide was the most common method ("Suicide by pesticide," 2001).

Pesticide residues in food also result in poisonings, but the number of Chinese consumers poisoned by pesticide residues is unknown. The National Product Quality Supervision, Detection and Quarantine Bureau summarized the results of tests of 181 vegetable samples from 23 Chinese cities and found that 47.5 percent of the samples exceeded the allowable levels of pesticide residues (*China Youth Daily*, 2001). Chronic effects of pesticides on the health of consumers are suspected, but little research has been done in this area.

Reliable statistics on the ecological effects of pesticide use in China are even harder to find. Pesticides, along with industrial pollution, have severely contaminated rivers and lakes, and threaten China's remaining biodiversity. In addition to toxic agricultural runoff, accidents also contaminate the environment—for example, a single boat accidentally dumped 50 tons of the pesticide methamidophos into Yangtze River on 19 June 2000 (Wu, 2000). Throughout China many farmers report having seen rivers once teeming with fish become barren over the last decade, while many economically valuable species of lake fish have become extinct (Becker, 2001).

CHINESE PESTICIDE LAWS, REGULATIONS, AND POLICIES

The Chinese government has an uneven record in regulating pesticides. Although it has banned some of the worst pesticides, overall use continues to climb. Efforts to reduce pesticide use or even ensure quality control have been undermined by conflicts of interest inherent in the agricultural extension and pesticide supervision systems. Attempts to ensure that qualified agents sell pesticides and to prevent the sale of food with excessive pesticide residue have been largely ineffective.

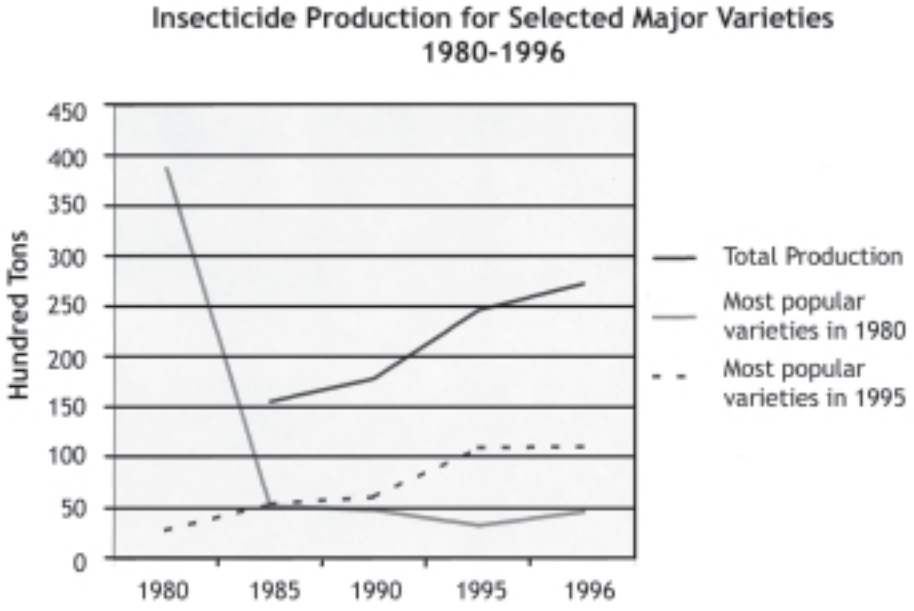
Pesticide Laws

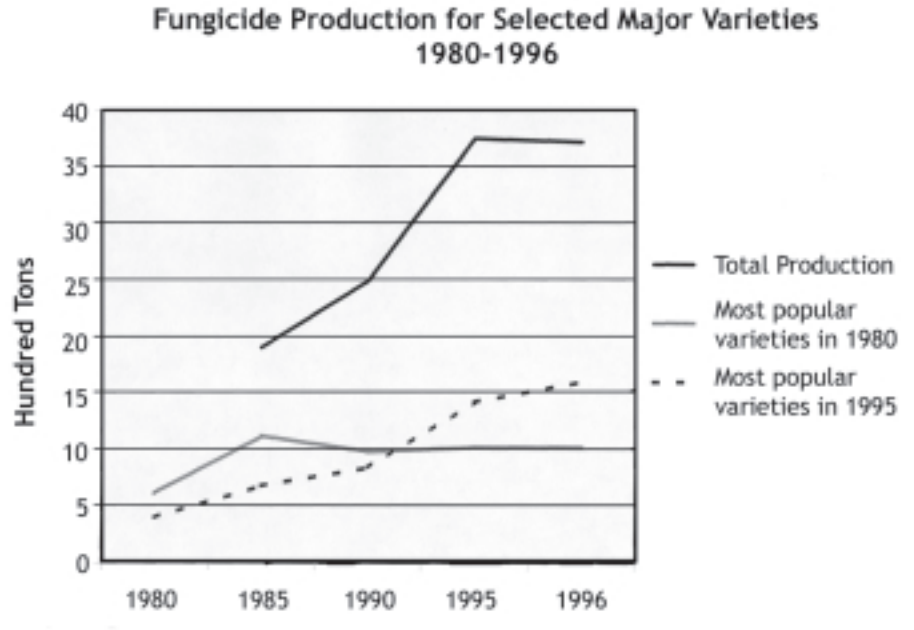
In the early 1980s, Chinese government officials became concerned about the high toxicity and high residue levels of pesticides used on crops and therefore formulated several policies and regulations on pesticide manufacture and use. The Ministry of Agriculture and Ministry of Public Health issued the Pesticide Use Safety Rule in June 1982. This rule classified pesticides into three types: high, moderate, and low toxicity. In order to protect public health, highly toxic pesticides were strictly banned for use on fruits, vegetables, and grain crops. In addition to national regulations, most provinces and some counties declared similar rules to ban the use of highly toxic pesticides on agricultural crops. The central government also banned the production of extremely hazardous organochlorine and organophosphate pesticides in 1983 and mandated the phase out of the highly toxic insecticide lindane in 1984 (Huang et al., 2000). DDT production was curtailed in 1983 and its use was limited to nonagricultural purposes, such as mosquito control. As of 2001, no products containing DDT were registered for use in China. However, in cases where highly toxic pesticides were banned for use on certain crops but the products themselves were not banned, it is still relatively easy for farmers to obtain and use them. In addition, banned and counterfeit pesticides continue to spread via the black market. In order to understand the impact of these bans on pesticide use, Box 2 illustrates the overall increase in pesticide (insecticides, fungicides, herbicides) production alongside the trends of the most commonly used pesticides in 1980 and 1995.[3]

The Pesticide Management Regulation of China, which became effective in 1997, addresses pesticide manufacture, use, and environmental impacts. Most provinces also have declared similar local regulations. Under these regulations, chemical and pesticide production is controlled by a licensing system. Manufacturers must obtain a production license from the Ministry of Chemical Industry and register at a provincial Institute for Control of Agrochemicals, and at the Technical Inspection Bureau. The National Institute for Control of Agrochemicals of the Ministry of Agriculture (ICAMA) oversees registration and quality control of pesticides. Pesticide management stations are charged with carrying out inspections at the county level, but not every county has established such a station yet (Hu et al., 1998). ICAMA has been working with experts from the German development agency GTZ on promoting quality control of pesticides and updating pesticide legislation at the local

Box 2. Pesticide Production Trends in China

Bans on persistent organochlorine pesticides and some extremely hazardous organophosphate pesticides in the early 1980s resulted in a dramatic decline in insecticide production between 1980 and 1985. Although insecticide production began to climb again between 1985 and 1996, the organochlorine pesticides DDT and lindane were gradually replaced by less persistent (but still highly toxic) alternatives. For example, methamidophos, one of the top three insecticides produced in 1995, is a potent nerve toxin that can cause muscle paralysis, among other symptoms (EXTOXNET, 2002). Fungicide use nearly doubled and herbicide use more than quadrupled between 1985 and 1996. The graphs illustrate the overall increase in pesticide (insecticides, fungicides, herbicides) production alongside the trends of the most commonly used pesticides in 1980 and 1995 (see footnote 3 for specific names of these top pesticides).





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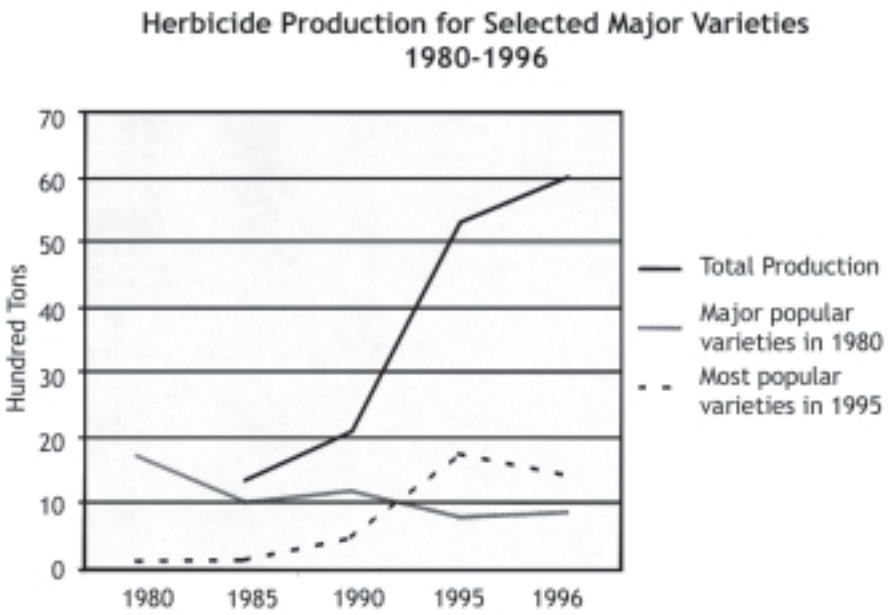

Source: Data for these graphs were drawn from various issues of the Ministry of Chemical Industry's *Chemical Industry Yearbook of China* cited in Huang et al., 2000.

level.

Regulations require that before a pesticide plant is set up, the provincial Environment Protection Bureau also must carry out an environmental impact assessment. A survey conducted in Hubei and Zhejiang provinces revealed that many factories, especially older ones, had not conducted the required environmental assessments (Hu et al., 1998). In addition, the older pesticide factories, which are often state-owned but no longer receiving government subsidies, often lack the funds to make the transition to producing less toxic pesticides and the government provides no incentives for them to do so (Hu et al., 1998). Pesticide producers actually face a financial disincentive to switch to new less toxic pesticides because if they do, they must pay patent fees (Meng, 2001).

The government also tries to regulate pesticide at the point of sale by requiring pesticide shops to meet certain qualifications. For example, they need: (1) a general trading license from the Industry, Commercial, and Administration Bureau; (2) a pesticide marketing certificate from the pesticide management station; and (3) a qualification certificate from the pesticide management station. Few shops have the latter two types of certificates, and many village-level shops are run by staff with no special training in pesticide use (Hu et al., 1998). These shops also are required to provide sufficient space for the safe storage of pesticides, but few shop managers are aware of these regulations (Hu et al., 1998).

Conflicts of Interest

Cutbacks in government funding for provincial and sub-provincial agencies have pressured government officials to raise money for their offices and salaries through alternate means. For example, agricultural extension agents generate most of their funds for offices and salaries through pesticides sales. While most of these officials are more qualified to sell pesticides than untrained shopkeepers in the villages, the system of drawing salaries from pesticide sales raises conflict of interest problems. For example, provincial Institutes for Control of Agrochemicals now are involved in marketing as well as inspecting pesticides (Hu et al., 1998). Similarly contradictory duties exist within county plant protection stations that are responsible for both selling pesticides and promoting ecologically based pest management. Agricultural extension agents, who work at these stations, have been encouraged to raise money through entrepreneurial activities such as selling pesticides.

The lack of comprehensive monitoring of pesticide residues on agricultural products, as well as weak enforcement of such regulations, mean there are no credible incentives for farmers and government grain

sellers to control pesticide residues. The Chinese government has established maximum residue levels for pesticides in food but, as mentioned above, these standards are regularly violated.

Two important steps toward reducing pesticide residues are to investigate the extent of the problem and publicize the information. Pesticide residues are normally measured using gas chromatography or high pressure liquid chromatography, which can cost from $60 to $180 per sample depending on the number of pesticides measured. A joint ICAMA and GTZ project has introduced a cheaper method called enzymatic fast detection, which costs less than one dollar per sample. Although this method can only detect common, highly toxic pesticides, such as organophosphates and carbamates, and is less sensitive, it is still useful for gathering some data on pesticide residues and raising awareness of the problem. Based on the positive experience of using the equipment in six pilot provinces, the Ministry of Agriculture bought 100 machines for use throughout China (Betz, 2002). Discussion of pesticide residues among the general public and in the press has increased greatly over the past three years, a good sign that consumer pressure for cleaner food is building. In fact, some of the larger markets in big cities like Beijing are starting to check food products for pesticide residues. However, even if these markets reject the products, it is likely that these agricultural products will be sold elsewhere rather than be destroyed or returned to their place of origin. Much greater accountability will have to be built into the food chain before farmers get a clear message that they will not be able to sell their food if pesticide residues contaminate it.

As in many areas of Chinese environmental management, pesticide laws and regulations are reasonably strong and thorough, but implementation is weak. The Chinese government will need to put more political muscle into reforming and strengthening systems and institutions and devote much greater financial and technical resources into enforcement if it intends to make real progress in controlling the production, sale, and use of high toxicity and high residue pesticides.

Promotion of Clean Food Production in China

The Chinese government has supplemented its efforts to control pesticide supply with attempts to reduce demand by promoting alternative farming methods and systems. The Ministry of Agriculture (MOA), the State Environmental Protection Administration (SEPA), and other government agencies have pursued a variety of marketing, technology transfer, and incentive schemes to promote the production of food with little to no pesticide residues. Some of this work has received technical and/or financial support from international organizations. Government agencies also have allowed and in some cases supported the work of Chinese and international nongovernmental groups that promote sustainable agriculture.

Green Food

MOA created the green food label in 1990. Leaders of MOA's Department of State Farms developed green food as a niche for food grown under strictly controlled chemical use (Thiers, 2000). The goal was to take advantage of the state farms' centralized control of production practices and relative isolation from industrial pollution sources to produce cleaner food.

The Green Food Development Center was set up to develop standards, certification, and administration for the label. With support from MOA and the State Council, green food development offices spread to many cities and counties in almost every province of China. Under this green food label initiative the China National Green Food Corporation was granted the right to export products directly instead of going through the foreign trade ministry (Thiers, 2000). Responding to the incentive of price premiums associated with exports, non-state farms began seeking to obtain the green food label. By the end of 1999, China had labeled 1,360 products from 742 enterprises as green food, with sales of $3.7 billion (Yunnan Entomological Society, 2002).

The Chinese green food system now has two levels: Grade A for food with pesticide residues that do not exceed allowable levels,[4] and Grade AA, which has become more similar to international organic standards over time, but still is not widely accepted abroad (Thiers, 2000). Acceptance of Grade AA green food as organic has been slow, mainly because of the lack of third party monitoring, which is required by recognized bodies such as the International Federation of Organic Agriculture Movements. Even the Grade A green food has a credibility problem within China, as there is no evidence that production practices or products are monitored regularly. Comparative research of over 1,000 products of the Green Food Development Center showed that the producers have problems guaranteeing low levels of pesticide residues, but the program is reducing pesticide use to some degree (Wu, 1999).

Organic Food

Export companies are largely responsible for developing approximately 200 Chinese organic products.

Most of these organic products are exported to Japan, Europe, and the United States, though some are sold in China's big cities, where specialized supermarkets now stock everything from organic soy sauce to lychees (Gilley, 2001).

Last year, the Chinese Organic Food Development Center (OFDC), which is affiliated with SEPA, began certifying farms based on the standards of the International Federation of Organic Agriculture Movements. OFDC products have met with some resistance in foreign markets because OFDC is not accredited according to the standards of the International Organization for Standardization (ISO Guide 65) and China does not yet have a national organic regulation. Some Chinese growers have sought to improve their access to foreign markets by working with internationally recognized organic certifiers, such as Organic Crop Improvement Association, Ecocert, and the German certifier BCS.

China's poor farmers in remote regions who could never afford to use pesticides in the first place may be in the best position to meet the country's growing demand for organic food. Their soils are usually uncontaminated by industrial and agrochemical pollution and these farmers often retain knowledge of traditional farming methods (such as crop rotation and intercropping) that naturally increase soil fertility and reduce pest infestations. The relatively clean soils of poor regions in western China may prove to be fertile ground for organic production, as China pursues a policy to "Develop the West." (*Editor's Note: See article by Elizabeth Economy in this volume for more information on the Develop the West campaign*)

On the other hand, poor farmers face the challenge of transporting their products from the remote areas where they live to urban markets where wealthy consumers will buy them. Also, poor farmers may not have the resources to undertake the intensive soil fertility management that organic farming requires. Therefore, farmers living closer to urban areas with ready access to markets and technical support may be even better placed to pursue organic farming, as long as their soils are not heavily contaminated. In addition, well-known production areas in highly developed regions in eastern China may choose to go organic to improve their reputations. For example, Guangdong—which has the highest per acre pesticide application of any province in China—has explicitly embraced the development of the organic farming sector in its new provincial agriculture plan.

As organic demand grows, so will the incentive for conversion from chemical-dependent Green Revolution techniques back to ecologically based farming systems. Organic conversion will be difficult because most communities have lost their traditional agricultural knowledge, and China has few experts or technical staff who can train farmers in organic agricultural practices. Nevertheless, some pioneers are forging ahead. For example, the Nanjing-based Organic Farming Development Project, which cooperates with experts from agricultural universities and local government, began re-introducing techniques such as intercropping, biological pest control, and green manure to farmers in Yuexi, Anhui Province in 1998 (Pennarz, 2000). Three years later, farmers from one of the villages in Yuexi organized China's first association of organic kiwi growers to provide technical support and jointly market their products. They have developed their own requirements and internal documentation system, and farmers who participated in the project since its inception have now received organic certification.

Integrated Pest Management

Even for farmers who do not go organic, economic and environmental gains from reduced pesticide use are well within reach. Studies of Chinese farmers who received training in ecologically based integrated pest management (IPM), have shown that these farmers developed an understanding of the rice ecosystem, and were able to use their knowledge to maintain yields and increase profits while reducing their use of pesticides (Mangan & Mangan, 1998).

China has received technical and financial support for IPM activities from the UN Food and Agriculture Organization (FAO) since 1988 (Kamp, 1999). At the national level this IPM program has been implemented through the MOA's Plant Protection Division of the National Agro-Technical Extension and Service Center. The Plant Protection Station of each Provincial Agriculture Bureau implements the program at the provincial level. While ten provinces were involved in the earlier phases of the program, six southern provinces are being supported in IPM activities as of 2001: Sichuan, Guangdong, Anhui, Zhejiang, Hunan, and Hubei. The participatory IPM programs in Sichuan Province have been particularly successful. (See Box 3)

NEW TECHNOLOGY AND INNOVATIVE PRACTICES

Sometimes simple changes in farming practices can enable farmers to drastically increase yields without using chemicals. For example, researchers in Yunnan Province found that intercropping sticky rice with standard rice varieties dramatically decreased the incidence of the fungal disease rice blast, allowing farmers to stop using fungicide

within two years. The authors of a study published in the journal *Nature* reported that blast severity on sticky rice averaged 20 percent in pure stands, or monocultures, but was reduced to 1 percent when sticky rice was dispersed in fields of standard rice in 1998, the first year of the experiment (Zhu et al., 2000). Evidently, planting a mixture of varieties reduces disease because plants susceptible to the disease are physically separated from each other. Highly susceptible sticky rice plants were planted in rows with several rows of disease-resistant standard rice in between. The standard rice serves as a barrier to the wind-blown fungal spores. The ongoing experiment covers 100,000 acres and involves tens of thousands of farmers in China.

In a similar success story, researchers helped poor farmers in Shandong and Anhui provinces increase sweet potato yields as much as 30 to 40 percent without additional fertilizers, pesticides, or genetic improvements. The crops are produced by extracting tiny bits of disease-free plant material from infected plants and re-growing them under sterile conditions. The resulting virus-free plants are then regenerated in greenhouses where they form small roots used to grow virus-free vine cuttings. Using this method, farmers in Shandong and Anhui provinces currently are growing about 30 million tons of virus-free sweet potatoes annually on 800,000 hectares (1.97 million acres). About 80 percent of the sweet potatoes grown in the two provinces are now derived from virus-free planting materials. The harvests from these 800,000 hectares capped a five-year growth period that added more than $550 million to China's farm economy (Fuglie et al., 1999).

Eco-Counties and Demonstration Areas

Beginning in the 1980s, MOA set up one hundred Eco-Counties (*shengtai xian*) across the country to encourage integrated agriculture, forestry, energy use and environmental protection in rural areas ("Eco-environmental protection," 2001). Developing green food can be an important step toward achieving sustainable development goals in these counties, which sometimes have greater access to training and other resources.

SEPA has a similar kind of program to promote ecological agriculture or environmentally friendly industry in 111 counties or county-level cities through its Eco Demonstration Area (EDA) program. While SEPA has traditionally focused on promoting cleaner production in urban industries, its mission expanded to include agriculture in 1998. The Ecological and Rural Environment Division of SEPA's Department of Nature Conservation is now responsible for promoting sustainable agriculture. Although the United Nations Environment Programme has recognized this EDA program for its environmental achievements (Hu, 1999), opportunities for scaling up the program are limited by the availability of subsidies.

Education and Advocacy Groups

A few Chinese nongovernmental organizations (NGOs) and research groups have begun conducting sustainable agriculture education and advocacy work, often with assistance from Chinese government or international supporters. For example, Rural Women Knowing All is a nonprofit group providing women farmers with training in the use of pesticides made from plants. The group is affiliated with the All-China Women's Federation and has received project support from the Ford Foundation.

Another important education and advocacy group is the Yunnan Entomological Society (YES), which has evolved from an academic exchange organization into an active promoter of pesticide reduction, biological control, and organic farming. YES, along with many NGO and government partners, is encouraging the Yunnan Provincial government to develop organic agriculture. YES also has set up a Web site containing pesticide information in Chinese and English and is conducting consumer outreach activities among student groups and women's organizations. Members of YES in early 2002 registered a new organization called the Pesticide Eco-Alternatives Center (PEAC). PEAC founders will recruit staff, volunteers, partners, and advisors from a broad range of organizations, including YES, student environmental groups, government agencies, consumer unions, women's federations, and hospitals. PEAC also will collaborate with Pesticide Action Networks of North America (PANNA) and Pesticide Action Network Asia-Pacific region. (*Editor's Note: See the NGO inventory in this issue of the China Environment Series for specific project descriptions*) YES has begun to establish a reputation for supplying hard-to-find information, such as pesticide residue standards in China and abroad and organic farming techniques. A few members of YES have formed a new group called Green Mountain Women that conducted educational outreach in 2002 to women on the need to protect their family's health by buying organic and green food. YES has received support from Global Greengrants Fund and Rockefeller Brothers Fund, and Green Mountain Women has received a grant from Global Fund for Women.

Two Hong Kong nongovernmental groups—Produce Green and Greenpeace—also are promoting sustainable agriculture in China. Produce Green is a small organic

Box 3. Farmer Field Schools—Creating Participatory IPM in Sichuan Province

The Sichuan Agriculture Department's Provincial Plant Protection Station has been promoting participatory integrated pest management (IPM) since 1989. The establishment of IPM in Sichuan is especially important because the large, fertile Sichuan Basin produces much of China's grain. IPM activities primarily have focused on rice, although a new project for oranges is now underway. Additionally, farmers and officials in the province are interested in developing IPM methods for vegetables. The Sichuan government's decision to provide political and financial support to the IPM effort has been a key to its success.

UN Food and Agriculture Organization (FAO) experts consider Sichuan's IPM program to be one of the best in China. The program utilizes the "farmer field school" approach, an innovative participatory learning process through which villagers apply critical thinking skills to agro-ecosystem analysis. Farmer field schools involve weekly meetings by a group of farmers. Instead of just listening to lectures and learning from textbooks, the farmers analyze the ecosystems in their rice fields and conduct experiments on pest-predator relationships and other farm-related issues. Research has shown that farmers exposed to this ecology-based paradigm of IPM learn and retain more than those who learn to base pesticide application decisions on economic thresholds (Mangan et al., 1998). While farmers trained in farmer field schools apply less pesticide to their crops, they experience no significant differences in yields compared with their counterparts trained in the economic threshold approach.

Graduates of a three-year IPM course in the Sichuan township of Tumen formed a community group to continue teaching farmers in their village about ecological pest management. They said that before the course, they had used highly toxic pesticides that caused health and ecological problems. Every year, two or three people would have to go to the hospital to be treated for pesticide poisoning. Several pigs died after eating fodder contaminated with pesticides. Moreover, the fish and frogs living in the rice paddies and irrigation ditches all died and bird populations declined. Now that the farmers have switched to less toxic pest management methods, no more poisoning incidents have been reported and frog and bird populations are on the rise.

Women farmers are a key target for IPM training courses, for they now comprise 70 percent of China's agricultural labor force because men have been leaving the countryside for jobs in urban areas. PANNA and the Center for Community Development Studies visited a farmer field school in Xinshi Township (Sichuan) where 25 women had learned how to identify pests and natural enemies and how to manage insect populations using *Bacillus thuringiensis* (*Bt*), a beneficial organism used in organic farming. After the course was over, the village agricultural technician tried to sell the people in the village a highly toxic insecticide. The women who had participated in the training course not only refused to buy it, but also convinced everyone in their village to switch to *Bt* instead. The programs in both Xinshi and Tumen townships show the potential for participatory IPM to empower farmers to achieve impressive reductions in the toxicity and frequency of pesticide use.

farm that teaches schoolchildren about how healthy food is grown. Greenpeace Hong Kong is leading a fight against the potential bio-piracy of Chinese soybeans as part of Greenpeace's international campaign against the use of genetically engineered crops.

POLICY OPTIONS

The Chinese government needs to take bold and decisive steps to control pesticide use, both to protect the health of its people and to safeguard the reputation of its growing agricultural exports. International pressure for public health and environmental protection, as well as global and domestic consumer demand for safer food are beginning to be reflected in government policy, but more intensive efforts are needed to free Chinese farmers from the pesticide treadmill. Some options include:

1. Strengthen and enforce regulations on pesticide production and use.

The Chinese government needs to consolidate authority for controlling pesticide production in one agency. China also needs stronger penalties for companies producing or selling pesticides that are not registered or have been banned. Current efforts to improve quality control of pesticides need to be continued and expanded. Local efforts to reduce sales of banned pesticides by fining local shops and closing down repeat offenders should be encouraged. Finally, turning poisonings resulting from violations of pesticide regulations into criminal offenses may help prevent unnecessary deaths in the future.[5]

2. Increase provincial support for sustainable agriculture programs and national policies, including integrated pest management, green food, and organic food.

Provincial governments should provide farmers with alternatives to pesticides by strengthening technical assistance in integrated pesticide management (IPM) and biological control. A prerequisite for any serious efforts to train plant protection staff and agricultural extensionists in promoting ecologically based IPM is to remove the conflict of interest inherent in allowing extensionists to profit from pesticide sales. This means more funds will be needed for government extension staff salaries. While the government may not be able to finance all agricultural extension functions, these responsibilities should not be handed over to multinational corporations, which are unaccountable to local governments. Other financing options for providing these services that have been developed in other countries need to be researched and adapted to conditions in China.

3. Fully fund pesticide residue monitoring programs for all food and raise farmer and consumer awareness of pesticide risks.

The government should continue and expand monitoring of pesticide residues and use the results to raise consumer awareness of health risks and create demand for clean food. Partnerships with consumer unions, women's federations, and schools can help the government spread information to both farmers and consumers about the effects of pesticides on the environment and people, as well as the need to eliminate unsafe pesticide practices and purchase healthy food.

4. Improve systems for monitoring food production to build consumer confidence in food labeled as safe.

Since analysis of pesticide residues as a guarantee of product integrity is too expensive, China needs to build up a reliable third party monitoring system for clean food production, such as international organic farming standards. While strengthening independent certification of crops would be challenging, such a move would help build consumer confidence in organic and other food labels.

5. Increase government funding for research on non-chemical pest management and prohibit government researchers from accepting research funds from pesticide companies.

The Chinese government needs to continue to invest in research on ecologically based, non-chemical solutions to pest problems. Public researchers should not be forced to cover their salaries by conducting research on pesticides with the support of private companies (a common problem in the United States as well). In addition, the government should ensure that the results of research and field trials undertaken at university and government institutes are made available to farmers. The programs meriting support are those that empower farmers and use the results of professional research as the basis of their own field trials.

6. Authorize the Ministry of Health to monitor pesticide poisoning and document the scope of the problem.

The government should authorize the Department of Occupational Health in the Ministry of Health to conduct research on the extent and severity of pesticide poisoning among farmers. Doctors and other health workers need to be trained to recognize the symptoms of pesticide poisoning.

7. The World Bank, Asian Development Bank, and other major donors should ensure their programs support sustainable agriculture and not pesticide company interests.

Multinational lending organizations such as the World Bank can work with experienced technical assistance providers (e.g., FAO and The Field Alliance[6]) to help the government extend IPM to poor regions of China where pesticide dependency is just beginning to take hold. IPM research and training also will be needed in wealthier regions where multilateral development projects are helping farmers grow new crops that are vulnerable to pests and diseases. Given the commitment to reducing reliance on pesticides embodied in its operational policy on pest management, the World Bank is in a good position to become a leading advocate of IPM in China. However, the World Bank's commitment to promoting IPM may be compromised by its growing closeness with multinational pesticide companies and its advocacy of shifting responsibility for agricultural extension from the public to the private sector. Experience in other parts of the developing world has shown that partnerships with pesticide companies, even when the companies volunteer to promote "safe use" of pesticides, usually leads to relatively high levels of pesticide use.

8. The U.S. government could promote more scientific exchanges and joint research projects.

The U.S. government could help support the adoption of alternatives to pesticides in China by sponsoring more scientific exchanges and joint research projects. U.S. scientists also have much to learn from their

Chinese colleagues in this area, and greater collaboration could help both countries make more rapid progress in identifying biological and other non-chemical means of managing pests.

CONCLUSION

The Chinese government needs to work harder and faster to halt the production and use of pesticides that endanger human health and the environment. The Chinese government should take great care in its selection of partners for promoting sustainable agriculture and eliminate any conflict of interest that may interfere with the objective to reduce reliance on pesticides. International NGOs and foundations, the World Bank and U.N. organizations, as well as the United States and other foreign governments can help by: (1) financing training in integrated pest management; (2) supporting NGOs that are building consumer demand for safe food; and (3) facilitating the development of a reliable monitoring system for organic food production. These and many other approaches discussed earlier in this paper can all contribute to helping China kick the pesticide habit.

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ENDNOTES

[1] In the past two years, Astra and Zeneca merged to form AstraZeneca, which joined Novartis to become Syngenta. AgrEvo merged with Rhone-Poulenc to become Aventis.

[2] Pesticide use is greater than 7 kilograms per hectare in Zhejiang, Shanghai, Fujian, and Guangdong. Pesticide use is less than 0.6 kilograms per hectare in Gansu, Xinjiang, Heilongjiang, and Inner Mongolia (Cai, 1999).

[3] *Top 4 insecticides in 1980*: 666 (Lindane), Didiwei (Dichlorvos), Leguo (Dimethoate), and DDT; *Top 3 insecticides 1995*: Jiaanlin (Methamidophos), Shachongshuang (Dimthypo), and Jiaji1605 (Parathionmethyl); *Top 3 fungicides in 1980*: Duojunling (Carbendazim), Jinggangmeisu (Validamycin A), and Yidaowenjing (MAFA); *Top 3 fungicides in 1995*: Duojunling (Carbendazim), Daishenmengxin (Mancozeb), and Yidaowenjing (MAFA); *Top 3 herbicides in 1980*: Wulufenna (Pentachlorophenol (PCP)), Chucaomi (Nitrofen), and 2,4-D; *Top 3 herbicides in 1995*: Dingcaoan (Butachlor), Yicaoan (Acetochlor), and 2,4-D

[4] The Ministry of Agriculture's Pesticide Use Rule for Green Food sets allowable levels for pesticide residues in these products.

[5] A recent case in which a man received a jail sentence after his use of a pesticide resulted in a child's death appears to be the first case in which an action resulting in pesticide poisoning has been punished as a crime (*Yunnan Information Daily*, 2001).

[6] The Field Alliance, a new organization in the region, has been initiated by FAO to replace the Intercountry Programme for IPM in Asia, staffed by former FAO or FAO-trained staff.

New Partners or Old Brothers? GONGOs in Transnational Environmental Advocacy in China

By Fengshi Wu

Chinese government organized nongovernmental organizations (GONGOs) have been viewed by most China scholars and international agencies simply as extended organs of the government. The GONGO sector in China—particularly in the environmental sphere—is quite diverse in terms of political independence and strength. Moreover, GONGOs are distinctive from the government and NGOs in that they straddle and sometimes bridge the worlds of governmental agencies and NGOs. In this paper, seven brief case studies illustrate the Chinese government's rationales in fostering environmental GONGOs and how in the 1990s these GONGOs developed in ways unforeseen by the government. Specifically, GONGOs have obtained some organizational autonomy from state control and some green GONGOs have opted to cooperate with local environmental NGOs in China. Access to international environmental communities and building organizational capacity are two factors that have contributed most to the increase in GONGO autonomy.

The China Green Light project is a joint initiative by the Chinese State Economic and Trade Commission, UN Development Programme (UNDP), and Global Environment Facility (GEF). All three partners regard this project as an example of "best practice in international cooperation," exceptional in that it enabled China to successfully adopt new energy-efficiency technology in a short period of time.[1] The Beijing Energy Efficiency Center (BECon), registered as nonprofit secondary governmental research institute under the State Development Planning Commission, has played a crucial role in the initiation and implementation of this project.

After participating in seminars at the 1995 UN Women's Conference in Beijing, several officials in the Shaanxi Provincial Women's Federation were inspired to initiate some informal environmental protection activities during their spare time. Their mobilization of stay-at-home mothers to undertake community environmental education work led to the creation of the Shaanxi Mothers Environmental Volunteers Association (MEVA). The reputation of this group has spread well beyond Xi'an and key members of the association have been invited to World Bank seminars and other international meetings organized by the Professional Association for China's Environment, an NGO based in Washington, DC.

Sponsored by the Chinese Aid Committee for the Culturally Disadvantaged and National Working Commission for Children, activists at the Hand-in-Hand Earth Village (an organization affiliated with the Children's Newspaper) have been working to build up hands-on environmental education facilities and activities in grade schools in Beijing and poverty-afflicted areas around China. Hand-in-Hand received two major environment awards funded by international organizations—the Ford Motor Environmental Protection Award (Ford Motor Company Fund) in 2000 and the Earth Award (Friends of the Earth, Hong Kong) in 2001.

Despite differences in the scope and substance of their successful environmental work, BECon, MEVA, and Hand-in-Hand all can be categorized as a type of organization distinctive from other governmental agencies and societal groups in China—government organized nongovernmental organizations (GONGOs). GONGOs have been viewed by most China scholars and international environmental organizations simply as extended organs of the government. Some China watchers have even inaccurately categorized GONGOs as genuine independent grassroots nongovernmental organizations (NGOs). The GONGO sector in China is quite diverse in terms of political independence and strength, but they are distinctive from the government and NGOs in that they straddle and sometimes bridge the worlds of governmental agencies and NGOs.

Within the environmental sphere in particular, as illustrated by the above examples, many GONGOs are building their capacity through partnerships with international organizations. Moreover, some environmental GONGOs are supporting the

development of a stronger independent green civil society in China. Are they new partners for transnational advocacy NGOs to work with to solve environmental problems in China? Or just old Communist brothers wearing new hats? More information and analysis of the GONGO sector are needed for the international environmental community to establish more sustainable working relationships in China.

Decentralization of administrative and financial power within the government sphere and the opening of China to the world are reforms initiated by Deng Xiaoping that created political and social space for dramatic changes in state-society relations. Most striking has been the formation of many new independent grassroots social organizations in the areas of health, environment, women, elderly, and disabilities.

This changing political landscape also has led to a quiet proliferation of new environmental organizations from within the government itself. Over the past 20 years, a great number of multilateral organizations, transnational environmental NGOs, and official development assistance agencies have been supplying Chinese governmental agencies, the small, yet growing, number of grassroots green NGOs, and environmental GONGOs with funding, information, and technical support. The growing environmental advocacy networks between international organizations and Chinese NGOs and GONGOs have resulted in innovative environmental activities ranging from national policies on greenhouse gas emission control to biogas utilization demonstration projects, from pesticide education in Yunnan to Tibetan antelope anti-poaching campaigns. Little comparative research has been done on the structures and complex patterns of this transnational cooperation with Chinese GONGOs. To fill this gap, this paper examines a group of newly established environmental GONGOs in China.

To understand the significance of these new types of GONGOs, I begin by reviewing theories of two typical views of Chinese GONGOs and then propose a middle-ground perspective on the topic. In the next section I introduce the variety of roles played by GONGOs in China's environmental politics by examining how they are situated in national and local policymaking circles and transnational NGO advocacy partnerships. This is followed by seven brief case studies that help to illustrate the Chinese government's rationales in fostering environmental GONGOs and how in the 1990s these GONGOs developed in ways unforeseen by the government. Specifically, GONGOs have obtained some organizational autonomy from state control and some green GONGOs have opted to cooperate with local environmental organizations in China. Access to international environment communities and building of organizational capacity has contributed most to the increase in GONGO autonomy. In my research I have found that GONGOs with access to international resources and the means and motivation to strengthen their organization's capacity have become more supportive of the formation of a green civil society in China than GONGOs with less autonomy from the government.

WHAT IS A CHINESE GONGO?

There is no single clear-cut law regulating various types of GONGOs and other quasi-governmental entities in China.[2] The core criteria differentiating a GONGO from a genuine independent societal group is that the initiative to establish a GONGO is taken by a government agency or institution. An important distinction between GONGOs and government agencies is that GONGOs do not implement projects directly through formal administrative systems but instead function more as research centers or consultants for government agencies. The GONGO sector is very diverse in terms of legal status, policy influences, amount of access to local organizations, and access to international resources (e.g., funding, partnerships, and information). Even the official names to describe them vary. Most GONGOs are registered as *social organizations* (*shehui tuanti*) or *affiliated units* (*guakao danwei*) at the Ministry of Civil Affairs and are professionally sponsored by a governmental agency. However, not all legally registered social organizations in China are GONGOs, some are genuine NGOs.[3] Some of the *public enterprises* (*shiye danwei*), *semi-affiliated units* (*guapai danwei*), and *double-governed units* (*shuangchong guanli danwei*) are operating under the same rules as GONGOs. [4] Due to the difficulty of registering as a formal GONGO, some organizations are registered under existing GONGOs as secondary entities. Notably, the number of secondary GONGOs has grown rapidly in the past few years. To add to the confusion in classification, some of these secondary GONGOs function as independent NGOs, while others maintain close links with a government agency.

Bottom-Up Perspective

There is an active debate within recent China policy and political studies literature as to whether the growth of autonomous societal forces in China is a grassroots, bottom-up process or is led by the state.[5] GONGOs are defined and analyzed differently under these two perspectives. The bottom-up perspective emphasizes the independent power within civil society to mobilize

without (and sometimes against) the control of the state. Utilizing this perspective in an analysis of mass protests and grassroots resistance in China, Elizabeth Perry and Mark Selden suggest that independent social forces have been growing in the latter half of the 1990s.[6] Tony Saich goes further claiming that emerging civil society organizations are limiting the state's ability to penetrate society. [7]

The depth of the solidarity that exists among the protesters observed by Perry and Selden and the NGOs discussed by Saich, however, should be questioned. Moreover, Chinese social and NGO activists are not always accountable to their constituencies. The lack of solidarity and accountability raise questions of the actual extent of civil society development in China. Even within the environmental field in which NGOs and activists have had some of their most visible achievements and greatest influence on policymaking and public education, it is still too early to conclude there is a strong group identity within the green community.[8] While there is a growing green civil society in China made up of NGOs and individual activists, scholars often overlook another force, namely GONGOs that also are contributing to the growth of civil society in China. Additionally, some civil society researchers inaccurately categorize Chinese quasi-governmental organizations, such as GONGOs, as independent NGOs.[9]

Top-Down/State-Led Perspective

Civil society development in China also is analyzed as a state-led phenomenon. This perspective argues that over the past several decades the Chinese government and Communist Party have created thousands of organizations—GONGOs—at different administrative levels to serve as support mechanisms for governmental and party structures. Many China analysts have dubbed GONGOs as a form of state or socialist corporatism, in which mass social organizations were created between the state and society to communicate the rationale of government and party policies to the public.[10] In other words GONGOs were established to shape interest group opinions and not to represent societal interests or enable individuals to lobby or act against the state. Thus, GONGOs are seen as organic parts of the government structure connected by a variety of financial, personnel, and operational ties.

An examination of recently established environmental GONGOs in China challenges this state-led model. The major administrative reform of the central and provincial governments in 1998 triggered a boom in the number of GONGOs. These GONGOs were not created simply to serve as arms of the government, but rather to absorb governmental officials who were laid off during this reform. On 13 August 2000, the Central Communist Party and the State Council both declared principles and timelines for the reform of public enterprises (*shiye danwei*), which compose a large share of the GONGO sector. A central issue was to urge public enterprises to be more market-oriented. Since 1998 the government and party leadership has been pushing GONGOs to become financially self-sufficient and partially separate from their affiliate government agencies. It is well known among national-level GONGO leaders that in one to three years the budget coming from the government will be slashed to zero.[11] In 2002, a new tentative regulation may be passed for nonprofit research institutions as well. The new regulation could adopt different financial, personnel, and organizational requirements than the 1998 amended Regulation of Social Organizations. Current legislation requires a strict two-step registration with governmental agencies for all GONGOs.[12] The pending legislative reform could relax this two-step requirement, which would mean new GONGOs would be easier to create and less closely tied with government agencies.

These looming changes have led those running GONGOs to reevaluate their role in society. Although the state initially established GONGOs primarily to: (1) receive assistance from multilateral, bilateral or international nongovernmental organizations; (2) strengthen technology and information support; or (3) solve new problems, many GONGOs are now developing their own organizational missions and capacities while some even opt to promote NGO development.

A Middle-Ground Perspective

To understand the rapidly changing role played by GONGOs in current environmental politics in China, researchers need to examine the distinctive goals and motivation of the techno-politicians (also known as tehnocrats) who lead and make up the staff of these GONGOs. The techno-politicians in GONGOs are situated in between the state and society, and as a result they can influence the formation of new collective identities and political coalitions.[13] Elizabeth Economy's studies on China's environmental diplomacy and compliance with international agreements revealed a dual policy-generating mechanism at work within the Chinese government—the formal institutional side and the informal (but increasingly structured) side in which techno-politicians play a major role. Economy's insights into the informal impacts of individual officials on environmental diplomacy provide a new perspective to

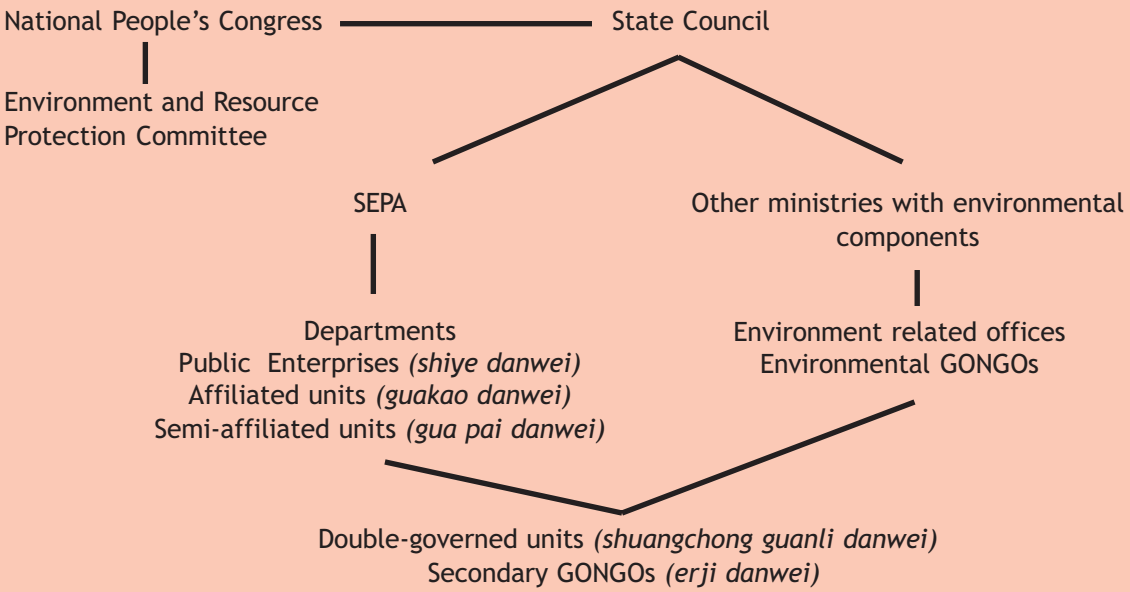
examine the potential power of leaders and staff within GONGOs.[14] Instead of a top-down or bottom-up analysis we need to adopt a middle-ground transformation model focusing on agents within political structures to capture how these GONGOs are empowered and motivated to change their role.

Environmental GONGOs have mushroomed within the national and provincial administrative bodies and attracted numerous retired (or nearly retired) high-level officials, environmental scientists, university scholars, respected practitioners, social celebrities, and international experts as leaders and members. This is especially the case since the administrative reforms of 1998. Because of the less restrictive institutional structure, leaders and staff in GONGOs can enjoy considerable leeway and take full advantage of their expertise, personal connections, and management innovations. GONGOs are therefore becoming a more important, non-state arena for China's environmental politics. Thus, this paper challenges the conventional top-down and bottom-up understanding of GONGOs and highlights the growing independence and diverse roles GONGOs play in linking external and internal actors in China's environment policymaking.

RETHINKING GONGOS IN CHINA'S ENVIRONMENTAL POLITICS

Although there is little literature on Chinese environmental GONGOs, they are pervasive at both national and local levels of environmental policymaking. (See Figure 1) The first national environmental GONGO, the China Environment Science Association (CESA), was founded in 1979, even before the National Environmental Protection Agency (NEPA—now elevated to the ministry level and known as the State Environmental Protection Administration, SEPA) was granted independent status from the Ministry of Construction in 1984. At the national level, currently, there are three major GONGOs under SEPA: (1) CESA, (2) China Environment Protection Industry Association, and (3) China Environment Fund. Because of the comprehensive nature of environmental issues there are many environment-related offices and GONGOs under the State Planning Commission as well as several other state ministries. In the field of energy efficiency, for example, the State Development Planning Commission oversees the Renewable Energy Center GONGO. Energy GONGOs under the State Economic and Trade Commission (SETC) include: (1) Chinese Renewable Energy Industry

Figure 1. GONGOs in the Chinese Environmental Administrative Structure (National Level)



Sources: *Chinese Environment Protection Institutions and Corporations Index*. (1996); and personal interviews. There are 22 public enterprises and 7 affiliated units under SEPA. In addition there are 30 semi-affiliated and 10 double-affiliated units under SEPA.

Association (CREIA), (2) Energy Saving Center, and (3) China Association of Resources Comprehensive Utilization.

There are many quasi-governmental units functioning as environmental GONGOs that also need to be included in a comprehensive analysis of national-level environmental GONGOs. Examples include:

- The China Environment Science Institute, whose members have presented themselves as nongovernmental representatives at international events and training workshops;[15]
- The Center for Environmental Education and Communication under SEPA has been implementing projects, hosting environmental scientists from German NGOs, and networking with international organizations; and,
- The Beijing Energy Efficiency Center is a secondary GONGO under SETC, which has played an important role in developing energy conservation targets and shaping national legislation and plans.

In an almost mirror-like structure, at the provincial level there are three major categories of GONGOs: those that (1) facilitate the interaction between the provincial Environmental Protection Bureaus (EPB) and local communities; (2) work with professional environment groups (in science and technology); or (3) cooperate with environmental technology or energy-efficiency corporations. Some publication and education centers under EPBs also have been moving toward a GONGO working style since the 1990s in order to obtain project contracts and build up more local connections.[16]

Environmental GONGOs are performing a variety of supportive functions at both national and provincial levels. GONGOs have their own expertise and are able to contribute to policymaking on particular issues. While they can take advantage of the existing administrative system, they do not have real power over government agencies. Instead, they need to foster their own cooperative working relationships with government agencies, research institutes, and NGOs. Within China's GONGO sector, environmental GONGOs are among the most active in forming transnational advocacy networks across China's

Table 1. Estimates of Transnational Environmental NGO Partnerships in China

Sources	Total Number of Transnational NGOs Working in China	Central Government Partners	Local Government Partners	NGO Partners	GONGO Partners
China Environment Series 3 & 4 Inventories [a]	28	13	15	9	17
China Environment Series 5 Inventory [a]	36	12	21	15	20
China Development Brief [b] and interviews	15	4	8	6	6

[a] "The Inventory of Environmental Work in China." *China Environment Series*: Issue 3 (2000), Issue 4 (2001), and Issue 5 (2002). Washington, DC:Woodrow Wilson Center.
[b] *China Development Brief*. (2000). *Directory of International NGOs Supporting Work in China*. Hong Kong: China Development Research Services and author interviews with Chinese government, NGO, and GONGO representatives.

borders. Table 1 summarizes transnational environmental NGO partnerships in China from 2000 to 2002 based on the *China Environment Series* "Inventory for Environmental Work in China," "Directory of International NGOs Supporting Work in China" published by the *China Development Brief*, and personal interviews with transnational NGOs and Chinese GONGOs. These data indicate GONGOs are among the most popular partners, second only to governmental agencies, for international environmental NGOs working in China.

In order to better understand the role GONGOs play in environmental protection in China, and their interactions with the state, transnational NGOs, and local communities, the following section will examine seven national-level GONGOs. Local GONGO politics, while important, are not addressed in this paper.

STATE RATIONALES FOR ESTABLISHING ENVIRONMENTAL GONGOS

The formation and development of seven environmental GONGOs are examined in order to shed light on why they were created by the Chinese government, and to understand the growing autonomy and increasing capacity of the GONGO sector in China. (See Table 2) Even though these seven GONGOs represent only a small portion of all environmental GONGOs in China, they demonstrate the diversity of the sector, which includes foundations, education centers, research institutes, and industry associations. These seven (six of which were established in the 1990s) are among the most active and influential environmental GONGOs because most were created in part by international organizations and all have taken advantage of international partnerships to achieve and expand their missions. These cases strongly suggest that the Chinese central government creates environmental GONGOs to fulfill specific goals, and not to channel and co-opt diverse societal interests, as argued by socialist corporatism theorists. The multiple goals of the Chinese government for creating environmental GONGOs are discussed below.

1) Reacting to the Internationalization of Environmental Protection

The China Environmental Science Association (CESA) was founded in 1979 as a leading consulting team for national policymakers after the deep frustration the Chinese delegation encountered during the 1972 Stockholm UN Conference on the Human Environment. Prime Minister Zhou Enlai, who headed the Chinese delegation to Stockholm, took the initiative to organize two national environmental meetings after the UN conference. These meetings led the Chinese leadership to: (1) create a National Environmental Protection Agency; (2) initiate national environmental legislation, and—of central interest to this paper; (3) establish CESA, which was set up to cope with the growing internationalization of environmental management and protection.

Since the late 1980s, in response to domestic environmental degradation and natural disasters, new global environmental problems, and the need to comply with a growing number of international environmental regimes, the Chinese government established other environmental GONGOs besides CESA. For example, during the preparations for the 1992 UN Conference on Environment and Development in Rio de Janeiro (Rio Earth Summit), the Ministry of Science and Technology created the Chinese Society for Sustainable Development (CSSD). Another key GONGO created in 1993 right after the Rio Earth Summit was the China Environment Protection Fund (CEPF). Since its creation Qu Geping, the former Minister of the National Environmental Protection Agency and the first Chinese representative to the UN Environmental Programme (UNEP), has chaired this GONGO. Unlike private foundations, CEPF cooperates with SEPA, the National Youth League Committee, and other governmental agencies in order to promote environmental awareness and education as a means of building up the state's reputation and capacity in environmental protection. To support its work, CEPF actually collects funds from (instead of providing funds to) social organizations and individuals.

2) Obtaining International Assistance

While opening its doors to the global market, the Chinese government also created opportunities for official assistance agencies, private foundations, development banks, and NGOs to work in China. In the environmental sphere, assistance strategies of both donors of official development assistance (ODA) and NGO communities have shifted toward a more grassroots orientation. This shift is due to concerns about the lack of transparency of Chinese government partners and lessons learned from some less-than-rewarding experiences with big government-led construction projects in other parts of the developing world over the past two decades.[17] Thus, in order to obtain more international grants and technical assistance for environmental projects, the Chinese government often must guarantee the participation of non-state organizations in the project's implementation. Environmental GONGOs have been set up in response

Table 2. Cases of National-level Environmental GONGOs

Full name of GONGOs	Abbreviation	Date Established and Governmental Affiliation
China Environmental Science Association	CESA	1979, State Environmental Protection Administration (SEPA)
China Wildlife Conservation Association	CWCA	1983, Ministry of Forestry (now the State Forestry Bureau)
Chinese Society for Sustainable Development	CSSD	1992, Ministry of Science and Technology
China Environment Protection Fund	CEPF	1993, NEPA (now SEPA)
Beijing Energy Efficiency Center	BECon	1993, Resource Institute of the State Development Planning Commission (SDPC)
Center for Environmental Education and Communication	CEEC	1996, SEPA
Chinese Renewable Energy Industry Association	CREIA	1999, State Economic Trade Commission (SETC), SEPA and UNEP

to this kind of external pressure. In the early 1980s, the great pandas in China were threatened by a sudden bamboo shortage in the southwestern provinces. In response, the Chinese government created the China Wildlife Conservation Association (CWCA) under the supervision of the Ministry of Forestry (now the State Forestry Bureau, SFB) to accept international donations from private foundations and NGOs to save the great panda.[18]

3) Benefiting from International Expertise

In 1993, the Beijing Energy Efficiency Center (BECon) was founded as a secondary GONGO under the Resource Institute of SDPC. The main leaders of this organization included Zhou Dadi, director of the Resource Institute, and William Chandler, director of Advanced International Studies at U.S. Pacific Northwest National Laboratory.[19] BECon is a hybrid organization in terms of its indirect affiliation with SDPC and its relatively high autonomy in decision-making. It was formed as a secondary GONGO because of the push from Chandler, whose vision for BECon grew out of his experience directing the establishment of five independent energy-efficiency centers in former communist countries (Ukraine, Romania, Czech Republic, Russia, and Poland).

Similarly, the Chinese Renewable Energy Industry Association (CREIA) was created jointly by international and Chinese government agencies in 1999 to implement the five-year *Capacity Building for the Rapid Commercialization of Renewable Energy in China Project*. This project was initiated by SETC, SEPA, and UNDP, and co-funded by UNDP, UNEP, GEF, and the Australian and Dutch governments. Despite the establishment of a government project office under SETC, the project partners simultaneously created CREIA as a GONGO to explore market opportunities for Chinese renewable energy enterprises and introduce foreign technical and financial measures. (*Editor's Note: For more on CREIA see the 19 July 2001 meeting summary in this issue of the China Environment Series*)

4) Absorbing Former Government Employees

Since the Jiang Zemin-Zhu Rongji regime was consolidated in 1996, the central government has been undergoing extensive administrative reform. Many GONGOs are being created to absorb former governmental officials and staff. Most key officials of GONGOs previously worked for the central government and were appointed or recommended by the government to lead these GONGOs. In addition, GONGOs will form

a consultation committee including former or current national and provincial governmental officials. Most retired officials or former government employees are grateful to take GONGO positions as compensation for demotion or job loss. As an example, China Environmental Science Association (CESA) is composed of the country's most influential environmental experts and techno-politicians. Currently, there are over 3,000 individual members and 16 full-time staff at CESA's national office, all of whom are still considered government employees. Moreover, CESA's Standing Committee (the consultation body) has 25 members, 8 of whom are from central government ministries. This is also the case with China Society for Sustainable Development (CSSD), China Wildlife Conservation Association (CWCA), and China Environment Protection Fund (CEPF). CSSD has a huge consulting body made up of political elites and most of its staff members keep their official government rank and benefits.[20]

It is because of the growing self-capacity and support from the outside that environmental GONGOs have come to realize their own organizational missions.

5) Requiring New Services

The Center for Environmental Education and Communication (CEEC) at SEPA is a good example of the trend that the government is creating new GONGOs to supply new technology services and alleviate fiscal burdens on state coffers. CEEC was officially founded in 1996 with the main purpose of expanding public education activities and providing information to SEPA. Their work has included organizing national campaigns for improving environmental curriculum in schools, setting up a specialized public library in environmental research, and creating a comprehensive Web site for SEPA. With a flexible entity such as CEEC, SEPA can maintain its control over public environmental education and propaganda without having to pay all the expenses.

GONGO Autonomy: Expanding beyond the State's Intention

Though all GONGOs have been created by the state to fulfill one or more particular purpose, the evolution in their organizational ideologies, the scope of their activities, and the recognition they have obtained from both domestic and international organizations have gone far beyond what the Chinese government ever intended. In this paper, I define GONGO autonomy not only by their independent legal and partially independent financial status, but also their expanding outreach into both local and international communities.[21]

After the 1995 UN Conference on Women in Beijing, for example, the Chinese Environmental Science Association (CESA) became very active in developing women environmental networks. Together with UNDP, CESA implemented a three-year program titled *Women in China's Sustainable Development*. The program deals with capacity building and sustainable development education among female political leaders and entrepreneurs at provincial and municipal levels. Recently, the China Environment Protection Fund (CEPF) has become friendly toward grassroots environmental NGOs, helping these small groups gain public recognition and trust. For example, CEPF gives annual awards to individuals who have made extraordinary contributions to China's environment. CEPF also has been active in international events such as the UN's NGO Millennia Forum in 2000. These activities, in turn, effectively have extended CEPF's reach into both domestic and international green communities.

The significant outreach into international and grassroots communities is beyond the mission SEPA set for CESA and CEPF. Both of these GONGOs have offices within SEPA buildings, which helps explain their tendency to follow SEPA's policy lines. While their organizational agendas are still shaped heavily by SEPA, in recent years CESA and CEPF have become increasingly aware of the strength and merits of building working relationships with international and local groups other than their founding government agency.

Some GONGOs, such as BECon and the Chinese Renewable Energy Industry Association (CREIA), have become more independent in decision-making and project implementation, partially because external forces were involved in these organizations from the beginning. Compared to other cases in this study, BECon has always enjoyed higher levels of autonomy in its own priority setting and partnerships than other environmental GONGOs. BECon is an example of a GONGO that has been granted more autonomy as a result of its effective

work—such as introducing new energy-efficiency technology and management techniques that have been used to shape laws and standards, which China desperately needs to guarantee continued energy security.

BECon's ongoing projects include providing SDPC with policy recommendations for formulating China's Tenth Five-Year Plan (2001-2005) and the national Medium to Long Term Strategy on energy efficiency. BECon also partners with the World Bank and GEF for projects on energy conservation promotion, barrier removal for efficiency lights products and systems, and training for various Chinese energy-efficiency organizations to apply for international funds, and many GEF activities. Because BECon's name is well recognized among energy-efficiency communities beyond China, it plays an active role in helping provincial and local energy-efficiency institutions obtain more assistance from international organizations.

As an exceptional GONGO in China, the BECon case illustrates that with advanced expertise and continuous support from the international community, it is possible for GONGOs to develop organizational capacity beyond the state's original design.

The state's original idea behind the establishment of CREIA was to: (1) take advantage of international capital to hasten the development of renewable energy industries; (2) promote the market for renewable energy products; and (3) encourage more corporations to join this market. CREIA's activities, however, have been expanded to include influencing national and provincial renewable energy policies, and building cooperative networks with GEF, the World Bank, the Packard Foundation, and other international donors.[22] With its leading role in setting professional standards and norms, and its networks with domestic industries and international actors, it is very possible CREIA will play a crucial role in the self-regulation and monitoring of the renewable energy sector. In a way, CREIA is creating a new interest group in society, rather than solely representing the government's views.

Like BECon and CREIA, the Center for Environmental Education and Communication (CEEC) has achieved more than the state's expectations in the field of promoting public environmental awareness. Its major achievements include: (1) the establishment of the Mobil China Environmental Education Fund; (2) the posting of public awareness billboards in cities; and (3) the creation of the official China environment information Web site.[23] Similarly, CEEC also has helped disseminate information on China's environmental status, social reactions to environmental regulations, and challenges resulting from China's integration into global environmental governance structures to a broader audience. Members of CEEC have been ceaselessly meeting environmental NGOs in Europe and North America, and actively participating in NGO activities sponsored by the World Bank and other international institutions. The newsletters published by CEEC have been widely read among policymakers and practitioners inside and outside China.[24]

When examining GONGO connections with societal groups or international organizations it is not always the case that these efforts stem from a GONGO's intention to become independent. The two cases of China Society for Sustainable Development (CSSD) and China Wildlife Conservation Association (CWCA) share a lot of characteristics in terms of their presence at international meetings and partnerships with inter-governmental organizations. Both of these GONGOs benefit from being closely connected with SEPA and sometimes carry the state views to international NGO gatherings. On many occasions, they are sent by the Chinese government to participate in international NGO meetings to collect information. Nevertheless, CWCA also has been partnering with many transnational NGOs, including International Fund for Animal Welfare, International Snow Leopard Trust, and Wildlife Conservation Society on specific projects. While these partnerships with NGOs are not yet fully developed, they can be regarded as signs that CWCA is reaching out to international green groups. Indeed, it is too early to argue that CWCA has abandoned its ties to the government in favor of outside partners.

Exploring Keys to GONGO Autonomy

GONGOs are gaining greater organizational autonomy. Elements most critical to increasing GONGO autonomy are their capacity-building abilities and access to international sources. It is because of the growing self-capacity and support from the outside that environmental GONGOs have come to realize their own organizational missions, negotiate with the state for more self-governance, and facilitate trans-societal cooperation.

Self-capacity Building

Generally speaking, the higher the capacity of a GONGO, the more autonomy it gains. Self-capacity in this paper specifically means the ability to: (1) implement projects; (2) create innovative solutions for problems; and (3) act as an independent force shaping policy. Due to existing connections with government agencies, most environmental GONGOs are able to assist with policy formation to satisfy the government. The challenge for GONGOs is to contribute something extra, to mobilize

sources of support beyond the government, and to maintain and expand their organizations. Freed from many of the constraints inherent within the government hierarchy and faced with the challenge of becoming financially self-sufficient, some environmental GONGOs have been motivated to improve their expertise, expand the scope of their activity, and gradually increase their capacity.

The China Environmental Science Association (CESA) provides one example of a GONGO using its expertise and greater autonomy to reach and train grassroots environmentalists. Even though the majority of CESA's research tasks are determined by SEPA, CESA was able to cooperate directly with UNDP on a project to design special training for female political and social entrepreneurs at the provincial or municipal level. During the project's implementation, CESA could not use administrative orders to reach their goals; instead, they took advantage of good connections with provincial environmental scientist associations and EPBs. Other examples of innovative GONGO initiatives include:

- CREIA's success in creating the Investment Opportunity Facility to serve renewable energy industries and attract international investment;
- CEPF's efforts to involve grassroots green NGOs in national Earth Day celebrations;
- CEEC's partnership with Mobil for the creation of an environmental education foundation;
- BECon's extensive input into the Tenth Five-Year Plan on energy efficiency; and,
- CSSD's effort in translating and promoting the Agenda 21 among the Chinese general public.

International Connections

International access appears to be having a two-fold effect on GONGO autonomy. On one hand, GONGOs are strengthening their self-capacity with information and expertise obtained from networking with international organizations. On the other hand, international access is contributing directly to GONGO autonomy, especially when external organizations were involved from the initial stage of a GONGO's existence. A GONGO can be relatively autonomous when it is established as a result of negotiations or interaction between the state and international organizations. In these cases, GONGOs typically are provided with sufficient funding, technology, and advice from outside China to conduct their activities. Importantly, the Chinese state is not the only supervising institution and the shared power between the Chinese government and external organizations provide these GONGOs with flexibility. The Chinese government avoids the appearance of overly controlling these GONGOs in order to attract international support. GONGO partnerships with international actors have included:

- UN agencies helped in the creation of CREIA;
- The Rio Earth Summit had a direct influence on the agenda setting of CSSD;
- The U.S. Pacific Northwest National Laboratory assisted in the creation of BECon; and,
- International NGOs, such as German environmental and energy NGOs have worked intimately with CEEC.

If a GONGO ruins its creditability in the eyes of international donors, it may lose its influence domestically. In the case of CWCA's wildlife conservation work, international donors have questioned CWCA's effectiveness and transparency. The scale of international nongovernmental funding for CWCA also has declined because more international environmental NGOs (e.g., International Crane Foundation, Conservation International, The Nature Conservancy, and International Fund for Animal Welfare) have been implementing wildlife conservation projects directly with local Chinese NGOs, who are considered more representative of the local people and governments than CWCA.[25]

In addition to large-scale international NGO sponsored projects, some smaller international foundations are also bypassing GONGOs and supporting grassroots conservation groups and individual environmental activists in China. For GONGOs to tap into this international funding, they must become more independent from the government. This highlights how international actors also are pushing GONGO autonomy through competitive pressure instead of incentive and direct support.

As Table 3 shows, the GONGO sector is very diverse in terms of capacity and access to international sources. The first tier includes those newly established GONGOs, BECon, CREIA and CEEC, which enjoy both high levels of capacity and international access. More traditional GONGOs, such as CESA, CWCA and CEPF are low in both categories. CSSC is an example of a GONGO that lies in the middle—their capacity, international access, and autonomy levels are moderate. CSSC also does lend some support to the green civil society and possess the ability to become more independent.

The next section explains how the levels of autonomy and capacity, as well as access to international funding appear to influence whether a GONGO is willing to

support independent environmental organizations in China.

GONGOs Utilize Their Autonomy

Not all the environmental GONGOs will pursue a more independent path. However, among national-level environmental GONGOs, a number that have enhanced their capacity and international access have become more open-minded toward Chinese green civil society than the GONGOs that have not innovated or sought international partnerships. Moreover, the second-generation leaders of those more internationalized environmental GONGOs will mostly be recruited from outside the government. The visions and education background of these new leaders will be key to the transformation of their organizations after they have won some organizational autonomy.

Support of Grassroots Groups

Some of the environmental GONGOs with a high level of autonomy are very supportive of grassroots environmental NGOs and even partner with them. For example, CEEC maintains close relationships with major Chinese environmental education NGOs (e.g., Global Village of Beijing on CCTV environmental education broadcasting). Not surprisingly, some GONGOs, such as BECon, which regularly contacts and trains local-level experts and NGOs, will likely become NGOs or nonprofit independent research institutes in the near future. As legalization of the civil society sector in China progresses, secondary GONGOs, which already accept little financial and technical support from the government will be tempted to move onto an even more independent path. Similarly, GONGOs with strong professional expertise, such as CREIA, will find it more effective to be independent as China's free-market and legal reforms progress.

However, in comparison to BECon, GONGOs such as CESA, CWCA, and CEPF are limited by their organizational goals, greater financial constraints, and lower levels of autonomy. These groups are unable (and perhaps unwilling) to extend their mandate into helping grassroots groups. An urgent challenge for CESA, according its leaders, is dealing with the association's

Table 3. Diversity of Environmental GONGOs

Environmental GONGOs	Level of Autonomy	Causes of Autonomy		Outcomes of Autonomy	
		Self-Capacity	Access to International Sources	Affiliation & Leadership Tendency	Attitudes Towards Independent Grassroots Organizations
China Environmental Science Association; China Wildlife Conservation Association; China Environmental Fund	Low to Moderate	Moderate	Low to Moderate	Remain within the Government	Indifferent to Moderate Interest
China Society for Sustainable Development	Moderate to High	Moderate	Moderate to High	Remain close to Goverment	Moderate Interest
China Renewable Energy Industry Association Beijing Energy Efficiency Center; Center for Environmental Education & Communication	High	High	High	Ready to be independent and innovative leaders	Moderate Interest to Actively Supporting

decreasing influence on SEPA's policymaking as a result of growing competition from other institutions, such as the China Environmental Science Institute, the Sino-Japan Center research departments, and CEEC.[26] CESA may need to find a new mission. Because the foremost task for China Environment Protection Fund (CEPF) is to collect funds for environmental protection in China and attract ODA, it is not likely CEPF will lose its special connection and trust with SEPA. In both CEPF and CWCA almost the entire staff is still affiliated with government agencies (SEPA and State Forestry Bureau, respectively), which is another practical obstacle for their independence from the government.

The future of CSSD is still hard to predict. The impacts of the Rio Earth Summit on China have weakened over the past ten years and the implementation of many international conventions has been deadlocked. Given its current loose structure, CSSD needs a core leadership to launch effective projects and stabilize the organization.

Second Generation Leadership

One key factor shaping the future of the GONGO sector is its second generation of leaders. Because the first generation GONGO officials were mostly named by the state, the effects of personnel relationships on GONGO autonomy are twofold. Namely, GONGO leaders face constraints placed upon them by their affiliated governmental agencies, but at the same time, they may also possess some leverage over policy outcomes and protect GONGO independence with their official power. In some cases, such as BECon, the leaders' ability to leverage policymaking and facilitate self-capacity building outweighs the potential constraints of government pressure. The autonomy of organizations such as CEPF, CESA, and CWCA has been limited due to the fact their leaders are former or still high-level governmental officials. However, the second generation GONGO leaders and staff most likely will be recruited from outside the government. Because many of these new leaders attended university in the reform era they very likely will have a different educational background, views, and visions from their predecessors.

For example, with the exception of chief directors, most of the 19 full time and 4 part-time staff members at CEEC are not government employees. Half of BECon's staff members were drawn from outside the government sector and work under contract, while the other half continues to work for the government. Most of the new staff, researchers, and project managers in these two GONGOs have had previous experiences with transnational NGOs and other international organizations, and therefore have been exposed to new international norms and standards. They tend to be more open to supporting domestic grassroots groups and facilitating trans-societal exchanges. CREIA always has had in residence some international experts, who bring "fresh air" and innovative ideas into the organization and have indirect influences on the upcoming second generation of leaders. Nevertheless, this is not to argue that all GONGOs are changing at the same pace and same manner. Table 3 suggests that GONGOs with higher capacity and international access gain higher autonomy. In turn, greater autonomy tends to create a more independent leadership and enables GONGOs to provide more support to local environmental NGOs.

CONCLUSION: IMPLICATIONS FOR THE ENVIRONMENTAL ADVOCACY COMMUNITY

Neither the state-led nor the bottom-up model of state-society relations is sufficient to capture the dynamism of GONGOs in Chinese environmental politics. Although they were creations of the state, increasingly, environmental GONGOs are pursuing organizational goals beyond the state's original expectations. The research presented here suggests that the extensive networks and partnerships with international organizations have enabled many GONGOs to gain a certain degree of autonomy from the state.

This article offered but a glimpse into the multifaceted nature of the environmental GONGO sector in China. Given the growth in their number and capacity, whether they strive to be independent or remain partially co-opted by the government, GONGOs are serving both the state and civil society—sometimes even acting as a bridge between government agencies and grassroots organizations. GONGOs also are assisting government agencies by acting as policy consultants, service providers, or communication facilitators with international organizations. Simultaneously, some environmental GONGOs are empowering grassroots groups by sharing their expertise and facilitating access to international support. Their "moral support" (i.e., inviting NGOs to national ceremonies) has been crucial in helping the general public to identify with the role of NGOs in China's environmental protection field, legitimizing the work of NGOs, and facilitating mutual trust building between the public and NGOs.

Their self-capacity building efforts and increased access to international sources are increasing GONGO independence from state control. Findings from this paper also suggest that the more autonomous the GONGO

sector becomes, the more likely it will facilitate the growth of a green civil society in China in two ways. First, given the freedom in decision-making and project design, newly established GONGOs, such as BECon, are playing active matchmaker roles between domestic NGOs and international donors. Moreover, many environmental GONGOs are beginning to resemble independent NGOs. Secondly, the second-generation leaders of those more autonomous GONGOs have not been recruited directly from government agencies. Instead, they have been exposed to grassroots activism and advocacy. The path they choose for their GONGOs should be even more independent and more driven to build up their capacity than the previous generation.

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Endnotes

[1]"Best Practice of International Cooperation and China Green Lighting Promotion Project," presentation by China Green Light Project Management Office at *International Energy Agency-China Seminar on Energy Efficiency Standards and Labeling*, Beijing, 6-7 Nov. 2001. [On-line]. Available: http://meteor.iea.org/conferences/conferpdf/china/Hong_l.pdf

[2] Most GONGOs are only partially funded by the government. In some cases, personnel of these entities are government employees, but without official rankings.

[3] For an informative essay on NGO development in China see: Nick Young. (Ed.), (2001). *250 Chinese NGOs: Civil society in the making*. Hong Kong: China Development Brief.

[4] Public enterprises mainly refer to news media, publishing, advanced research (e.g., National Academy of Science), and public education institutions. Semi-affiliated units are comprised of even more diverse groups of entities ranging from monitoring and assessment, to standard setting institutions. Double-governed units are under the supervision of more than one governmental agency. Secondary GONGOs have even less financial or personnel connections with the government.

[5] Frolic, Michael. (1997). "State-led civil society." In Timothy Brook and Michael Frolic. (Eds.), *Civil society in China*. Armonk, New York: M.E. Sharpe.

[6] Perry, Elizabeth and Mark Selden. (Eds.). (2001). *Chinese society: Change, conflict and resistance*. London and New York: Routledge.

[7] Saich, Tony. (2000). "Negotiating the state: The development of social organizations in China." *The China Quarterly*, Vol.161: 125-141.

[8] I make this argument based upon numerous interviews and discussions with not only Chinese environmentalists, but also with many independent researchers and practitioners inside and outside China. See also Turner, Jennifer and Fengshi Wu. (Eds.). (2002). *Green NGO and environmental journalist forum: A meeting of environmentalists in Mainland China, Hong Kong, and Taiwan*. Washington, D.C.: Woodrow Wilson Center.

[9] For example, the term social organization (e.g., NGO) is used in a loose way in Saich's paper in that his case studies include a national-level GONGO (China Family Planning Association), a member-based NGO (Friends of Nature) and an informal activist network (the magazine *Rural Women Knowing All*). The important differences among these organizations were not noted.

[10] Phillipe Schmitter popularized the idea of state corporatism in *The New Corporatism* (Frederick B. Pike and Thomas Stritch. (Eds.). (1974). London: University of Notre Dame Press) and has been frequently applied by China scholars when addressing the state-society relations question. See also Unger, Jonathan, and Anita Chan. (1996). "Corporatism in China: A developmental state in an East Asian context?" In Barret McCormick and Jonathan Unger. (Eds.), *China after socialism: In the footsteps of East Europe or East Asia?* Armonk, New York: M.E.Sharpe, pages 95-129.

[11] Interviews with GONGO leaders and SEPA officials in summer 2000.

[12] The first step is to register with the Ministry of Civil Affairs and second step to register with a professional government agency.

[13] Cheng, Li and Lynn White. (1990). "Elite transformation and modern Change in Mainland China and Taiwan: Empirical data and the theory of technocracy." *China Quarterly*. No.121. Hendrishke, Hans. (1994)."Expertocracy and professionalism." In David Goodman and Beverly Hooper (Eds.), *China's quiet revolution: New interactions between state and society*. New York: St. Martin's Press.

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[15] Interview with Jin Jiaman from the CESI in summer 2000. Jin was invited by ECOLOGIA (a U.S. NGO), for a study tour of American environmental NGOs in 1994. Later, she and Wang Yongchen started a grassroots green NGO in Beijing, the Green Earth Volunteers.

[16] Interviews with EPB officials in Beijing, Shanghai, and Dalian in summer 2000.

[17] World Bank Policy Research Report. (1998). *Assessing aid: What works, what doesn't, and why*. Washington DC:Oxford University Press. Wedel, J. (1998). *Collision and collusion: The strange case of western aid to Eastern Europe 1989-1998*. New York: St. Martin's Press. Mendelson, S. and J. Glenn. (2000). *Democracy assistance and NGO strategies in post-communist societies*. Washington DC:Carnegie Endowment of International Peace.

[18] Interview with Mr. Zhang Shanning, deputy general secretary of the CWCA in summer 2000.

[19] The Battelle Institute, which is affiliated with the U.S. Pacific Northwest National Laboratory, is a quasi-nonprofit private entity specialized in the management of scientific research. See The Wilson Center's "Inventory of Environmental Works in China." *China Environment Series* Issues 2,3,4,5 for more information on Battelle's China activities. My thanks to Zhou Dadi, William Chandler, and Jeff Logan for sharing their insights on this topic.

[20] Interview with Mr. Chen Kun, deputy general secretary of CSSD in summer 2000.

[21] Legally, most GONGOs are actually independent entities. BECon is an exception, as it operates under the supervision of SDPC's Resource Institute. Financially, after the state creates the institutional framework for a GONGO, it is expected to gradually take care of its own operational costs. Support from the government (or from international organizations through inter-governmental agreements) typically declines and is eventually cut off.

[22] Interview with Mr. Zhu Junshen, director of CREIA in summer 2001.

[23] www.chinaenvironment.com

[24] Monthly Newsletter by the China Environment and Sustainable Development Reference and Research Center. [On-Line]. Available: http://www.chinaeol.net

[25] The information in this section is drawn from numerous discussions with American conservation NGOs and researchers. Special thanks to Dr. Jennifer Turner, senior project associate at the Woodrow Wilson Center and Dr. James Harkness, director of the World Wildlife Fund–China office, for sharing their insights on this issue.

[26] Interview with Ms. Yang Jinwei, general secretary of CESA in summer 2000.

COMMENTARIES

Looking into a Microcosm of China's Water Problems: Dilemmas of Shanxi—A High and Dry Province

By Jih-Un Kim

Su Naihuang, a 67-year-old man living in Yangqu County of Shanxi Province, China, expressed his excitement when he saw the first water faucet in his village: "Chairman Mao liberated us; Deng Xiaoping gave us affluence; and General Secretary Jiang provided us with tap water. How could I forget their blessings?"[1]

Despite blessings (of liberation, economic reform, and water taps) from above, the stark reality for people in Shanxi is that they live in a poverty-stricken province with severe water shortages and water degradation. This water-starved province, located on the dry Loess Plateau (*Huangtu Gaoyuan*) in north central China, also currently confronts a 300 million kilogram grain shortage, which has created food insecurity for 7.6 million people. According to Lee Zhuangwei (an emeritus professor in the history department of Shanxi University) Shanxians sometimes remark, "Shanxi is neither the east nor the west" (*shanxi bushi yige dongxi*), which also can be translated as "Shanxi is nothing." This sentiment stems from the fact that the province does not belong to the rapidly developing eastern coast of China, nor is it a major investment target for the central government's new Develop the West Campaign (*xibu dakaifa*).

Shanxi's isolated location means it is not an appealing target for economic investment. Development in the province also is restricted greatly by serious water shortages and degradation. Over the last two decades, the total amount of available water resources in Shanxi has drastically decreased—between 1985 and 1994 it fell from 11.9 billion tons to 9.5 billion tons. Among Chinese provinces and autonomous regions, Shanxi is now ranked second from the bottom (Ningxia is last) in terms of total available water resources. The per capita water allocated to Shanxians is 17 percent of the national average and only 4 percent of the world per capita average (Song, 1998).

While water problems are more severe in the countryside, both rural and urban people in Shanxi experience the challenges of water shortages. Currently, 4.4 million people in villages face drinking water shortages; nearly 200,000 residents in the mountainous region of Luliang have no choice but to trek more than five kilometers to fetch drinking water. Zhou Yuanyuan, a sophomore college student from the region, told me that her family and neighbors relied heavily on the rain from the heavens for their daily water needs. Even my apartment complex on the Shanxi University campus (a mere 25-minute drive from the provincial government center) is under regular water cuts everyday. Water is provided to the complex only three times a day (7:00-9:30 in the morning, 12:00-1:30 in the afternoon, and 6:00-9:30 in the evening), but luckily, tap water is available around the clock on weekends and on national holidays.

Agricultural production in the province also suffers as a result of water scarcity. Even in years of normal rainfall the water resources available for each acre of Shanxi's agricultural fields is only 13 percent of the national average. Under the severe droughts of recent years approximately 42.1 million *mu* (2.8 million acres) of agricultural fields in Shanxi are parched and are unable to sustain crops. An unpublished report by the Shanxi government reveals that 383 out of 691 reservoirs in the province already are dried up and a third of its 261 rivers and streams are running dry.

To quench the thirst of cities and rural areas, municipalities and farmers desperately dig wells, which have led to overexploitation of approximately 500 million tons of groundwater each year. Consequently, the groundwater level in aquifers throughout the province has dropped an average of 100 meters and in many areas throughout the province ground subsidence has caused structural damages to homes and other buildings.

Top-Down Pronouncements

In China high-level prioritization of the water problems is a necessary step for substantive action to be taken by lower-level governments. Therefore it is a promising sign that Shanxi's leaders appear to be aware of their province's water crises. One example of high-level concern was noted in the provincial water bureau publication (*Shanxi Shuili*, 2001). The report stated that on 16 January 2001, when Tian Chenping (general secretary of the Shanxi Party Committee) was discussing

the Tenth Five-Year Plan (2001-2005) with the staff of the Provincial Development Planning Commission and other officials he emphasized the need to prioritize water conservation and infrastructure in order to solve the province's dire water shortage. The 25th Standing Committee of the Ninth People's Congress of Shanxi, which convened on 27 September 2001, passed a report highlighting the province's dire water situation. On 15 November 2001, former Vice-Governor Guo Yuhuai contributed a full-page article to *Shanxi Ribao* (a daily provincial newspaper) titled "Wake up and Face the Water Crisis" (*qingxing miandui shuiweiji*). During an interview with a secretary for the governor of Shanxi I was told twice without hesitation that Shanxi's water shortage is "very severe." The secretary then shared some documents that outlined water conservation priorities of the provincial government. Specifically, in order to mitigate the province's water problems the Shanxi government is prioritizing more efficient rain collection in mountain regions and development of high technology water-saving irrigation equipment for its agricultural sector.

Challenges to Government Action

While government officials are quick to make pronouncements about the dire water situation in the province, in my eyes, there are still various challenges that will test the enthusiasm and ability of the provincial and sub-provincial governments to solve their water problems.

• *Limited options to increase water supply*. Many of the existing reservoirs are currently dry and groundwater resources are already over-tapped. Shanxi is a dry region, so improving rain catchments will not solve all water needs. Since it is located on a high mountainous plateau, Shanxi cannot be a beneficiary of the central government's planned south-north water transfer (*nanshui beidiao*), which will divert water from the Yangtze River to China's dry north.

• *Economic priorities.* Shanxi has been designated a national coal mining center in China. Coal mining is ultimately a bondage to Shanxi for it is an industry that not only generates low incomes, but also produces harmful air and water pollution as well as considerable water loss. Every year, in order to extract and clean 300 million tons of coal, mining companies pump out and blacken 250 million tons of groundwater, which equals the total annual water supply to Taiyuan, the capital of Shanxi. Regrettably, approximately 70 percent of this water is dumped unprocessed into Shanxi's waterways, which has triggered drinking water shortages in some 1,540 villages around coal-mining areas.

• *Growing water pollution and erosion problems.* Shanxi water pollution is impacting approximately one billion tons of water annually, which equals 18 percent of the province's total yearly water consumption. According to investigations into water quality by the Shanxi government, 1,817 kilometers (57 percent) of the evaluated 3,178-kilometer river channels are ranked the lowest rating for water quality (grade V). Erosion in the province also is so severe that 69 percent of the total area of Shanxi is now bare and dry without topsoil (*Shanxi Shuili Keji*, 2001).

• *Water wastage*. In Shanxi, approximately 60 percent of irrigation water is lost before it reaches crops in the irrigation fields due to cracked and perforated aqueducts or the lack of aqueducts all together. Considering that 70 percent of Shanxi's total water supplies goes to its agricultural sector, this leakage is creating enormous wastage. Water leakage in urban areas cannot be ignored either. The water pipes in some cities in Shanxi were built during the Japanese occupation period (1937-1945) and these old pipes often leak more than 40 percent of the passing water. Former Vice-Governor Guo estimates that 30 to 35 percent of Shanxi's urban water supply is lost due to these inefficient pipes. When I interviewed officials in the Shanxi Water Resources Management Commission, I was told the leakage rate was only about 15 percent. When I questioned this estimate one interviewee's voice raised to a slightly higher pitch to refute any implication the water agencies in Shanxi were lax in their work. He informed me that the Shanxi provincial water commission was created in 1982 when no similar organization existed in any other Chinese province. Moreover, today a former Shanxi governor holds the top position in the water commission. In short, the water official wished to stress that Shanxi's water officials had considerable experience and their leaders took water problems very seriously. It was therefore somewhat ironic that when I paid my second visit to the water commission, I chanced upon a leaking toilet in the washroom right across from one of my interviewees! I suddenly felt that the more reliable estimation of water wastage would be Mr. Guo's. I also realized that a disparaging remark by General Secretary Jiang Zemin about how China is "the country that shoots rockets into space [but] cannot fix its shoddy (leaky) toilets" was not groundless.

• *Weak institutions for demand management of water.* Last in this litany of water challenges are the many defects in the water fee system and the water withdrawal permit system (*qushui xuke zhidu*) in Shanxi (and in most other provinces). There are two types of fees—water fees and water resource fees (*shui ziyuan fei*). Water fees are charged to users to cover the water supply costs as well as to generate some support for the management and investment into water supply infrastructure. Water resource fees are levied on developers of water resources to help promote sustainable development and protection of water.

Currently, only when urban factories blatantly overexploit water resources do provincial water agencies levy the WRF (0.06 Yuan/ton for surface-water withdrawal and 0.06-0.12 Yuan/ton for groundwater withdrawal), and at these times the collection rate, according to Mr. Xue, still is only about 70 percent. The Shanxi government has a plan not only to raise WRF standards to 0.25 Yuan/ton for surface-water and 0.5 Yuan/ton for groundwater, but also to include TVEs and tap-water suppliers in the scope of WRF payers. Apparently, however, adoption of the plan will be long delayed, since agricultural and industrial government agencies oppose it and Shanxi's leaders worry about its negative effects on the province's already sagging economy.

…Shanxi's water fee rates are so low that agricultural water is supplied with no profit leftover for the water supply bureaus or companies.

In practice, Shanxi's water fee rates are so low that agricultural water is supplied with no profit leftover for the water supply bureaus or companies. Xue Fenghai, Vice-Director of Shanxi Water Resources Institute, explained to me that agricultural water prices could not be higher than the supply costs considering the poor marginal value of agricultural production per ton of water (about one Yuan from 0.7-0.8 kilogram of grain). These low rates are understandable, but I still wondered how exactly Shanxi's water agencies could even charge the supply costs to agricultural water users, for many farmers do not have metering equipment. Once on a trip out to an interview I had to gently shake my head when a taxi driver living in a rural village north of Taiyuan's downtown told me happily that his villagers now had tap water but did not have water meters. The water prices for urban areas are also low. In Taiyuan, for example, the proportions of water fees to the average family actual income and to the average industrial production value in 1999 were only 1.01 and 1.28 percent, respectively (Lee, 2001). The collection rate of water resource fees (WRF) is meager, due to the fact that:

(1) Water withdrawals for agricultural use are exempt from the WRF;
(2) Virtually no water resource fees are collected from township and village enterprises (TVEs); and,
(3) For more than 20 years tap-water suppliers have been enjoying Shanxi's "temporary" suspension of WRF collection.

Help From Above, But Not Below

With little income from water fees, Shanxi's water conservancy projects mainly depend on the central government's financial support. Fortunately, in terms of proportion to Shanxi's total annual budget, the province's budget for water conservation work has increased from 3 percent in the 1990s (the Eighth and the Ninth Five-Year Plan periods) to 8 percent today (the Tenth Five-Year Plan period—2001-2005).

I do not know how much the increased budget will help Shanxi extract itself from its water predicaments. I am quite sure that in addition to the increased awareness of the provincial leadership and greater funding for water infrastructure, the improved water habits of Shanxians in their daily life will be integral to solve the province's water problems. However, I must confess some pessimism about the possibility of citizens in Shanxi rapidly becoming water conservation champions. One day, the middle-aged wife of my Chinese landlord beckoned me over to the communal bathroom of our place and asked with a slightly humorous smile, "Jih-Un, can you guess what I'm doing? I'm just managing to steal water by turning on this faucet so little that the water meter does not turn [but water does run]. That's the way we save money." I related this story to a Chinese acquaintance in Taiyuan and asked whether this was a common practice. Instead of giving me a direct answer he said, "Let me tell you in this way. Shanxi is so poor that saving is considered a virtue." I now cannot get rid of a lingering pessimism

that perhaps too many people in Shanxi consider themselves poor enough to save on their individual water fees but at the same time "rich" enough to waste the precious collective good of water.

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ENDNOTES

[1] *Zhang, Xiangming and Wang, Kuanying*. (2001, October 28). "*Woshi yinshui jiekun gongcheng qude tupoxing jinzhan*" (My city made a breakthrough in construction to resolve drinking water problems). *Taiyuan Ribao*, p. 1. Local newspaper articles, unpublished governmental documents of Shanxi Province, and notes of interviews are on file with the author.

Second NGO Forum on U.S-China Environmental Cooperation Held in Beijing

On 14-16 November 2001, the Department of Agriculture Economics at Remin University (Beijing) and the International Fund for China's Environment (IFCE) organized the second NGO Forum on U.S.-China Environmental Cooperation in Beijing. The 212 participants from NGOs, research institutes, news media and governmental agencies attending this forum represented 135 organizations from China, the United States, Europe, and other countries. This is another milestone in the development of Chinese environmental NGOs since the first forum held in Washington, DC in 1999. More than thirty national and international news media organizations reported the event, including three major channels on Chinese Central TV.

The forum included a one-day workshop on NGO development and management. This workshop included four speakers from the United States, Germany, and Japan, who covered topics such as: (1) the role of NGOs in civil society, (2) NGO growth and sustainability, (3) project development and management, and (4) an introduction to UNDP small grants for NGOs.

During the two days of panel discussions fifty experienced professionals gave presentations in nine sessions, including issues such as: (1) women and the environment, (2) ecological preservation in western China, (3) education and the environment, (4) resources preservation and regional economic development, (5) sustainable agriculture and environment, (6) public relations, (7) funding sources and fundraising, (8) environmental policy development and implementation of laws, and (9) WTO/corporate partnerships.

Sponsored mainly by the Ford Foundation, this forum also was supported by Conservation International, International Crane Foundation, U.S.-China Environmental Fund, Chinese Environmental Foundation, E3/Shanghai, and the Little Swan Art Group of Xian.

Most of the presentation papers are included in the two volumes of the forum proceedings. For a copy of the final report, contact IFCE at 703-222-1280 or ifce@ifce.org.

Networking for Development of Legal Assistance to Pollution Victims in China

By Kenji Otsuka

When I arrived in Beijing in March 1997 I was eager to begin two years environmental research on pollution conflict resolution. Unfortunately, I could not find a Chinese research center or nongovernmental partner of environmental and social studies in this area. I then hoped to locate some Sino-Japanese bilateral program related to pollution disputes that could help me in my research, for within the governmental sphere environmental cooperation projects between Japanese and Chinese agencies have grown considerably over the past twenty years. Both sides have increased their awareness of the serious environmental problems facing China and the region. Sino-Japanese environmental cooperation has been particularly active in the areas of pollution control technology, environmental monitoring systems, and nature conservation. However, despite the increasing number of pollution disputes in China and the valuable experience on pollution conflict resolution in Japan, bilateral projects have never focused on environmental conflict resolution or assistance to pollution victims. So even in the governmental sphere there was no proper counterpart for Japanese nongovernmental organizations (NGOs) or researchers like me wishing to conduct a project on pollution conflict resolution.

Despite lacking a Chinese counterpart to help me, I was able to take advantage of the fact that in the late 1990s the Chinese government loosened information disclosure restrictions regarding environmental problems. It was fairly easy for me to locate articles about serious local pollution problems in China. Therefore during my first year at Beijing University I collected a considerable number of documents and articles on environmental conflicts and social changes in China. Nevertheless, political and social constraints meant I had few opportunities to access the actual areas with serious pollution problems or talk to people involved in pollution-related disputes.[1] Such limitations were frustrating and without a counterpart organization or partner researcher in China, I began to feel I would have to give up this line of research.

Almost magically, my research problems were resolved in the tearoom at the Beijing Yanshan Hotel in November 1998 when a Japanese doctoral student introduced me to Professor Wang Canfa. Professor Wang—a professor at the China University of Politics and Law—had just succeeded in setting up an NGO at his university that focused on providing legal aid to pollution victims. Appropriately the NGO was called the Center for Legal Assistance to Pollution Victims (CLAPV).[2] I was very excited to learn about how his center was planning to set up a hotline for legal assistance for pollution victims[3] and training courses for lawyers. I was doubly excited when I recalled a Japanese NGO with a similar mission—the Japan Environmental Council. When I told Professor Wang about a Japanese counterpart to his NGO he quickly suggested that we set up a China-Japan workshop in Beijing on legal assistance to pollution victims. The enthusiasm of this first conversation sparked three years of cooperation that produced a workshop on pollution victims in Beijing in 2001.

Wang Canfa and I believed that Japanese researchers, lawyers, and NGOs could bring valuable insights to China on pollution conflicts. During the period of high-speed economic growth after World War II, Japanese people endured bitter experiences from industrial pollution when chemicals were dumped indiscriminately into water supplies and caused terrible diseases such as Minamata[4] and itai-itai,[5] as well as severe asthma from air pollution, which became particularly serious in the southern port city of Yokkaichi. Since economic growth was a national priority, pollution victims were isolated and ignored. Polluters, the local communities, and the central government were reluctant to recognize these victims and unwilling to push for treatment of industrial waste, for such regulations were seen as a hindrance to industrial development.

The situation for pollution victims began to improve in the early 1970s when lawyers, scholars, and citizen groups assisted victims in winning pollution lawsuits against industries and the government.[6] In the late 1970s, pollution victims and their supporters (scholars, lawyers, and civic organizations) who had struggled together since the 1950s and 1960s created an NGO—The Japan Environmental Council (JEC). This NGO conducts policy research and advocacy for comprehensive relief for pollution victims and the need to halt environmental disruption in Japan. Over the years of activist work in Japan on behalf of pollution victims, JEC also has developed a network with NGOs in other Asian countries through meetings of the *Asia-Pacific NGO Environmental Conference* (APNEC)[7] and the periodic publication *The State of the Environment in Asia*.[8]

Similar to Japan, pollution stemming from the country's rapid economic growth has also victimized many Chinese citizens. Today in China there is only one NGO—CLAPV—that strives to give a voice to these pollution victims and help them navigate the newly reformed legal system in China. CLAPV clearly had found an ideal partner in JEC.

Beginning in 1998, CLAPV had numerous chances to conduct cooperative work with JEC and the Institute of Developing Economies (IDE).[9] All of these experiences laid the groundwork and set the tone for the large international conference on pollution dispute resolution that CLAPV and JEC held in Beijing on 15-18 September 2001 under the auspices of the China University of Politics and Law.[10] Wang Canfa opted to emphasize advocacy at the Beijing workshop in great part because when he attended the annual JEC conference in Tokyo-Kawasaki in 2000 he had been very impressed by the highly vocal pollution victims, lawyers, and scholars who participated in the meeting. These Japanese activists do not hesitate to lobby the government for their cause.

In the first two days of the Beijing conference approximately 80 people from Japan and China gathered in the Beijing Friendship Hotel and listened to presentations from scholars,[11] lawyers, as well as pollution victims and their supporters. In their presentations they related their experiences and analysis of environmental pollution disputes in their respective country.[12]

It was very exciting that not only scholars, but also lawyers, victims and even one judicator from China participated in the conference. These participants revealed their own views and were not reluctant to criticize the current system of dispute settlement by administrative bodies and courts in China. Professor Wang explained the openness of the Chinese participants at the workshop was due to the fact that "this is an NGO initiated conference, so it is not the same as government initiated conferences which often exclude any criticism of the government."

In addition to being the first such conference held jointly by Chinese and Japanese NGOs, it was also the first time such a conference was held in China. A short news report of the opening of this conference was also broadcast on China Central TV. In the last two days of the conference CLAPV led over 20 Japanese participants to visit pollution sites. One site was in Qinghuangdao City in Hebei Province where villagers have suffered from serious noise pollution from heavy train traffic. Another site was Huairou County in Beijing where ducks bred by farmers died when wastewater discharged from a pig breeding company contaminated the water.[13] At each site, the conference participants were able to meet with some victims and their lawyers to exchange some views on the process of pollution dispute resolution.

This may have been the first time for foreigners to meet with pollution victims in China. Victims in two sites had asked lawyers in CLAPV to plead their cases, while victims in Huairou have already won their lawsuit. It merits mention that most cases receiving assistance from CLAPV (including the one in Qinghuandao) remain in dispute at court. Although most cases are still moving through the courts, it is certain that the people at CLAPV have played a critical role as both legal adviser and advocator for pollution victims. The first important challenge in the process of pollution dispute resolution is for victims to dare to accuse polluters, who usually would not admit their faults. Besides empowering pollution victims, a major strategy of CLAPV has been to raise public awareness for better implementation of environmental laws through mass media.

This collaboration with CLAPV has given me, a researcher concerned about protecting people from pollution, insights into the evolving pollution dispute process and implementation of environmental laws in China. For further understanding, it would be necessary to conduct interdisciplinary research including not only lawyers, but also other social and natural scientists, who currently are not very involved in CLAPV's activities. Such research might help CLAPV to set up a stronger strategy to win lawsuits.

While international partnerships help improve the capacity of CLAPV, this unique Chinese NGO still has a challenging agenda. Maintaining and developing more networks between stakeholders in pollution dispute resolution in China is the next significant step for CLAPV. I believe CLAPV will play an important role in assisting environmental lawyers who are engaged in providing legal assistance to pollution victims all over China. For example, in October 2001 CLAPV ran a successful training course for 99 lawyers in China to study environmental law—focusing on dispute resolution. Educating and promoting professional networking among such lawyers empowers them to better protect pollution victims. I concur with Professor Wang who often comments that: "We need to empower others for we at CLAPV can not assist all the pollution victims in China by ourselves!"

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Endnotes

[1] One of the most exciting moments in my fieldwork during my stay in China was when I booked a taxi to drive me around northern Jiangsu Province. The taxi driver took me to Hongze Lake to meet with some fisherman to understand how they made their living in the polluted lake. During my field research I had numerous opportunities to visit governmental bureaus throughout China and officials were generous in providing official data on pollution problems. However, these same officials rarely gave me a tour of polluted sites.

[2] The center was registered at the Ministry of Law after receiving the university's permission in October 1998. CLAPV is a popular name for the center in English that reflects the center's mission. In Chinese the center's registered name is *Huanjing Ziyuan Fa Yanjiu He Fuwu Zhongxin* (Center for Research and Service of Environmental and Natural Resource Law)

[3] CLAPV has run the hotline since 11 November 1999.

[4] Minamata is a small factory town on the coast about 600 miles southwest of Tokyo that was dominated by the fertilizer producer Chisso Corporation. From the 1930s until the late 1960s this fertilizer factory dumped mercury compounds into Minamata Bay. This mercury was absorbed into the fish, which were subsequently consumed by the town's inhabitants. Approximately 3,000 people became ill with methyl mercury poisoning. It took 40 years for these citizens to receive some compensation for their suffering.

[5] The itai-itai disease is the name for the cases of chronic cadmium poisoning caused by heavy metals such as zinc and lead that were dumped into the Jinzu River by a mining company in Toyama Prefecture.

[6] See Japan Environmental Council. (Ed). (2000). *The state of the environment in Asia 1999/2000*. Tokyo: Springer-Verlag:41.

[7] APNEC has been held in Bangkok (December 1991) Seoul (March 1993), Kyoto (November 1994) Singapore (November 1998) and Agra (September 2000). The next conference will be held in Gaoxiong City in Taiwan in 2002.

[8] The first and second volumes of *The State of the Environment in Asia* in Japanese were published in 1997 and 2000. The first English edition was published in 2000 and the second English volume covering 2000/2001 is forthcoming.

[9] In March 2000, JEC invited Professor Wang to its annual conference in Japan. From September 2000 to March 2001, IDE and CLAPV conducted a joint research project on environmental pollution disputes in China. IDE also invited Professor Wang and Professor Xu (she is assistant director of CLAPV) to hold a mini-workshop in IDE. A report was published from this project: Wang et al. (Eds.). (2001). *Studies on environmental pollution disputes in East Asia: Cases from Mainland China and Taiwan.* Joint Research Program Series No. 128. Institute of Developing Economies, Japan External Trade Organization.

[10] The Japan International Exchange Foundation, Aeon Group Environment Foundation, and the Ford Foundation also sponsored this workshop.

[11] Most of these scholars specialized in environmental law, but others were from the fields of economics, medicine, and engineering.

[12] The proceedings of this workshop will be printed in both Chinese and Japanese in spring 2002.

[13] More information on this latter case can be found in *The New York Times* Article "Pollution Victims Start to Fight Back in China" May 16, 2000.

Xinjiang: A Trip to the New Territory

By Wen Bo

Ma Ming—a diligent young ornithologist at Xinjiang Ecology and Geography Institute—strongly recommended that I go to Hongqilapu, "it is an exciting time and you will get to see the military tension there." Ma was my first environmental contact during a month-long trip to explore environmental problems and meet "green-minded" entrepreneurs in Xinjiang in October 2001. As I prepared for my trip to Hongqilapu I heard many war rumors and stories of danger in Xinjiang.[1] The rumors led some of my friends to admire me for taking such a trip at that time to Xinjiang, an Islamic region of China. Others were more concerned about my safety. I was quite surprised, however, by how peaceful Xinjiang was—even with the United States raining bombs onto neighboring Afghanistan. Another surprise during this trip was the discovery that many of my preconceptions about Xinjiang were not completely accurate.

Xinjiang occupies one-sixth of China's territory and it is an area facing tremendous environmental challenges and developmental pressures.

A year ago, while helping Greenpeace China strategize a development plan, the Hong Kong-based office first took Tibet and Xinjiang out of their plan, saying work in these areas would undermine the group. At that time I nodded without any hesitation, for my perception was that any international NGO—particularly an NGO so renowned for political outspokenness as Greenpeace—involved in the two Western regions would attract negative attention from the Chinese government.

Now I realize I was wrong. Xinjiang occupies one-sixth of China's territory and it is an area facing tremendous environmental challenges and development pressures. It is a region that certainly deserves attention from not only Beijing but far beyond.

Perhaps because many environmentalists think as I did before—that Xinjiang is a dangerous and politically sensitive place to work—environmental protection efforts by the nongovernmental community have been negligible in this region. Nevertheless, during my journey I did discover some exceptional and inspiring environmental activists, journalists, government officials, and professors working in small ways to improve environmental quality in Xinjiang.

Li Jun's story was the first that helped shed some light on the challenge of doing green work in Xinjiang. Li Jun, who previously worked for an oil company, was sent to Beijing for a three-month training program in 1999. By chance, she encountered a group of activists handing out environmental publications in downtown Beijing during an Earth Day event. She read the materials and became interested in the environment. Back in Urümqi, she decided to do some serious study on the subject at local libraries. Later, she quit her job and started to give environmental lectures at schools and industries in her city. Drawing on her own personal savings she has given more than 200 environmental presentations. Some people find it hard to understand why she left a paying job to give environmental talks. Her volunteer work also has many obstacles, for she does not have many contacts outside her city where she can turn to for information, funding, or institutional support. No doubt Li Jun's single-handed efforts can help spread some environmental messages, but ideally schools should put environmental education on their agenda.

Eli Normal University, which lies in Yining City in northwest Xinjiang, is a multiethnic university with graduates spread throughout Xinjiang teaching in schools and serving in government agencies. However, the university does not have two basic departments that would strengthen environmental education—biology and geography. These omissions do not seem to concord with Xinjiang's vast natural resources. Fortunately the president and some teachers at the university were quite open-minded and graciously accepted my proposal to start up an environmental education center.

Indeed, there are numerous opportunities to assist environmental initiatives in Xinjiang. I also was thrilled to meet an environmental journalist, Dai Jiangnan, at *Dushi Xiaofei Morning Post* in Urümqi City. Despite having been on the environmental beat for more than three years, she had no knowledge about any of the Chinese or international environmental groups crowded in Beijing and Yunnan Province. When I asked her what assistance she might require, Dai could not immediately name any needs, for she sees herself as a capable journalist. "How about some environmental information?" I asked. "Yes," she replied as if suddenly awakened to the depth

of her own need. I was full of confidence and excited about the opportunity to give some support to Dai Jiangnan, for such people will make a difference in Xinjiang.

At the Xinjiang Forestry Department, I found myself talking with a novelist. Yuan Hong, the director of the CITES (Convention on International Trade in Endangered Species) Urümqi office, asked me to read a list of cases on the smuggling of endangered species. As I read he returned to the novel he was trying to finish writing. "My novel appears on the Internet," commented Yuan. "Pity that the contribution fee is too modest." "Oh, yeah," I mumbled, for my mind was completely absorbed in what I read: "*More than 6,000 live horsfield tortoises smuggled in March, 1998 from Kyrgyzstan….2,240 Kilograms Saiga antelope horns on June 9, 2000…..62 saker falcons...*" The list was long and covered species ranging from fir to falcon.

Yuan Hong has his own network of monitors tracking these smuggled species. Once, after being tipped off about a possible saker falcon smuggling case, Yuan halted a Xinjiang Airline plane bound for the Middle East. Repeated checks of passengers' luggage revealed no clues, but as the search continued they discovered three saker falcons in the cockpit! The smuggler was a pilot. Beloved by emirates in the Middle East as a symbol of power and wealth, a saker falcon can fetch up to $20,000 in markets. Lured by the huge profit, smugglers, mostly Pakistanis, flock to China to collect the falcons. These rare birds of prey are trafficked by air, land, and sea. What Chinese customs confiscate is only a tiny fraction of the trade.

Surprisingly, from time to time the Xinjiang government sets a catch quota in nature reserves, which then enables the government to export some saker falcons to Middle Eastern nations. The official excuse is that these exports help the government maintain good relations with these oil-rich countries—or rather their royal families.

Lu Jun, director of Wenquan County Environmental Protection Bureau, did not know much about the saker falcon's role in international relations. He was just uncertain why the forest department sent teams to catch the birds at a nature reserve under his administration. I met Lu during a trip with Professor Wang Xiuling to release captive bred Xinjiang salamanders, which is another intriguing story.

First discovered in 1866, another sighting of the Xinjiang salamander was not recorded again until June 1989, when a local herdsman saw "four-footed fish" in a mountain stream. The word of the strange fish quickly spread and local people caught large numbers of them, placing them in jars where they quickly died. Others were dried and sold as medicine. It was not until a student of Professor Wang Xiuling at Xinjiang Normal University brought a specimen from Wenquan (a county bordering Kazakhstan) did the world start to learn about the rediscovery of this 250-million-year-old species that is closely related to another "living fossil," the coelacanth. Since then, Professor Wang has trotted around the mountains of Tianshan and Alataw and found three Xinjiang salamander habitats. The salamanders live only in high mountains streams at 2,800-3,200 meters above sea level. Human disturbance and global warming are the main threats to the salamander. Increased water levels, due to melting snow, constantly wash the salamander down the stream where goats and sheep frequently disturb their dwellings. During the dry season, the salamander's wetland habitats shrink or disappear completely.

While it is true that much of Xinjiang's wildlife is facing a dim future, this western region is also at the crux of another wildlife crisis. International trade of horsfield tortoise is banned by CITES, but this tortoise, once abundant in Central Asia, has been rampantly smuggled into Xinjiang. Traders in each of the tourist stores I visited at the Alataw Pass and Khorgos border gates promised they had the means to obtain horsfield tortoise from Kazakhstan if I paid enough money. The growing economic affluence of the Chinese population increases demands for the tortoise as pets, food, and medicine, which in turn causes wildlife casualties to spread beyond China's borders. To meet China's hunger for the tortoise, in 1998 the Kashgar International Trading Company alone imported from Kyrgyzstan more than 6,000 wild tortoises in a single deal.

"Traders disguise horsfield tortoise as a 'grass turtle' or something else, " explained Yuan Hong. "So one of my duties is to identify confiscated wildlife species." However, Yuan's knowledge does not stop at identifying endangered species, but also the source of smugglers. For example, Yuan found out that a majority of saker falcon smugglers were from the Afghanistan-Pakistani border town of Peshawar. I speculated that perhaps once Afghanistan and Pakistan become more stable countries, such smuggling could be better controlled. Ultimately, however, the solution to smuggling and other environmental threats in Xinjiang rest on the improvement of local government enforcement of environmental protection laws and a greater involvement of international and domestic nongovernmental green groups. Increased involvement of NGOs in this area could play key roles in empowering local government officials and protecting this fragile, beautiful, and neglected region of China.

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ENDNOTES

[1] For example, I heard through the grapevine that a handful of American Marines had parachuted into the China-Afghanistan border trying to search for Bin Laden's camps in Xinjiang, but immediately found themselves captives of the People's Liberation Army. If this rumor were true (which was doubtful) the Marines' fate would not have been that bad, as China again found itself a U.S. ally—this time in the war against terrorism. This situation reminded me of World War II when U.S. Flying Tigers came to the rescue in the Chinese sky.

American Bar Association—A Green Approach to Governance in China

While the People's Republic of China has enacted a substantial body of environmental laws and regulations, many are not being effectively enforced. As a result, not only do China's people and environment suffer from the effects of air, water, and soil pollution, but also the inconsistent enforcement of existing laws severely undermines the concept of rule of law in Chinese society. Improved enforcement of Chinese environmental law will require inputs and changes at a variety of levels and on a variety of fronts. For example, it will require greater involvement—indeed, a mobilization—of China's fledgling civil society; changes in the structure and funding of the country's environmental regulatory bodies; greater public access to environmental information; and more efficient economic incentives for pollution abatement, and disincentives for pollution emissions.

In February 2002, the Asia Law Initiative Council of the American Bar Association (ABA) placed a liaison attorney in Beijing to implement an environmental governance-training project. The project is providing a broad range of Chinese stakeholders with training and education on environmental governance issues. The training courses will include three components:

- An overview of various national systems of environmental management, and the different approaches that result;
- A review of emerging strategies for environmental compliance in different countries; and,
- A comparative review of roles and responsibilities of public, private, and nongovernmental stakeholders in environmental management, analyzing each sector's role in providing for public participation in environmental decision-making and citizen access to information and justice in environmental matters.

Training activities will take place in three cities. ABA, together with working partners in each city, will adapt the training materials to the environmental circumstances in each locale. The training courses will include individuals from a broad variety of stakeholder perspectives.

Following these training programs, ABA will work with Chinese partners to implement a series of pilot projects that highlight various "tools" for enforcing Chinese environmental law. To the maximum extent possible, ABA will involve more than one category of stakeholders in each activity. Each project will focus on one environmental management technique that illustrates good governance practices, such as: (1) development of a publicly accessible pollutant release and transfer register; (2) conduct of an open legislative process, (3) a transparent permitting process, (4) a participatory environmental impact assessment, or (5) legal advocacy for citizens. In this way, ABA hopes to assist its Chinese partners not only to adopt techniques that afford greater environmental protection, but also to undertake measures that provide for greater governmental transparency, increased citizen participation in decision-making, and enhanced respect for and implementation of law in China.

China's Nature Reserves: Protecting Species or Generating Profits?

By Lawrence Glacy

The Chinese government has taken many steps toward protecting the country's natural resources. Over the past two decades the government has enacted new natural resource protection laws, significantly expanded the number of nature reserves, and increased the national budget for environmental protection. In addition, China cooperates with many international conservation nongovernmental organizations (NGOs) and has strengthened the authority of its environmental protection agencies. Despite these efforts animal and plant species in China are under greater stress than ever before as the ecological environment—even within nature reserves—continues to deteriorate at an alarming rate.

The environmental deterioration and loss of habitat occurring inside China's nature reserves results from a government-sponsored conservation paradigm that weighs the economic benefits and ecological harm of development projects inside nature reserves. I believe that nature reserves are not proper venues for the application of a balancing test to measure the efficacy of a development project. Strict enforcement protecting the nature reserves and education would be more appropriate planning measures than developing an ecotourism plan that extracts forest products and damages habitat in order to address local poverty and development.

Between 1998 and 2000, as part of an undergraduate special study and later for my master's thesis research work, I traveled to seven Chinese provinces, interviewing a broad range of government officials and NGO representatives, notable conservationists, and local stakeholders in and adjacent to reserves. (See Map 1 for location of reserves discussed in this paper)

My research revealed that local government prioritization of economic growth has allowed for the proliferation of commercial activities within nature reserves and hindered effective implementation of pollution control and natural resource protection policies that are crucial to protect the ecosystems within and surrounding the reserves. The following snapshots provide grim insights into the severe threats to nature reserves in China. Ironically, one of the major threats to ecosystem health in these reserves stems from attempts to protect these areas through ecotourism schemes.

A Look Inside China's Nature Reserves

Since opening to the West in 1978, China has continually expanded its nature reserve system and by 1997 the government had set up 926 nature reserves, covering 769,800 hectares, or 7.64 percent of the country's territory. By 2000 China had created 1,227 nature reserves accounting for almost 10 percent of the country's landmass.

Since reserves are, as a rule, considered cornerstones of biodiversity protection, the number and extent of nature reserves should protect many of China's natural resources. However, because nature reserves are being legally and illegally used to support the country's economic growth, they are proving inadequate refuges for the protection of species (World Bank, 2001). The Nature Conservancy working in southwest Yunnan Province concluded, "[p]oor management and poor public awareness of ecological conservation have reduced the current nature reserve network to the verge of a breakdown" (The Nature Conservancy, 2001). WWF, working to safeguard the giant panda (Ailuropus melanoleuca), expressed their concern for its survival stating, the "panda is precariously clinging to survival while under intense exploitation" (WWF–Panda Strategic Plan, 1999, page 3).

Dalainuer, Zhalong, and the Yellow River Delta Nature Reserves

In China's northeast, the Dalainuer Nature Reserve in Mongolia consists of more than 400,000 hectares providing habitat for more than 120 nesting species of birds. The State Environmental Protection Administration, which oversees the reserve, is struggling to overcome budget constraints and administrative and jurisdictional barriers to effectively manage the reserve. In the absence of a well-maintained management and monitoring system, local government agencies have been unable to prevent overgrazing, commercial fishing, occasional water diversions, and extraction of wetland grass and reeds within the reserve. These activities impair water quality and damage nesting habitats.

The Zhalong Nature Reserve in Heilongjiang Province is another important bird refuge facing pollution threats. Occasional flooding and close proximity to Qiqihar—the region's industrial and commercial center—are adding pollutants into the reserve. In addition, valuable wetlands are drained for commercial and agricultural use while roads, hotels, restaurants, and viewing platforms are constructed to promote tourism. These activities have put Zhalong's bird population under

increasing environmental stress due to the reduction of feeding, nesting, and breeding areas.

Another extreme case of rampant commercialization within nature reserves is the Yellow River Delta Nature Reserve on the eastern coast that provides habitat for 1,527 animal species and 393 plant species. A recent utilization survey found that basket weaving, charcoal manufacturing, animal food production, fishing, crabbing, 53 oil wells, as well as shellfish and shrimp farming are all commercial activities taking place inside the reserve (Chen, 1997).

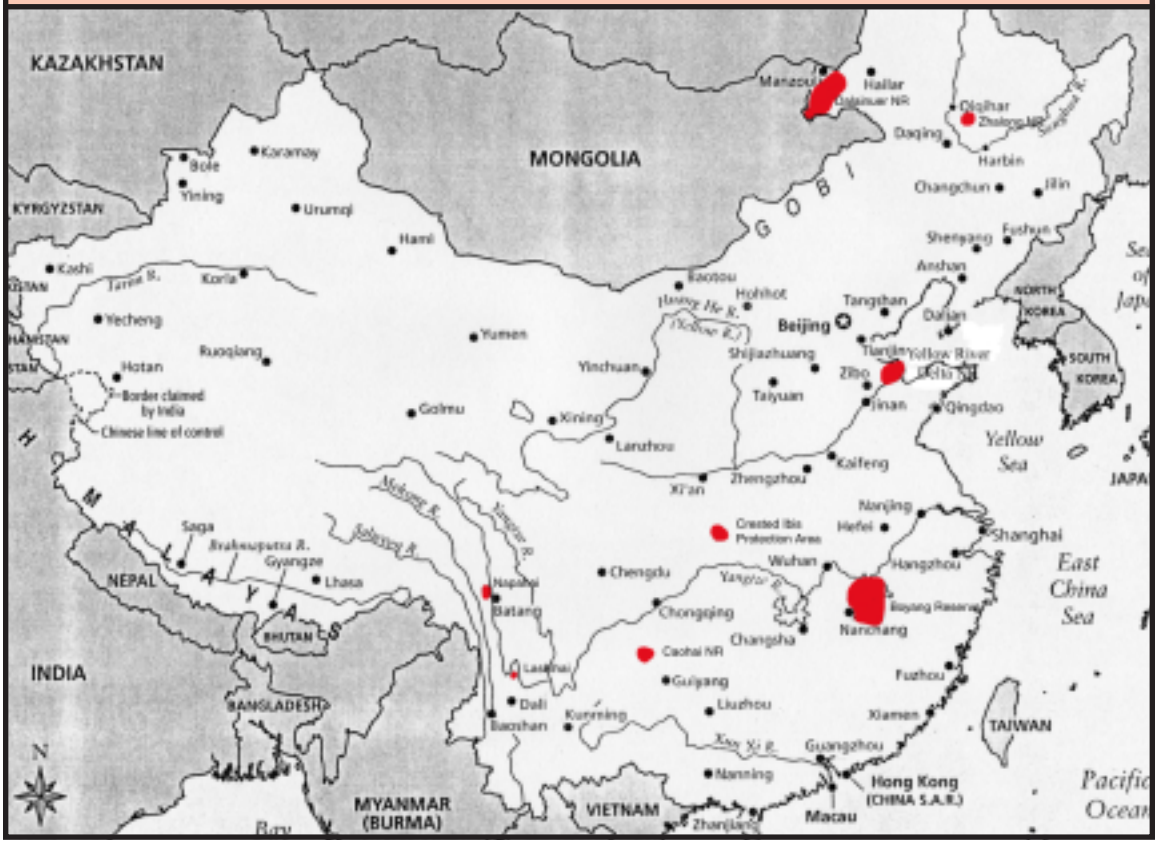
Birds in Need of Protection

In central China, Yangxian County, Shaanxi Province, the central government established a protection area for the critically endangered crested ibis *(Nipponia nippon)*. Approximately 50 remain in the wild and another 50 (more or less) survive in captivity. The Hanjiang River flows through the reserve carrying toxic agricultural runoff and human waste from upstream communities. In addition, industrial waste is discharged into the ibis feeding areas. Further, due to their small population, many ibis are born blind or otherwise impaired from the genetic effects of inbreeding depression. The survival of the crested ibis in the wild is doubtful since it would require major investments outside the protected area, such as restoring the Hanjiang River, demolishing dams, closing industrial polluters, converting to organic agriculture, and constructing waste treatment plants for communities along the river. Moreover, inside the protected area the local government would have to increase the woodland roosting habitat and effectively control poaching.

During my visit to Yangxian in the summer of 2000 it was clear that this management area was faced with problems similar to many other nature reserves. For example, insufficient budget allocations, inability to control development, and the failure of inter-jurisdictional cooperation have made serious restoration of the crested ibis habitat unlikely. A reintroduction program is planned for many of China's endangered species, including the ibis. However, where they might be reintroduced is a dilemma.

Pollution problems also plague wetland nature reserves in northwest Yunnan Province, which support 134 species of waterfowl and 382 species of fish, and provide winter habitat for over 30,000 water birds. For example, the Lashihai Nature Reserve in Yunnan Province faces pollution loaded agricultural runoff and human and

Map 1. Nature Reserves in China



animal waste discharged into the lake that supports the reserve's ecosystem. In addition to water quality problems, habitat for many shorebirds is threatened by the inability of the local government to stem the extraction of freshwater from the lake. The nearby city of Lijiang is constructing a second pipeline from the lake to support the freshwater needs of a burgeoning population, increasing the threat to the feeding and nesting habitats around the lake. Another supposedly protected area in northwest Yunnan under siege is the Napahai Reserve in Zhongdian, which supports many of Yunnan's waterfowl, most notably the endangered black-necked crane. This important wetland reserve now abuts a new international airport. The Lashihai and Napahai reserves are among the many in China threatened by water pollution, local extraction of reeds and grasses, conversion of wetlands to farmland, and development.

Ecotourism as the Cure?

Currently, many Chinese government officials and some international NGOs working to protect species in China consider ecotourism the panacea to the threats to the country's nature reserves. In theory, ecotourism simultaneously offers a level of protection for the natural resources of a reserve and a means to alleviate poverty within the local communities. The idea is that rather than protect the natural resources through education and strict enforcement of anti-poaching and conservation regulations, the standard of living in an area is raised by selling the viewing and enjoyment of natural resources to tourists, which provides the incentive for local people to avoid practices harmful to the nature reserve. Thus, economic development through ecotourism, merged with poverty alleviation, has become the prevailing model of nature reserve management in China. However, similar to other developing countries, this ecotourism model has never achieved its intended result in China. Some of the most serious side effects of ecotourism programs in China include:

- Large numbers of China's unemployed flock to an area receiving outside (international or Chinese government) investment to develop ecotourism infrastructure;
- The creation of new local infrastructure to serve the influx of tourists places added demands on the habitat,
- Damage to the reserves from a large number of vehicles and people; and,
- Local people exploit the forest products on a commercial scale to supply souvenirs and food for tourists.

It appears that in China no matter how much ecotourism increases the standard of living for communities, it is never enough to prevent the exploitation of natural resources. While some nature reserves do monitor the impacts of ecotourism on the area's ecosystem, such monitoring is usually short-term and is insufficient to control and respond in a timely manner to the harm. For example, one common method of monitoring nature reserves is to count large species, but such populations do not necessarily provide insights into the deterioration of plants, rodents, and insects, which often are far more important for the functioning of an ecosystem than, for instance, the panda.

The Wolong: A Model Reserve?

An examination of the Wolong Nature Reserve provides evidence of the shortcomings of over-emphasizing the strategy of ecotourism. The Wolong Nature Reserve is the largest giant panda reserve and it has received more study, money, and world attention than any other protected area in China (Jianguo et al., 2001). Government panda protection programs in this reserve have been implemented with technical and financial support from WWF. Both the government and WWF consider Wolong a model of protection to be replicated in other panda protected areas (WWF, 1998). However, between 1974 and 1989 Wolong and other giant panda habitats have shrunk by 50 percent (Panda Strategic Plan, 1999). A recent study of ecological degradation in the Wolong Nature Reserve found that since the reserve was established in 1975, the loss of prime panda habitat has continued and fragmentation of the protected area from development has increased (Jianguo et al., 2001). The report attributed most of the destruction to local people and cited the loss of habitat as the main cause for the reduction of pandas in the wild from 145 in 1974 to 72 in 1986.

Since 1989, new roads, hotels, restaurants, and businesses that sell a variety of products extracted from Wolong's forest all have contributed to the problem. Some of the products extracted from the forest include wild animal parts, butterflies, mushrooms, herbs, roots, ginseng, and many other species used as medicine. Occasionally, pelts from fox, bear, snow leopard and other vertebrates are available for sale. During the high tourist season, an average of 1,000 visitors a day enjoy Wolong's many attractions and, in addition to purchasing some wildlife or products from the reserve, tourists have the

opportunity to be photographed holding a live panda for 12 dollars.

The Development of Wanglang

In the Min Mountains of northwest Sichuan province, the pristine Wanglang Nature Reserve — established in Pingwu Country in 1963 for the protection of giant panda, golden monkeys, takins, panthers, and other species—is about to be exploited with the development of an ecotourism plan similar to the Wolong scheme (WWF Panda Report, 1999). Wanglang is an area rich in biodiversity where in addition to pandas, there are 61 species of vertebrates, 152 species of birds, and 615 species of plants.[1] The extraction of forest and animal products, until now, has been a limited local activity due to Wanglang's isolation from the impact of mass tourism. In 1998, massive flooding of the Yangtze River led the central government to impose a partial ban on logging in Sichuan Province, for overexploitation of timber in the upper reaches of the Yangtze was the main cause of the destructive flooding. This partial ban on logging has hurt revenue earnings in many areas of Sichuan Province, so it is not surprising that the local government and community people in Pingwu have focused on the commercial value of the Wanglang Nature Reserve.

The provincial and local governments in this area, in cooperation with WWF, have developed an ecotourism plan. The WWF plan suggested limiting the tourist population to 50 per day, but local government officials, tourist bureau personnel, reserve management, and the local Baima minority people plan to fully exploit Wanglang's resources, and are preparing for mass tourism on a daily basis. New roads now provide access to the Wanglang reserve and the region's other scenic sites as local hotels, restaurants, and businesses prepare to accommodate the influx of tourists.[2] Like Wolong, the local population will exploit the commercial potential of forest products in the area (WWF Panda Report, 1999). A nature reserve brochure notes the attraction:

> Visitors can take a bus to enjoy a torrential river and well-protected habitats, defoliation forest and natural forest along a road. They can also enjoy [a] sunbath on a meadow. *It is suitable for mass tourists* (Emphasis added).

The environmental damage from the development of Wanglang most likely will be substantial. The reserve has only one dirt road for access and tour buses will impair air quality and increase erosion. Exhaust emissions will damage riparian habitat along the roadway, and oil and gasoline deposits will pollute the river and wetlands. Tourist activities will increase garbage waste, noise level, trail compaction, and fire risk from smoking. The commercial impacts from the extraction of forest products on the region's ecology are largely unknown. The development of the neighboring Baima village, [3] as well as the nearby town of Pingwu will increase timber consumption for construction materials and firewood for cooking to feed the tourists. Use of natural gas, though intended, most likely will be minimal.[4] A significant increase in animal husbandry will have to take place to feed the onslaught of tourists in the reserve, the village, and town. This increase in people and animals would mean more waste to threaten water quality. The rising economic development could encourage many of China's unemployed to move to the region further adding to the region's environmental problems.

Quantifying the Harm

The harm ecotourism will have on Wanglang's ecosystem is difficult to predict. As species are removed from a nature reserve its ecosystem is made functionally weaker, which reduces its ability to recover from stress, and gross productivity suffers (Tilman et al., 1996). How much of the flora and fauna can be removed from Wanglang without irreversible environmental damage is unknown. The ecological relationships that exist between panda and other high-order vertebrates, their food source, and the remaining forest flora and fauna are complex and difficult to ascertain. Studies demonstrate that when considering community-based levels of extraction of non-timber forest products, "more information is needed on harvestable levels and management techniques as local preferences move from subsistence uses to commercial production" (Hartshorn, 1995, page 155).

The natural resources and overall ecological health of Wanglang and other nature reserves in China are at risk from mass tourism and the commercial extraction of flora and fauna. Without more proactive and effective efforts by the government, the water, air, soil, forest, and wildlife in many of China's reserves will continue be degraded by pollution and other stresses. Ecotourism alone is not the answer. In short, the utilization of the Wolong Nature Reserve as a model and the role of ecotourism in poverty alleviation should be revisited if the sustainability of the nature reserve's biodiversity is the goal.

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active member of the California State Bar. He has traveled extensively in China and in 1998 returned to Sonoma State University completing a B.A. in Environmental Studies. He is currently writing his master's thesis on nature reserve planning in China. He can be contacted at glacy@sonoma.edu

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Endnotes

[1] The commercial possibilities of the plants in the reserve are great. Among the plant resources, 400 species are considered "worth development," accounting for 65 percent of reserve's total plant resources, including 166 species of herbs that are known and utilized and 33 species of wild fruit and vegetables collected and eaten by local people. In addition, there are 70 species referred to as "familiar and appreciative" plants and include many species from the orchid family (Orchidaceae). According to a survey in 1998 there were 103 species of fungi, mostly edible and some having considerable value.

[2] In the past, Wanglang lacked suitable roads and facilities and was inaccessible to this tourist population. The repair of the road from Jiuzhaigou to Pingwu and the construction of a road, into Wanglang now make it available as a stop on the "mass" tourist route.

[3] Baima—a colorful local minority people—live at the intersection of Tibetan and Han culture and their lifestyle has strong attributes of both cultures. They are considered major stakeholders in the development of the area and many are making their homes ready for overnight guests.

[4] Conversations I had with Mr. Lishengzi, the local field representative of the World Wide Fund for Nature, indicated that local people who integrate natural gas or biogass into their households for cooking and heating will receive preference in hosting overnight visitors to the nature reserve. However, biogass probably cannot become a major clean energy source due to the low amount of available agricultural waste in the area.

The Yunnan Great Rivers Project

By Ou Xiaokun

With its extremely rugged terrain, varied climates, and rich biological and cultural diversity, the northwestern region of Yunnan Province is one of the world's most important ecological hotspots. Northwest Yunnan also is an economically disadvantaged region, in which twelve of the fifteen counties (which contain more than 3 million people) are impoverished. The natural resources in the region have been degraded in great part as a result of poverty, low education, and the continued practice of some environmentally harmful traditional resource use methods (such as shifting agriculture). Protecting this rich biodiverse region is crucial for preserving the soil and water ecosystems in the lower reaches of major rivers flowing from Tibet and through Yunnan Province into Myanmar (Burma), Laos, and Thailand. Thus, the conservation and sustainable development strategies adopted in northwest Yunnan will not only shape the environmental quality and well being of the citizens within the province, but also will impact ecological health regionally.

Recognizing the imperative to promote sustainable development, the Yunnan provincial government initiated the Yunnan Great Rivers Project (YGRP, also referred to as the Northwest Yunnan Conservation and Development Action Plan). As a part of this project, the provincial government invited The Nature Conservancy (TNC) to advise them on nature conservation in northwest Yunnan. The YGRP was initiated at the end of 1998 after the signing of a joint agreement and pledges by the Yunnan provincial government to invest $3 million and $2 million by TNC. The provincial government and TNC set up a joint project office (JPO) in the provincial capital Kunming that helped to coordinate the more than 200 Chinese and U.S. experts who worked on initial feasibility and planning reports during the first phase of the YGRP.

The feasibility and planning reports looked at broad-scale patterns of biological and cultural diversity in the region and served to identify: (1) areas of cultural and biodiversity significance; (2) region-wide or multi-site threats to this diversity; and (3) conservation activities needed to maintain this diversity. By December 2000, these studies and reports led to the creation of an extensive conservation and development plan for the YGRP area. This master action plan also included research into appropriate and sustainable economic and regional development strategies that could maintain and enhance the enormous ecological and cultural diversity in northwestern Yunnan.

After finishing the master action plan, the provincial government held several consultative meetings at various levels of government to solicit input for revising the plan. In May 2001, a provincial-level meeting was held in Kunming in which experts from various research institutions and government agencies not only expressed their satisfaction with the YGRP master action plan, but also recommended the plan be integrated into the province's Tenth Five-Year plan. In short, this master action plan will be used to guide the conservation and development work in northwest Yunnan Province over the next five years. The high-level acceptance of this plan highlights how effectively TNC and the provincial government worked together in the initial research stages of the project.

There exists, however, challenges to the implementation of this plan. For example, the Provincial Development Planning Committee is the only official agency that sets the development plans in the province. While this provincial committee approved the YGRP, the plan must be carried out by other agencies, such as the provincial forest and construction departments, as well as a plethora of agencies at the prefecture or county level. Gaining the support from and coordinating all of these agencies to implement such a broad sustainable development plan will be challenging. In addition, it will take the various government agencies a long time to finalize and approve a concrete plan of action.

Even while waiting for final approval on the action plan, TNC actually has begun to move ahead on implementation. Specifically, TNC is working with the Lijiang County government to set up a demonstration project in Lashi Hai Lake. The goal of this project is to make a site conservation plan for the lake area to promote the protection of migrating birds, lake conservation, and ecotourism development.

TNC also has started work at the practical level in both the Meili Snow Mountain and Lao Jun Mountain areas. TNC staff and their Chinese partners began by using the methods TNC developed in South America to make the site conservation plans for these two areas. Two joint project offices were established with county-level governments—one in Deqin County (a Tibetan minority county) and another in Lijiang County (a Naxi minority county). TNC has provided funds for Chinese and American experts to survey the biodiversity and cultural

diversity of these two areas and to gather base-line data necessary for the establishment of national parks in these mountainous counties. These would be the first real national parks set up in this region of China.

TNC's work in these minority areas in northwestern Yunnan looks exciting and promising. What is striking, however, is that Chinese officials in the provincial-level JPO in Kunming do not appear to know what activities have been carried out in northwest Yunnan besides the action plan research for this project. Only TNC staff is familiar with the development and status of the on-the-ground projects. The JPO at the provincial level does not seem to be functioning. It is as if it no longer exists.

...the conservation and sustainable development strategies adopted in northwest Yunnan will not only shape the environmental quality and well-being of the citizens within the province, but will also impact ecological health regionally.

All of the Chinese nongovernmental organizations (NGOs), researchers and government officials involved in the YGRP hope that it will be successful and that the master action plan will be used to guide the conservation and development policies in northwest Yunnan. In my work with this exciting project I have observed some potential obstructions and challenges to the implementation of the YGRP, which are presented below:

1. *Both sides (the provincial government and TNC) lack experience in cooperating on such a large-scale project.* At the beginning of the project, when the agreement was signed both sides pledged a total of $5 million ($3 million from the Chinese side and $2 million from TNC), which makes this a very large-scale environmental project in China—particularly one undertaken with an international NGO. Today, TNC has provided more than $1 million to the project, but the Yunnan side has invested less than $1 million directly in the project. Inexplicitly, some government officials believe that much more already has been invested in this area for the environment and sustainable development projects. This confusion regarding the investment commitments is but one area of miscommunication among the partners. I believe this miscommunication stems in part from insufficient opportunities for the partners to exchange thoughts and experiences. Since China has had its doors open to the outside world for less than twenty years, Chinese agencies and organizations need more understanding of the operation and experiences of international organizations. With better communication, the Chinese and TNC partners could more effectively coordinate their work and mutual expectations.

2. *Conflicting priorities among local government participants.* The local governments in northwestern Yunnan are eager for outside investments, especially for development and economic projects that could bring direct and quick benefits. The same local government officials view conservation and environmental protection projects as long-term work with little immediate benefits. Because local officials have only five-year tenures they are not overly eager for such long-term environmental projects. In my opinion one of the methods that the TNC could use to solve this problem would be first to invest directly into the local communities and then to find some suitable partners in the conservation and development project. In the latter area TNC has benefited from the growth in environmental NGOs in China, which have become partners with TNC northwest Yunnan.

3. *Insufficient exchange of ideas at the local level.* As the successful completion of the master plan indicates, TNC worked very well with upper-level officials and agencies during the initial research phase of the project. However, at the practical, implementation level there is insufficient exchange of ideas between TNC staff and their Chinese partners. Even though more and more people in the project are bilingual, language barriers and clashing personalities hinder this exchange. However, the larger and perhaps more difficult challenge to efficient idea exchange and cooperation are the different methods the Chinese and American partners have in conceptualizing and solving problems. For the YGRP to be successful all the implementing partners must feel comfortable in giving input and asking questions, which I believe will occur over time as the partners become better acquainted.

4. *Insufficient clarity of TNC's goals.* Since the

Yunnan Great River Project represents the first time for TNC to work in China, it is perhaps not surprising that the purpose and operation style of TNC is not very clear to some of TNC's Chinese counterparts. Many Chinese participants and observers would like to ask the same questions, namely, what is the purpose of TNC to invest in such a remote area of China and what is the benefit to TNC to undertake such a project? Northwest Yunnan is one of the most politically sensitive areas in China, for it is very close to the borders of Burma and Tibet. Moreover, most people living in this region are Tibetan or other minority peoples. Therefore, the Chinese government is very attentive and cautious regarding the affairs in this area. The political sensitivity in this area is one of the barriers for some of the Chinese officials, researchers, and community groups to understand fully TNC's motivation. After working for a considerable time with TNC I have come to understand that TNC's purpose is first and foremost to protect nature. TNC's mission, however, is not an easy concept for officials and "common people" in China to grasp. I am confident that this problem will be solved over time as evidence of TNC's good work becomes more widespread.

5. *Insufficient understanding of the project's ultimate purpose.* Many of the Chinese officials and experts involved in the YGRP are not clear as to the purpose or the final results of the project. Will the final results of the project be the establishment of national parks? Nature reserves? Or only a plan on paper? There are eight departments in China connected to conservation affairs and each of them wishes to be involved in the development and maintenance of national parks and reserves. One of the experts in TNC commented to me that TNC only would do some very basic conservation work for the area, which perhaps means that creating a site conservation plan will be the final project result. But will all of the necessary agencies follow this plan?

In order for TNC's work to be fully implemented, a new agency with the authority to deal with all conservation affairs in China would have to be established, similar to Parks Canada or Parks USA. Such an agency is currently but a faraway target. Today, the first step would be for TNC and its partners to provide research information and results to the agencies and institutions that are working on the master plan or are undertaking related projects in northwest Yunnan. Beyond sharing information with various stakeholders, TNC could set up more demonstration projects to show how the broader master plan could be implemented successfully in the future.

6. *Technical problems*. There is not yet clarity as to the specific methods and techniques that should be used for the site conservation plan in northwest Yunnan. Several training courses for local protection experts have been held in Yunnan to explore this issue. The YGRP hopefully will produce examples for Chinese experts to identify effective conservation methods to apply in northwest Yunnan. When YGRP planners enter a new community it is important for them to first understand and integrate local conservation techniques and methods into their master plan work, rather than simply teach new conservation methods and techniques.

Although there are problems in implementation, overall I see that the Yunnan Great Rivers Project is moving in a very positive direction. As they have become acquainted with TNC, local people in northwest Yunnan increasingly accept this international NGO. Moreover, many people in the local governments and communities go directly to TNC with questions, good suggestions, or requests for help. TNC has funded several community-based small projects, such as school building, biogas demonstration projects, and training courses. The National Forest Bureau, Yunnan Forest Department, Yunnan Environment Protection Bureau and some other government agencies have invited TNC to help in the training and conservation projects in Yunnan and other provinces. The YGRP is a pioneering project and TNC is the ideal partner. I believe this project will leave a long and lasting impact on conservation and sustainable development work in China.

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Environmental Action as Mass Campaign

By Jane Sayers

An intriguing feature of the environmental movement in China is an apparent absence of resistance strategies among grassroots environmentalists. While blockades and protest rallies are standard fare for environmental activism in the West, these kinds of actions do not represent a sanctioned form of political participation in China, and thus are not staged. Conscious efforts are made by those working for Chinese environmental nongovernmental organizations (NGOs) to adapt their activities into accepted models of political participation such as mass campaigns and model emulation. While campaigns may appear as superficial and ineffectual tools for NGOs to wield, such tactics are much richer in subversive potential than they may at first appear.

The mass campaign is a particularly significant example of sanctioned political participation in China's modern history. From the seminal land reform campaigns in the early 1950s and the excesses of the Great Leap Forward in 1958 to more recent campaigns that target spiritual pollution and crime, mass campaigns have greatly influenced the communist era and the power dynamics between citizens and the state. It is not surprising that the government still employs strategies derived from mass campaigns, for the Chinese leadership has long recognized campaigns as effective tools with which to involve people in politics without giving them a voice in the formulation of policy. Mass campaigns raise people's consciousness of government policy aims without invoking any sense of independent initiative. Strikingly, in my investigation of contemporary environmental protection activities, I found that mass campaign structures also are used effectively by Chinese NGOs to stimulate public participation and environmental awareness. While the use of mass campaigns in the nongovernmental sector is perhaps unexpected, these kinds of strategies do provide the security of a familiar framework to participants while also offering a surprising scope for substantial—or even radical—social change.

In 2000 and 2001, I conducted my doctoral fieldwork in Beijing where I hoped to find a case study to deepen the research I had been doing on forms of expressions of environmental attitudes in China. In this search to better understand the varying types of environmental activities, I went to any "green" event I was invited to and talked to anyone who could understand my Chinese. Consequently, much of my fieldwork involved attending assorted government and NGO-sponsored environmental activities. Among the many events, two revealed highly divergent and intriguing uses of mass campaign style strategies in environmental activism. One was a government-organized tree-planting event and the other a school participating in the recycling program organized by the Chinese NGO Hand-in-Hand, Building an Earth Village (*shou la shou, diqiu cun*). (*Editor's Note: More information on this NGO can be found in this issue's inventory of environmental projects in China*)

Tree Planting Duty

On 12 March 2001, China's National Tree Planting Day, some 4,000 middle school students descended upon a site in Huairou County, just outside Beijing. The site had been prepared for the planting by local peasants, who had until very recently used this field for their crops. In anticipation of the tree planting, peasants had dug rows of holes (each with a mound of dirt beside it) and at the head of each row was a bundle of meter long sticks, poplar trees stripped of branches and most roots. The students formed lines and their teachers issued both behavioral instructions and shovels. The children then raced off in pairs, shouting and jostling, grabbing a tree on their way to the holes at the other end of the field, as far from teacher supervision as they could manage.

The process of planting for most consisted of one child holding the stick in the hole while the other shoveled in dirt around it. They gave each other critical instructions on how best to hold the tree and how best to shovel the dirt. It was evident that planting trees was not a regular school activity. In their excitement the kids planted the trees in at all kinds of angles. Many of the kids were in need of a gentle reminder to put the dirt in all the way around the tree, rather than just filling up the closest side. Most planted the trees as quickly as they could and then proceeded to chase each other around the field flinging dirt.

In talking to one of the men who had been involved in preparing the site, I was told of the importance of this event in raising the students' awareness of environmental issues. I was further informed that this event was also a chance for the students to show the world their desire to see the Olympics hosted by Beijing in 2008. "How so?" I asked. The students were planting 2,008 trees, a symbol of their green Olympic hope. I then inquired what was to happen to the poor odd-angled trees, would they be replanted or supported? No, I was informed that the angle

of the trees did not matter; those would be pulled out. Successfully planting a stand of trees was not the issue. What was important was raising the students' environmental awareness. I asked him to repeat what he had just said, knowing my Chinese was not all it might be and that I had probably misunderstood. I then repeated it back to him. Yes, I had heard correctly, the trees did not matter, but the raising of consciousness did.

All my experience in China has been in the post-Mao era, but on this occasion I had come as close as I ever would to witnessing the logic of the Great Leap Forward and countless other campaigns. What the organizers considered important was the display—a symbolic action—and not the practical need for afforestation in China's north. The students planted because they were told to—it was their duty. Any environmental awareness gained on this trip was just as likely to come during the bus ride out to the fields as during the actual experience of planting. These children were not fervent communists planting trees for the party or a great leader; rather just kids excited to be out of the classroom. This was a campaign enactment in the style of old. The government issued an order for people to plant trees, and plant they did.[1]

Recycling—Campaigning with a New Face

Hand-in-Hand, Building an Earth Village is an NGO based in Beijing and affiliated with the *Chinese Children's Newspaper* (*Shaonian Bao*). Of the more than 200 schools participating in Hand-in-Hand's programs about half are in Beijing and others are scattered about the country. In 2000, this NGO was awarded a Ford Motor Company conservation and environmental grant to help support its major program that educates children about recycling. The Hand-in-Hand recycling activity involves students collecting recyclable materials at home and each student's "harvest" is weighed, sorted, and recorded at school. The materials are then sold to recycling stations and the money raised is used to help build schools in poverty-afflicted areas of China.

To administer this program, an Earth Village (*diqiu cun*)—a contemporary, albeit miniature, equivalent of a model village—is established in each participating school. Every student becomes a member of the Earth Village's citizenry (*xiao cunmin*). Students hold most of the positions of responsibility within the village: Recycling Depot Leaders (*huishouzhan xiao zhanzhang*) record the quantity and category of recycling materials brought in by each student; Little Recycling Bank Accountants (*huishou yinhang xiao kuaiji*) count and record the amount of money raised from the sale of the recyclable materials; and Little Journalists (*xiao jizhe*) put together a regular environmental bulletin for the school. Each Earth Village also elects a Little Village Leader (*xiao cunzhang),* who takes responsibility for the entire program.

This use of a mass campaign strategy to create Earth Villages differs significantly from the tree-planting event in that it is a form of campaign enactment that empowers and truly educates the participants. Moreover, the children love their village responsibilities. These little environmentalists encourage people from their community to save recyclable items; convince their parents to help carry their heavy loads to school; and scrutinize the weighing and recording process. In short, the students take their roles in the Earth Village very seriously. Through this sustained activity the children learn the power of their own agency and their ability to change their community and the world around them.

In the Hand-in-Hand project, independent learning is facilitated through political structures familiar to the children and families, such as the model village and the mass campaign. But these kids are not just exhibiting proper "external behaviour" (*biaoxian*). Instead they are taking away a different understanding of their role in society. It is a completely different experience from that of the students involved in the mass tree-planting event. This is not to say tree planting lacks value, for afforestation is a vitally important issue and community involvement should be encouraged. But the focus of the tree-planting campaign is flawed. To be truly effective, campaign enactment needs to run deeper than superficial display. The Great Leap Forward and Dazhai embody a sad legacy of the futility and even danger of superficial campaigns.

The Chinese government has encouraged "green" NGOs to become active in the realm of environmental protection and education, but is unwilling (and perhaps unable) to fund such activities. In developing their role in these environmental fields, NGOs have been innovative in using acceptable models of mass participation. As the Hand-In-Hand case illustrates, the ways in which some NGOs are using these mass campaign strategies is moving political participation in environmental protection into the realm of individual agency. May their steps be bold!

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Endnotes

[1]At the end of 1981 the National People's Congress adopted *The Resolution on the Nationwide Voluntary Tree Planting Campaign*. Since that time, it has been compulsory for all able bodied Chinese over 11 years of age to plant 3-5 trees each year, or make comparable contributions to work in nurseries, forestry management, or other afforestation tasks in accordance with local needs. For many, this requirement is fulfilled on March 12 each year, China's National Tree Planting Day.

Notes from the Field: A Peace Corps Perspective

Peace Corps/China, known locally as the U.S.-China Friendship Volunteers, conducts its work solely in Sichuan. While the Peace Corps' presence in China was inaugurated with an English language project in 1993, an environmental education program opened in 2000. Twenty-six Peace Corps Volunteers (PCVs) are currently assigned to universities and high schools in Sichuan Province where they teach, develop curriculum, and conduct community environmental education activities. A glimpse at the experiences of two PCVs in Sichuan is presented below.

My colleagues and I spent three months designing a two-week investigation of ecotourism and development in Rilong—a small mountain town in rural western Sichuan Province. The plan included tallying the bird and plant species in the area, surveying various interest groups in the area (e.g., local residents, tourists, shop owners, tourist companies, government officials), conducting hydrologic measurements, and making maps of the specific tourist trails. Our overall goal was to get an integrated picture of how tourism was affecting the local economy, culture, and environment. It will be the responsibility of the students to organize a duplicate investigation to compare changes over time in the area. These investigations, together, should be able to monitor the changes in development, attitudes, and the natural habitat that is the base for tourism in the area.

With the trip now long over, I feel the real impact lies not with the community that we investigated, but with the investigators themselves. The students have expanded their knowledge of their own community while learning leadership and analytical skills that can accompany them for years to come. Searching for funding options, researching the area's history, contacting government officials, and even setting up a meeting with one of the companies that is investing money in the area—there was no task too daunting or too intimidating for my students. The memory of students drawing little sketch maps in the rain, laughing and singing while sloshing through the mud is an indication that the project was a worthwhile endeavor.

—Brian Robinson, PCV—Sichuan University

Although the performance was several months ago in the heat of a Sichuan summer, I remember my pre-program jitters as if the show was yesterday. It was easily more than 100 degrees where I was sitting in the sun watching the final rehearsal of my students' environmental program. This was the grand finale of a three-week intensive environment and theater class conducted in English. It was (as far as I know) the first of its kind to be taught in Sichuan Province and certainly the first of its kind to be taught in the city of Mianyang. Locally, the event generated so much interest that a television station did a short documentary about the class while local radio stations conducted interviews.

Our vision was to take a group of Chinese high school students and give them the knowledge and tools to create their own performance that would educate the community about various environmental issues. The students who participated in the experiment were hand picked from the top members of the junior class at Nanshan High School. They were selected for excellence in English, interest in environmental science, and a desire to be creative. It was, for most, their first time performing in front of an audience. At our first meeting the students were shy, nervous bookworms, but the class transformed them into confident, creative actors. A few months after the show, I had a chance to meet with several of the students and discuss how the course impacted them. Their response was overwhelmingly positive. The students all said their English fluency is much higher—along with their grades. Moreover, they are much more confident and willing to participate in English class, and many said they want to study environment, biology, or urban planning in university.

—Rehema Clarken, PCV—Mianyang Nanshan Middle School

Spray-Painting Change? Beijing's Green Olympics, NGOs and Lessons Learned from Sydney

By Timothy Hildebrandt

As it campaigned for the 2008 Summer Olympic Games over the last eight years, and even after awarded the honor, Beijing promised the most environmentally friendly Games to date. Is this pledge of "greenness" blind ambition, genuine commitment, or just lip service? Does Beijing garner support from Chinese environmentalists and nongovernmental organizations (NGOs)? Will international NGOs paint their name on these green Olympics as they did in Sydney? Perhaps there are lessons for Beijing to learn from Sydney's attempt at creating the first green Games.

The Chinese government can never be faulted for a lack of ambition. Looking far back into dynastic China and more recently to today's People's Republic, when Chinese leaders embark on a project, they prefer to do it big and with much fanfare. From relatively trivial endeavors such as the new Beijing opera house (the "egg"), to more consequential projects such as the Three Gorges Dam construction, Chinese leaders regularly launch projects with enough gusto and aspiration to make old Soviet hands envious. Watch China fail once, and you can be sure that the next time around, it will succeed…or, at the very least, spend fantastic amounts of money trying.

Having lost by a mere two votes to Sydney during the final round of voting for the 2000 Games, China's leaders almost immediately began examining the source of the failure, and keys to future success. For all that Beijing and Sydney had in common, there was one great difference: Sydney devoted tremendous energy to the newly created "third pillar" of the Olympic movement—environment. Juan Antonio Samaranch, then president of the International Olympic Committee (IOC), acknowledged the integral role of the environment in awarding Australia the 2000 Games, lauding Sydney's commitment to energy, water conservation, and protection of the natural environment.[1] With the endorsement of respected environmental NGOs and a detailed plan of action, Sydney successfully differentiated itself as greener than its Asian neighbor.

The Highest Form of Flattery

If China's ambition is to be admired, so should its knack for imitation. After losing the 2000 Games, the Chinese leadership was determined to make China's next Olympic bid a success. Modeled after Sydney 2000, Beijing's bid showcased a concern for the environment. As has grown fashionable in recent bids, competing cities have attempted to "out-green" each other to demonstrate their concern for environment and devotion to this new "pillar." As expected, China did not disappoint in this respect. Beijing's winning bid included a massive environmental overhaul over a short nine-year period (1998 to 2007). The Beijing Sustainable Development Plan calls for a total of $12.2 billion, devoted to moving or retrofitting high polluting factories; shifting from coal to gas for heating and energy production in the city; reducing auto emissions and solid waste; and general "greening" (e.g., planting trees, laying sod).[2] At the center of its Olympic environmental efforts is the proposed Olympic village, tagged the "Olympic Green." Beijing promises that green land will account for 62.55 percent of the total planned area.[3] The planning committee has further pledged that by 2007, 40 percent of Beijing proper will consist of parks and waterways.[4] Although light on details, the Chinese government is prolific with grand predictions: "In short, by 2008, Beijing will become a 'garden city' up to international standards with blue sky and clean water."[5]

A Pie in That Blue Sky?

While the verb "greening" has become passé, a cynical environmental buzzword has come into fashion: greenwash. Some pundits fear that Beijing's promises are empty, as fake as the Beijing parkways spray painted green in preparation for an IOC visit. Much of Beijing's push for green has focused on creating the image of a green city. Critics contend that while the newfound devotion of Beijing city officials to the environment is admirable, their motivation is dubious and perhaps even dangerous. The easiest way to achieve a green look, beyond the temporary spray paint, is to create a garden city—characterized by vast areas of lawn and trees. Environmentalists argue that water-hungry lawns will only swell an already large water shortage problem and using precious groundwater in planting trees will further deplete aquifers, weakening an already fragile ecosystem.[6] Many of Beijing's greening efforts do not eliminate problems, but simply move them away from Olympic venues. Moving industrial plants, the greatest contributor to pollution in Beijing, might be the capital city's saving

grace yet become the new environmental menace of other areas. For example, the steel maker Shougang Corporation will relocate plants most harmful to the environment from Beijing to Qianan in Hebei Province.[7]

Sweep it Under the Rug, Too

Describing China's motivations to clean up Beijing, Olympic Committee secretary general Tu Mingde opined, "Just as you might…clean the curtains before visitors arrive, the Olympics will provide the urgency the city needs to put its environment in order."[8] Even among those who maintain hope that Beijing's Olympic greening efforts are indeed genuine and not just obligatory window dressing, some insist that the Olympics should not be the motivating factor for environmental policy. Howard Liu, a Hong Kong-based Greenpeace campaigner contends that rescue from the environmental crisis in China should not depend on hosting a sporting event. Liu argues, "China should clean up the air to benefit her people and the environment…if she loses the Olympic bid, will this stop the effort of improving air quality?"[9] A longer, more sustained commitment is necessary for a truly viable environmental policy. Conversely, an overly ambitious policy, bound within an unrealistic timeframe, may cause the environment to fall off the list of China's priorities, with the Olympics now firmly in hand.

Green Power?

A Chinese government poll concluded that 95 percent of Beijing residents supported the Olympic bid (an independent IOC poll arrived at a slightly higher 96 percent figure). Beijing bid officials probably would not include NGOs in this small minority. In fact, officials have claimed that 20 NGOs collectively signed an "Action Plan for a Green Olympics" to show support.[10] However, Wen Bo, a veteran Chinese environmental campaigner reports that, not surprisingly, nearly all of these twenty are government-organized NGOs (GONGOs). Despite efforts to emulate the Sydney formula of including NGOs in the environmental planning process, he speculates that there are not many real chances for NGO involvement—Beijing prefers the NGOs to serve as a rubber stamp as opposed to an active participant or watchdog. Wen Bo views the government's desire for NGO participation as largely superficial, for environmental groups were not invited to participate until very late in the bidding process. Moreover, while the government informally consulted nonprofit NGOs such as Global Village Beijing, Friends of Nature, and Friends of Earth (Hong Kong) prior to the bid, the bulk of outside input has come from professional environmental for-profit consulting corporations—Beijing has enlisted the services of Colorado-based CH2MHill.

The founders of China's first two independent environmental NGOs—Sheri Liao Xiaoyi (Global Village Beijing) and Liang Congjie (Friends of Nature) were dubbed the "Green Olympic Ambassadors" during the bidding process. Both utilized their new "title" to introduce some new greening efforts in Beijing. Friends of Nature laid the groundwork for a green hotel certification and Global Village Beijing expanded on their existing green communities work. Now that Beijing has secured the Olympics it is not yet clear whether these two NGOs will be part of the official planning.

This somewhat half-hearted effort to involve NGOs elicits the question of whether Chinese environmental NGOs truly support Beijing's Olympic bid and its massive effort to green the city over the next seven years. Many NGOs believe there is much criticism to go around. The huge infrastructure projects, for example, will have a high environmental toll. Stadiums are going up in the environmentally desirable (read: naturally green and clean) north area of Beijing. Such natural greenways shield Beijing from the swelling desertification of northeastern China. But environmental observers speculate that massive digging projects necessary for Olympic infrastructure projects will destroy the last natural means of blocking the exceedingly frequent sandstorms. These adverse environmental impacts call into question the government's declaration that "the construction of the Olympic village will not threaten the city's ecosystem."[11] Quite possibly, the currently unspoiled and undeveloped areas of the city could be degraded in the name of a Green Olympics.

Yet, despite the possible shortcomings of Beijing's plan, greening efforts enjoy (sometimes muted) support among Chinese NGOs. Wen Bo speculates that Chinese NGOs do not criticize the bid committee because they trust the Olympics will transform the way China's government works. In other words, if Chinese environmental activists give a moderate thumbs up (or at least reserve outright criticism), they may enjoy greater freedom to perform their work.

Indeed, many Chinese environmentalists see much to gain from the Beijing Olympics. At the very least, the previous attitude of indifference will give way to simple recognition of environmental inadequacies. Sheri Liao Xiaoyi, while critical of the present environmental situation in Beijing, theorizes that the Olympics offer the best opportunity yet to advance the green movement in China—a "moment that has to be seized for the chance of a lifetime to introduce Beijingers to a green lifestyle."[12]

The Olympics will promote cleanup efforts; result in an increase in overall public awareness; and provide many lessons on a large-scale model for environmental management. For many Chinese NGOs, the benefits of the Olympics outweigh the costs.

Spray painting Beijing grass green in preparation for an IOC visit in 2000

Once Bitten: The Case of Greenpeace and Sydney 2000

The Beijing bid committee's limited inclusion of NGOs is no real surprise. The "Green Games" did not gain an air of legitimacy until Greenpeace endorsed the Sydney Olympic bid committee's greening efforts. Leading the environmental NGO charge, Greenpeace took a highly visible role in developing environmental guidelines for Sydney's bid and even claimed ownership of the Game's environmental pillar. A Greenpeace Olympic representative reminded media, "The idea for a Green Games was ours."[13] Indeed, Greenpeace's involvement proved crucial for the credibility of truly green Games and for Sydney's defeat of Beijing.

Outwardly, the Greenpeace/Sydney 2000 partnership was a case of opposites attracting. The Sydney Olympics secured an endorsement for its environmental pillar from an independent organization with unquestioned devotion to the environment. Greenpeace, often viewed as radical among other more mainstream international organizations, showed it could engage the international community in an effective, non-confrontational manner.

Sydney 2000's idyllic vision of institutional reciprocity would give international NGOs like Greenpeace all the more reason to support Beijing's greening efforts. Beijing would gain an independent endorsement and legitimacy of its efforts, while Greenpeace could restore its relationship with the Chinese government after years of hostility, best exemplified by the 1995 incident in which six Greenpeace activists were arrested in Tiananmen Square for protesting China's nuclear program.[14]

A Greenpeace endorsement of Beijing might have been feasible had its relationship with the Sydney Olympics actually succeeded. The unlikely pairing of government officials and notoriously radical environmentalists was perhaps doomed from the beginning. Greenpeace reports that constant supervision was required to ensure that Australian Olympic officials adhered to their environmental commitments.[15] Even worse, on the eve of the opening ceremonies, Greenpeace made headlines threatening to withdraw support of the green Olympics upon discovering the use of ozone-depleting chemicals in Olympic construction.

The environmental community did not wait until the opening ceremonies, let alone the close of the Sydney Games, to voice their dissatisfaction. As early as 1995, Greenpeace began to abandon its support of the Games. "Our investigation shows…not only is the 'Green Games' concept rapidly becoming a cynical farce, but…the presence of high levels of dioxin at Homebush Bay presents a real environmental and health threat." Homebush Bay, the showcase site for the 2000 Summer Games, quickly emerged as the primary example of Sydney's flawed effort to green the Games. A former industrial site and armaments depot, Homebush Bay had experienced years of unregulated waste dumping and widespread water contamination from asbestos, arsenic, chromium, lead, and mercury—with levels so high that comprehensive fishing bans are still enforced throughout the area. The bay is further noted as one of the world's worst dioxin hotspots, a consequence of Union Carbide's local manufacturing of Agent Orange during the 1970s.[16]

The failure to clean the Homebush site was just one in a long list of environmental gaffes noted by Greenpeace. Sydney's Olympic Committee Authority (OCA) failed to provide natural cooling chemicals for venue air conditioning. Greenpeace representative Blair Palese criticized, "Not a single venue meets the guidelines where they committed specifically to non-ozone depleting and non-greenhouse gases."[17] After learning that Sydney's SuperDome installed an ozone-depleting air-conditioning

system, Michael Bland offered a particularly disheartening rebuke, "The OCA has put another nail in the coffin of the Green Games."[18] The Olympic Village, once the centerpiece of the green Games, underwent a drastic design change after the bid was won. Most troubling to Greenpeace was the use of the toxic building material PVC in the village's construction—a particularly stinging slap in the face for Greenpeace in light of its worldwide campaign to ban all use of PVC material in construction projects.[19]

Greenpeace was not alone in its dissatisfaction with Sydney's Olympic greening efforts. As early as the bidding process, and up to the completion of the Sydney Games, other environmental groups were reserved in their support for the OCA. Although Sydney Olympic bid documents claimed wide NGO support from the largest Australian environmental NGOs (Australian Conservation Foundation, New South Wales National Conservation Council and Total Environment Centre), these organizations were quick to draw a distinction—while some individuals affiliated with these NGOs had joined an environmental task force on the Games, individual participation did not imply institutional support. In the end, Green Games Watch 2000 (a coalition of major state and national environmental groups) concluded that Sydney served as an example of opportunities lost, dubbing the 2000 Olympics the 'light green' Games.[20] Although the campaign to create green Games did bring environmental concerns into the Olympic debate, the inadequacy of Sydney's efforts reveal that much work remains to have truly green Games. Moreover, the Sydney experience raises serious questions regarding Beijing's chances for green Games.

Red and Green—Clashing and Complementing

The environmental shortcomings of the Sydney Olympics do not provide much promise for future Games. If a technologically advanced country marked by relatively clean cities struggles to meet its goals for green Games, it is difficult to have high expectations for Games to be held in a rapidly developing, relatively dirty Beijing. While the Sydney Games illustrate the difficulty of executing a green Games, the Salt Lake City Games offer a more recent case. Although satisfied with efforts at environmental education and awareness, local and national conservation groups were distressed at the overall environmental degradation caused by the 2002 Games. Even those who took an active role in working with the Salt Lake Olympic Committee (SLOC) issue harsh criticism of the *Game's* environmental failings. Tom Price, chairman of SLOC's environmental advisory committee, acknowledged, "[SLOC] really dropped the ball and the environment is going to suffer."[21] Others have been even more cynical. "The only thing green about these Games is the color of the currency being thrown around," declared Alexis Kelner, co-founder of the Utah environmental group Save Our Canyons.[22]

For fear of risking their reputations, international environmental groups might logically hesitate to endorse the Beijing Olympics after witnessing the negligence of the seemingly responsible Sydney bid committee. For Greenpeace specifically, the fear of compromised ideals and possible public embarrassment outweigh the benefits of endorsing the Beijing Games and gaining favor with the Chinese government. The Greenpeace case, however, does not equate broad-based reluctance from international groups.

While it can be reasonably assumed that international environmental NGOs will not engage in a cooperative relationship with Olympic planners as in the Sydney Games, a number of the NGOs which have been active in China for many years are beginning to design projects that might help lessen the environmental impact of the Olympics. Discussions with international NGOs and academic institutions suggest that low-level, non-controversial and non-confrontational environmental work will occur. [23] For example, some groups are embarking on energy efficiency projects. [24]

Chinese NGOs, well acquainted with the difficulty of activism in their country, appear even more willing than international groups to undertake projects and activities aimed at lowering the environmental impact of the 2008 Olympics. The NGO culture in China, perhaps a product of China's political culture, helps explain the willingness of Chinese NGOs to work with the government. Liang Congjie, founder of Friends of Nature, contends that NGOs in China choose their battles carefully, lest they lose credibility and any possibility of government support. In the case of the green Games, as with most campaigns, environmental groups will devote themselves to raising awareness and educating the public.[25] Chinese environmental NGOs are dedicated to using the 2008 Olympics to their advantage regardless of whether concrete improvements in Beijing's environment result.

Despite Chinese environmental NGOs' willingness to work with the Olympic planners, groups even less likely to be a thorn in the side of Beijing may very well compromise the NGO role. The greatest potential for international activity lies, perhaps not surprisingly, in the corporate sector. Beijing's reliance on an environmental consulting agency, as opposed to environmental NGOs, suggests a future trend. Private enterprises, paid by the

Chinese government, are far more easily controlled—CH2MHill will most certainly not brand these green Games a farce. More importantly, the private sector greening efforts in China are expected to bring rise to an environmental protection industry; government officials predict an annual industry growth of 15 percent, reaching 200 billion RMB by 2005. The privatization of environmental work could very well be a more accurate prediction of the future greening of China.

Six years ahead of the opening ceremonies, the success of Beijing's green Games is obviously uncertain. We are then left only with speculation. The hopeful theorize that the Olympics will provide an opportunity to heighten the awareness of environmental problems; cynics see the greening as disingenuous with the NGO role merely a rubber stamp for centrally planned and centrally executed changes.

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[23] While no NGOs have yet taken a position on Beijing's successful bid, it is conceivable that some international environmental groups that have long protested the involvement

of U.S. businesses and banks in China's massive infrastructure projects (e.g., the Three Gorges Dam), may campaign against U.S. business investment in the Beijing Olympics.

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Call for Contributions to the New Sinosphere Journal

Sinosphere Journal is the journal of PACE, the Professional Association for China's Environment (http://www.chinaenvironment.net). The *Sinosphere Journal* has enjoyed great success in the past and published 12 issues from 1998 to 2000. Past issues of the journal covered a wide range of topics including transportation, energy efficiency, U.S.-China relations, trade and the environment, air and water resources, environmental education, and NGOs in China (available online at: http://www.chinaenvironment.net/sino). After a recent reorganization of the editorial board, the new *Sinosphere Journal* will resume publication in the summer of 2002. The new *Sinosphere Journal* will be distributed electronically, as well as by mail, to nearly 1,000 PACE members around the globe.

The editorial board is seeking three types of contributions:

Abstracts

Individuals who have written, published, or presented any articles relevant to the study of China's environment are invited to send an abstract of the article. Please include the date and full citation for the article and information on how to obtain a copy.

Field Notes

Short summaries of field studies are welcome, for these field notes have proven to be very timely and informative for our readers.

Articles and Essays

For those interested in expressing views in short scholarly essays devoted to a single topic, articles on any subject relevant to China's environment, including technological developments, business trends, and policy issues are welcome. These articles should be approximately 2,000 words in length, although quality is more important than quantity.

Please send all submissions with your full contact information to the editors at: sinosphere@yahoogroups.com

The Next Issue

The theme of the summer 2002 issue will be "New Approaches to Emission Control in China." It will expand upon the discussion of this topic at the March 2002 PACE China Environment Workshop in Washington, DC, and will feature articles by the U.S. Environmental Protection Agency and the China Research Academy for Environmental Science, the Massachusetts Department of Environmental Protection, Environmental Defense, and the Natural Resources Defense Council.

Brick by Brick: Improving the Energy and Environmental Performance of China's Buildings

By Robert Watson and Barbara Finamore

As the old saying goes, "In theory there should be no difference between theory and practice; but in practice there usually is." The first goal of the Natural Resources Defense Council (NRDC) in China is to promote innovative energy and environmental policies, or "theories," while furthering China's development goals. Our second, and generally more vexing, goal is to turn these new theories into practice.

Improving the energy and environmental performance of China's buildings is a central feature of NRDC's China Clean Energy program. In terms of total national energy consumption in China, the energy used to operate buildings in China is estimated to range between 20 and 25 percent on a coal equivalency basis,[1] while the energy used to produce building construction materials (e.g., embodied energy[2]) adds another 15 to 20 percent. At 35 to 45 percent of total national energy consumption, buildings in China are a sometimes overlooked but extremely important area to target for reducing energy consumption and its attendant environmental problems.[3] The World Bank estimates that more than one-half of China's urban residential and commercial building stock in 2015 will likely be constructed after the year 2000. Therefore, the buildings that will be constructed over the next decade will determine future energy-efficiency levels for decades, since each new building may be used for 50 years or more.

Besides energy consumption concerns, urban water consumption and the provision of clean drinking water are also severe environmental issues that can be positively impacted by better building design. Reducing the water consumption in buildings, while at the same time providing onsite sewage treatment or pretreatment facilities, would significantly move these water issues forward in China. In addition, indoor air quality problems resulting from the direct combustion of coal, kerosene, oil, and traditional biomass pose very serious public health threats and are worthy of inclusion in programs to reduce the environmental impact of buildings. Finally, as China's housing stock and commercial building stock grow rapidly over the next 20 years, the amount of land dedicated to not only buildings, but also the supporting infrastructure—roads, parking lots, and walkways—will be a significant source of land consumption in China. Given the rapid disappearance of arable land caused by desertification and encroachment from construction, the ramifications for China's food supply are considerable.

Energy-Saving Building Codes

Supported by the U.S. Department of Energy and the Energy Foundation, NRDC has been working with the Ministry of Construction (MOC), the Ministry of Science and Technology (MOST), and Lawrence Berkeley National Laboratory (LBNL) to reduce energy consumption in Chinese buildings. With MOC and LBNL, NRDC has been deeply involved in the development of energy-saving building codes for the so-called "transition zone," the region encompassing the Yangtze River Basin, home to over 500 million people. It is called the transition zone because it requires heating in winter and cooling in summer, and is also characterized by relatively high levels of humidity in the spring and fall.

The stated goal of this building code is to reduce heating and cooling energy consumption in residential buildings by 50 percent. This was principally accomplished by requiring additional wall insulation and window improvements that reduce infiltration and energy loss through the window frames. During the course of the development of the transition zone energy standard, we saw a number of very important changes taking place. First, under the tutelage of LBNL, detailed energy simulation modeling of potential energy-saving measures was carried out using the DOE-2 energy model. A simplified version of this model is currently being developed in China as a code compliance tool.

A second very important change was the growing inclusion of private sector participants, such as developers and materials and equipment manufacturers, in the standard setting process. NRDC supports increased participation by affected parties in this process because implementation of China's energy standards will rely very heavily on the availability of products to meet the standards, as well as the willingness of the developers to implement those standards.

Third, we were delighted to see an increased willingness on the part of local governments to allow international experts to review and comment on draft legislation. As a prelude to our work on the transition zone code, we first signed an agreement with the Chongqing Construction Commission to assist with the development of a local energy-saving building code. We

assembled a team of experts from within and outside NRDC and came to our first meeting in Chongqing eager to review the draft code, the first of its kind in China. Imagine our astonishment to find out that in the few short weeks between the signing of our agreement and the first substantive meeting, the Chongqing government already had submitted a building code to the municipal legislature, which quickly enacted it into law.

We later learned that the local government was extremely nervous about showing any sort of draft legislation or regulations to foreigners, so they enacted the building code first, and then asked for our comments. After recovering from the news, we dutifully prepared dozens of pages of comments on the final version, which appeared to break the impasse. The Chongqing government used these comments as the basis for preparing detailed building code management and implementation regulations, and has worked closely with NRDC ever since on both local implementation and the development of the transition zone code.

There are a number of areas where the standard setting process in China could be improved. For example, conducting detailed economic and cost benefit analyses of proposed measures could determine which measures are most cost effective in achieving the standards' goals. In addition, we believe that broader outreach to industries and the implementing agencies at the municipal level is warranted at the code development stage and would result in a standard that is more readily implemented. Finally, we believe that China should release a standard with more than one tier of requirements, one with a near-term implementation date, the other a more stringent tier that would be implemented later. A two-tiered standard would be beneficial in triggering the market transformation that the standards are intended to stimulate.

Energy Efficient Building Demonstration

In the commercial sector, NRDC has been coordinating a project with the Ministry of Science and Technology and the U.S. Department of Energy to design and build a demonstration energy efficient commercial office building in Beijing. This building will house the offices of the National Research Center for Science and Technology for Sustainable Development and the Administrative Center for China's Agenda 21, two divisions of MOST.

The 130,000 square foot cross-shaped demonstration building is expected to use between 30 and 50 percent less energy than a comparable square-shaped office building in Beijing due to a number of energy-efficiency measures. (See Table 1) The demonstration building is intended to be revolutionary through its comprehensive utilization of "state of the shelf" technologies[4] to reduce energy consumption and an integrated design process.

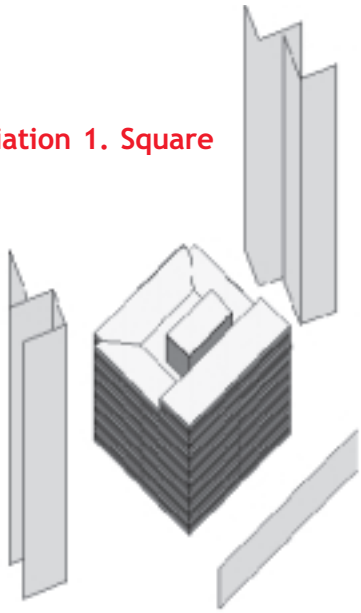
The integrated design process ensures that the energy savings resulting from the application of energy-saving technologies are enhanced and amplified by the application of other energy-saving technologies. For example, when energy-efficient windows and lighting systems are installed, there is much less waste heat to remove, whether generated by indoor lights or the sun. Therefore, the size of the air conditioning system can be

Table 1. Energy Consumption Savings of Efficient Buildings

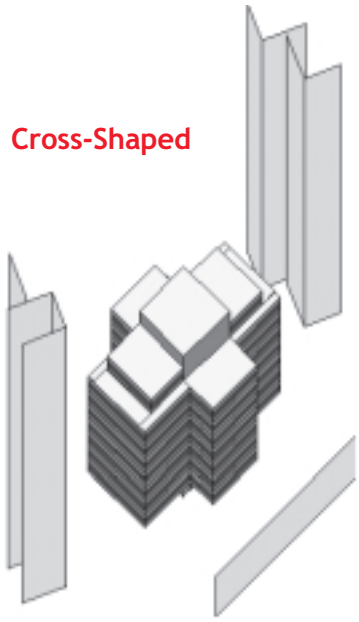
	Megawatts/Year
Energy Consumption of Square Building (With no energy efficiency measures)	1167
Energy Efficiency Measures	
Cross-Shaped Building	-41
Energy Efficient Lighting	-453
Energy Efficient Windows	-26
Energy Efficient HVAC	-56
Other Efficiency Measures	-35
Projected Energy Consumption of Efficient Building (Does not include plug loads - computers, office equipment)	556

Figure 1. Building Designs

Variation 1. Square



Variation 4. Cross-Shaped Building



reduced dramatically. Reducing the size of the air conditioning system can result in very significant capital cost savings, which in turn can be used to invest in the additional energy-saving measures for the windows and lighting.

Other innovations include the addition of architectural light shells that will not only act as physical shading devices for the windows, but also will bounce light deeper into the core of the building, producing higher lighting levels with less electric lighting. In addition, a significant operational cost savings will result from the utilization of ice storage air conditioning technology, which will be charged during the off-peak hours when electricity costs are low, and utilized during the peak electricity hours when energy prices are high. Finally, the energy modeling undertaken by LBNL identified many opportunities for cost-effective savings from building design. One of the most dramatic savings came from changing the geometry of the building from a square-shaped building to a cross-shaped building. (See Figure 1)

Bidding and Breaking Ground

Every one of Beijing's top construction companies competed fiercely in MOST's competitive bidding process for the right to build the demonstration building. Representatives from several companies said they saw this building as representing the future of construction in China. A number of American companies are participating in the project by selling their efficient building technologies and materials to MOST for the same price as ordinary non-efficient products—an across-the-board price reduction of about 30 percent. The Ministry of Construction has said that they will use the information coming out of this project to inform the development of an energy-saving commercial building standard for China.

On the second floor of the building will be an energy technology demonstration center, which will be used to display the latest energy-saving technologies from around the world, as well as train architectural students and professionals in integrated energy-efficient and environmentally sound building design. Manufacturers from around the world will be solicited to donate their material and equipment to the facility, which will have rotating displays demonstrating and emphasizing various energy-efficiency issues, measures, and technologies.

The Ministry of Science and Technology hosted a gala groundbreaking ceremony in Beijing on the last day of February 2002. Legions of Chinese construction workers in bright red or yellow hard hats stood guard in the brilliant sunshine as a host of dignitaries with orchid corsages shivered in the shade covering the platform. After the requisite speeches, each VIP turned a shovel of dirt over the handsome foundation stone while cardboard cannons of multicolored confetti (in lieu of forbidden

NRDC's Rob Watson and Barbara Finamore join Joe Huang (LBNL), Wang Weizhong (ACCA21), and Wang Yuan (NRCSTD) to break new ground in Beijing (February 2002).

firecrackers) were shot overhead.

As the guests moved away toward the waiting buses, a roar of heavy machinery caused them to turn back. Aided by a giant backhoe and tired of standing around, the construction workers wasted no time in getting down to the real work of digging the building's foundation. When it comes to energy efficiency, these workers practice what others preach.

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Endnotes

[1] China uses "tonnes of coal equivalent" (tce) as the common unit of reporting energy consumption at the macro level. One tce approximately equals 4 barrels of oil.

[2] For example, a ton of cement has about a barrel's worth of oil "embodied" in its production and transport to the building site.

[3] In terms of total national energy consumption in the United States, the energy used to operate buildings in is 36 percent direct consumption, while embodied energy (e.g., building materials) is 6 percent.

[4] This means the best technology readily available in the market.

Lean and Green: Boosting Chinese Energy Efficiency through ESCOs

By Pam Baldinger

In my old office in Beijing, the rooms sometimes became so stiflingly warm and dry in winter we were forced to open the windows to admit a few gusts of blustery air. I also knew a woman whose office was so cold in summer that she actually bought a portable space heater to warm her cubicle! Efficiently utilizing heating and air conditioning systems is becoming more important in China as the country continues to build both a market economy and ever larger numbers of new buildings. Though China has made great strides to improve the energy efficiency of its industrial base over the past 20 years, statistics show there is still a long way to go. Heating, lighting, and cooling public buildings alone accounts for 5 percent of China's energy consumption, while a Chinese steel maker uses nearly three times as much energy to make a ton of steel as a Japanese steel maker. On average, China's key energy-consuming industries use anywhere from 12 to 98 percent more energy per unit of production than those in developed countries. The cost of this inefficiency is high—more pollution, lower productivity, and wasted resources. So, the $64,000 question becomes:

Q: *How can you get Chinese factory managers or building owners to focus on and invest in energy-saving measures when their real interest is boosting sales?*

A: *By providing them the relevant services and equipment* ***without*** *making them pay upfront.*

At least, that is the hope of the joint World Bank/ Global Environment Facility (GEF) China Energy Conservation Project, which is now entering its second phase. The goal of this project is to promote the concept of energy management contracting in China, through the introduction of specialized companies referred to worldwide as ESCOs (energy service companies). Since the term "energy service company" is already used in China for a different type of organization, the Chinese have coined a different name for their ESCOs—energy management companies, or EMCs.

EMCs provide a unique combination of services to their clients. After conducting an energy assessment of a facility, an EMC will design an energy savings plan, buy and install requisite equipment, train the facility's staff how to use the equipment, and then monitor implementation of the overall savings plan. The client's facility pays nothing upfront, and obtains title to the equipment upon expiration of the contract. The EMC is paid with the funds its client saves through its new energy savings. Based upon the initial audit, the EMC and its customer will sign a contract specifying the amount of expected savings, and obligating the customer to pay a certain percentage of the savings to the EMC each month. In essence, the EMC functions as both banker and technical expert for its clients; the EMC must therefore have strong financial, management, and technical capacity to succeed.

The World Bank began discussing the EMC concept with the Chinese State Economic and Trade Commission (SETC) in 1997. With financial support from GEF, the World Bank, and the European Commission, the first phase of the resulting China Energy Conservation Project focused on establishing three pilot EMCs. Prior to this time, the notion of energy management contracts was unknown in China. Though the Chinese leadership has long recognized the importance of improving energy efficiency and SETC—through its local branches—has established a nationwide network of energy conservation centers to assist industry, most efforts have been government-directed, utilizing a command-and-control approach. EMCs represent a novel way of using market mechanisms to drive efficiency efforts; the customers enter into contracts to bolster their overall energy and economic efficiency.

The pilot EMCs, located in Liaoning, Shandong, and Beijing, began operating in 1998-1999. To date, they have implemented over 200 projects, resulting in significant energy savings and reductions in greenhouse gas emissions. The payback period for the EMCs is quite quick, with contracts typically lasting one to three years, and the work can be lucrative—the average annual rate-of-return exceeds 20 percent. Unlike the experience in the United States, where the contracts between ESCOs and their clients are extremely legalistic and disputes over the measurement of energy savings common, the Chinese EMCs have had few problems of this nature.

Based upon the successful experiences of the pilot EMCs, the World Bank, GEF, and their Chinese partner on the project, SETC, decided to expand the project. Phase II, which should be approved by the World Bank's board of directors in the summer of 2002, has two goals: (1) to expand the number of EMCs in China by setting

up an EMC association that will provide training and other services; and (2) to set up a risk reserve fund for partial loan guarantees to lenders, so that Chinese banks will feel more comfortable lending to the new EMCs. Currently, the small size and new nature of most EMCs and EMC projects are disincentives to risk-averse Chinese banks. Involving the financial community in the development of the EMC industry is critical if the industry is to become sustainable, the ultimate goal of the project.

In August 2000, SETC posted a notice announcing Phase II and asked companies interested in learning more about the EMC concept to contact the project management office. Over 100 companies from all over China responded and several dozen already have completed introductory training courses. I recently had the opportunity to work with a World Bank team preparing for implementation of the project, and was able to meet with several prospective EMCs as well as representatives of the financial community. These meetings highlighted the bright prospects for the EMC model in China, as well as the significant challenges that must be overcome to make the model successful.

If there was one common denominator amongst the companies I met, it was the need for more information. The bankers are unfamiliar with energy efficiency projects in general, let alone such a new concept as energy management contracting. The prospective EMCs offered the flip side: they may understand energy efficiency technologies, but tend to have limited financial expertise and little or no experience in obtaining financing from Chinese banks. All of these factors now are being incorporated into various Phase II training programs that will seek to bridge these gaps.

Many EMCs estimated they would be able at least to double their business with access to a line of credit; the challenge will be to establish their creditworthiness given limited assets and credit histories. The critical role of intermediary between the banks and EMCs will fall to the China National Investment and Guaranty Company (I&G), which is working with the World Bank and SETC to structure the guarantee fund. In issuing a guarantee to a bank for a loan to an EMC, I&G essentially takes the first-loss position. The guarantee company, therefore, will work with prospective EMCs to evaluate project risk (particularly the EMC client's ability to meet contract terms), as an EMC's future cash flow will have a significant impact on its ability to repay a loan.

The loan guarantee fund not only will be critical to spurring development of the EMC industry (by providing access to much-needed capital), it also should foster reform of China's financial sector. Though much work remains to be done, the structure of the fund will compel Chinese banks and guarantee companies to evaluate new forms of structured finance and risk-sharing agreements. Ultimately, Chinese financial institutions should be utilizing more market-based criteria with which to evaluate projects and set prices for various services.

The prospects for energy savings in China are tremendous, given the inefficient use of energy by industry as well as significant waste in residential and commercial buildings. According to SETC, China's average energy consumption per 10,000 RMB of GDP is triple the world average. Given China's heavy reliance on coal, more efficient energy use can result in significant environmental improvements; GEF estimates that over ten years the China Energy Conservation Project could reduce carbon emissions by 34 million tons. Moreover, China's experience with the credit guarantee fund, if successful, could serve as a model for other countries, many of which are watching the program closely. Thus, the potential for China's EMCs to make their mark is great indeed.

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Pacific Environment

Pacific Environment—a California-based nongovernmental organization (NGO)—protects the living environment of the Pacific Rim by strengthening democracy, supporting grassroots activism, empowering communities, and redefining international policies. In China, Pacific Environment is active in four areas—civil society support, marine conservation, timber trade monitoring, and freshwater conservation.

Building Civil Society through Support of Chinese NGOs
Pacific Environment, in partnership with Global Greengrants Fund, provides direct support to thirty Chinese NGOs that have great potential to become the cornerstones of the environmental movement in China. Pacific Environment's China Representative, Wen Bo, is always seeking promising new environmental groups and leaders. In 2003, Pacific Environment will host a Chinese NGO/student training conference that will cover campaign training, strategic planning, fundraising, and administration.

Marine Conservation
China is home to an astonishing variety of marine life. Many mammal species, such as Yangtze River dolphins, Chinese white dolphins, and Dugong sea lions are unique to China. However, growing industrial waste dumped directly into rivers is seriously polluting the marine habitat along China's coast.

- Pacific Environment is now working with the Liaoning Marine Fisheries Research Institute to establish a natural reserve for the Dugong sea lions in Hainan Province. In October 2002, Pacific Environment will convene a China Marine Stakeholders' group (comprised of scientists, NGOs, and government officials) to build political support for marine protection and to develop a strategy to protect marine species and habitats.

Timber Trade Monitoring and Enforcement
China's economic growth has resulted in a huge demand for wood and paper products. Massive deforestation in the upper reaches of the Yangtze River led to serious floods in 1998, which motivated the Chinese government to place bans on logging to protect forests and limit erosion. These bans have pushed Chinese industries to look abroad for sources of timber—north to the vast forests of Russia; and south to Burma, Laos, Cambodia, and other Southeast Asian countries. The volume of Russian timber alone sold in China has increased ten-fold in the last five years.

- Pacific Environment is developing a transboundary strategy to counter this rapid deforestation rate. In 2000, Pacific Environment organized the first meeting of forest activists from Russia and China to launch a program to help stem the tide of illegal logs. Pacific Environment also is developing a program that will involve: (1) hiring monitors in northern China to gather timber information at border crossings, and (2) initiating an outreach effort to regional news media and government officials on forestry protection and the impact of timber consumption in China.

Freshwater Conservation and River Monitoring
China has nine of the world's ten most polluted rivers, making water quality a critical concern of virtually all Chinese citizens. Paper factories and industrial agriculture facilities dump untreated pollution directly into rivers, which threatens human and ecosystem health.

- Many freshwater species, including the Yangtze River dolphin, are now on the verge of extinction due to their habitat being poisoned. In the coming year, Pacific Environment will be providing support to Chinese organizations that will participate in an international Yangtze River monitoring project.

Further information on Pacific Environment is available at: http://www.pacificenvironment.org

Renewable Energy in China

19 July 2001

Debra J. Lew, U.S. National Renewable Energy Laboratory

Eric Martinot, Global Environment Facility

Song Yanqin, Chinese Renewable Energy Industries Association

By Qin Xin

Although governments (and individuals) around the world are becoming increasingly concerned about degraded air quality and global warming, many remain unwilling to sacrifice economic growth or comfortable lifestyles in exchange for a cleaner environment. The development of safe, clean, and cost-effective alternatives to conventional energy has therefore become crucial. For China, a country relying on coal—the "dirtiest" energy source—for 75 percent of its primary commercial energy use, the task to find clean energy is even more imperative. Given China is expected to become the largest energy consumer in the coming decades, how the Chinese leadership chooses to solve its energy problem will not only bear on the country's own environmental future, but also on the environment of neighboring countries, and the world. China's energy path will have strong implications for global climate change. Rich in renewable energy sources (such as wind, solar, small hydro, and biomass) China has a great potential to develop clean energy. On 19 July 2001, the Environmental Change and Security Project's Working Group on Environment in U.S.-China Relations gathered at the Woodrow Wilson Center in Washington, DC for a discussion on China's renewable energy development. Three speakers discussed the current status of China's renewable energy development, and examined problems China needs to overcome to successfully develop a clean energy infrastructure.

Debra J. Lew

An Overview of China's Renewable Energy Development

A considerable amount of renewable energy is being used in China, according to Dr. Debra Lew, a senior project leader with the National Renewable Energy Laboratory (NREL). Traditional, noncommercial biomass constitutes 15 percent of China's total primary energy use. While new, commercial renewables (wind power, solar, small hydro, biogass, and biomass gasification) represent another two percent. China has been very successful in developing small-scale renewable energy. In fact, a significant number of installed household systems and a mature industry for small-scale renewable energy are already in place. China leads the world with its 155,000 to 170,000 small wind turbines and 17 gigawatts (GW) of energy generated by small hydropower. The country also contains the world's most household biogas digesters and biomass cook stoves. Additionally, the use of solar home systems is rapidly

expanding in China, with approximately 200,000 systems already installed for rural electrification.

In contrast to impressive small-scale facilities, the development of utility-scale, grid-connected renewable energy is not as successful in China, for the market is still being developed and the industry is not mature. For example, China now has 345 megawatts (MW) grid-connected wind power, merely 1/1000th of its potential; its biomass power generation, at about 400 MW, is only one percent of that used in all other developing countries.

Debra Lew attributes the relative success of small-scale energy development in China to a combination of research and development (R & D) with institutional infrastructure development and fiscal incentives. Chinese researchers have made considerable R & D efforts on small renewable energy since the 1950s; foreign technologies also were imported and adapted to China's needs. Simultaneously, a complete institutional infrastructure has gradually been established. Most notably is the fact that 80 percent of the counties in China now have a rural energy office, which plays an important role in marketing and popularizing the new renewable energy technologies, as well as providing training and technical services. In addition, the Chinese government also has promoted the use of these energies through a series of fiscal incentives such as subsidies, low-interest loans, and preferential tax policies. All these efforts have helped bring about a mature small renewable energy industry that is driven by the market instead of government command-and-control.

Debra Lew then highlighted some of the challenges facing the development of large-scale, grid-connected renewables. While the lack of funding often is cited by the Chinese government as the greatest barrier to building large renewable energy projects, Dr. Lew believes the real problem is market distortions due to China's reliance on tied aid from some European countries. Tied aid makes it difficult for the private renewable industry to grow on a commercial scale and become self-sustaining. In addition, China's power industry is currently in the process of utility restructuring and companies are reluctant to invest in renewables which are high risk and costly investments. Another major hindrance to large-scale renewable energy development is the fact China does not have an independent power industry and the government control leads to a lack of competition and distorted power prices. The Chinese government has set up a variety of policies and programs to promote the development of renewable energy in recent years, but too often these programs create only rules and guidelines without specific measures for implementation. All these problems, as well as issues such as technology transfer and resource assessment, need to be addressed for the successful development of large-scale renewable energy.

In conclusion, Debra Lew talked briefly about international assistance to China's renewable energy development, such as World Bank/Global Environment Facility (GEF) projects, the U.S.-China Bilateral Protocol on Energy Efficiency and Renewable Energy, and the Energy Foundation's China Sustainable Energy Program.

(*Editor's Note: For more information on these projects, see the NREL inventory entry in this issue of the China Environment Series and see Fact Sheet: Renewable Energy in China on the Environmental Change and Security Project's Web site http://ecsp.si.edu)*

Renewable Energy Market Development in China

Dr. Eric Martinot of the Global Environment Facility (GEF) focused his talk on market development for renewable energy. He first compared China's renewable energy development with other developing countries. The global investment in the power sector in developing countries is about $40 billion a year, of which only $0.5-1.5 billion flows to renewable energy, and this number is expected to increase to $2-3 billion in the coming decade. Currently the developing countries have an installed capacity of 55,000 MW in grid-connected renewable energy (large hydro excluded), of which China accounts for approximately one-third (18,000 MW). China has a substantial share in small hydropower but much smaller shares in wind, solar, and biomass relative to the total amount of developing countries. With regard to off-grid and mini-grid applications, China has done extremely well in household wind and biogas systems, accounting for 90 and 70 percent, respectively, of the total for developing countries.

Eric Martinot then examined four GEF-supported wind and solar energy projects in China and analyzed lessons to be learned from these projects, as well as challenges confronting China's renewable energy market development. He highlighted the following key issues:

- Since China initiated power sector reforms in 1998 utilities increasingly act as profit-seeking commercial entities and prefer to buy cheap conventional power to higher-priced wind power. The cost difference will have to be financed in some way in order to spur domestic demand for renewable energy.
- Technology transfer has proved difficult. Foreign manufacturers often are concerned about the improved competitiveness of Chinese enterprises and thus unwilling to give away their advanced renewable energy

technology.

- International aid is sometimes used to subsidize provincial utilities to lower capital costs of their renewable energy projects. The purpose of such subsidies is to initiate a market and spur investment. However, these subsidies actually have the effect of hindering private companies from investing in renewable energy because they are left in a disadvantageous position compared with those subsidized utilities.
- High transaction cost is associated with marketing and servicing solar home systems. So far China has not been able to develop a viable consumer credit mechanism in rural areas, which severely limits the affordability of such systems and the expansion of the market, even in the energy-starved rural areas.

In his final remarks, Eric Martinot argued that market development could be greatly accelerated in China by supporting Market Facilitation Organizations (MFOs). MFOs are often joint public-private organizations that sell services to private clients but also act in the public interest with some public funds. MFOs provide a variety of services for private energy clients such as developing industry strategies, building networks, matching partners, and disseminating information. A good example of a renewable energy MFO, he noted, is the Chinese Renewable Energy Industries Association (CREIA), which was created with the support of the UN Development Programme (UNDP) and GEF.

A Market Facilitation Organization for China's Renewable Energy Development

Mr. Song Yanqin from the Chinese Renewable Energy Industries Association (CREIA) offered a brief introduction to the function and activities of his organization. CREIA was established as an independent, industry-based association in January 2000 as part of the *UNDP/GEF Project on Capacity Building for the Rapid Commercialization of Renewable Energy in China*. CREIA aims to: (1) raise awareness of renewable energy investment opportunities; (2) create a business network for professionals in the renewable energy industry; and (3) provide key policy advice to the Chinese government. CREIA's activities will be financed by the UNDP/GEF in the first three years, but the organization will gradually evolve into a self-supporting body with membership fees and other independent funding mechanisms.

CREIA defines its role as a bridge between regulatory authorities and industry professionals; a window bringing together national and international project developers and investors; and a network for its members from the Chinese renewable energy business community. To fulfil these functions, an Investment Opportunity Facility (IOF) has been created within CREIA, which will provide assistance to the renewable energy industry in China to identify, develop, and obtain financing for renewable energy projects. In addition, CREIA assists in the training of national policymakers, sector professionals, and businesses. For example, a Project Management Training Program for CREIA members and staff was held in July 2000. CREIA also works closely with regulatory authorities and business communities to develop industry standards for renewable energy technologies, such as solar water heaters.

Mr. Song concluded by stressing the importance of CREIA's role as a channel linking the government and the business sector. Such linkages combined with foreign investments and project development assistance will help promote the adoption of renewable energy technologies China.

(*Editor's Note: For more information about the work of NREL, GEF, and CREIA, please visit their Web sites: www.nrel.gov/china; www.gefweb.org; www.creia.net*)

NGO Conservation Work in Tibet and Western Sichuan

5 September 2001

Yang Xin, Sichuan GreenRiver Environmental Conservation Promotion Society

Grace Ge Gabriel, International Fund for Animal Welfare

Jake Brunner, Conservation International

By Fengshi Wu and Timothy Hildebrandt

While ecologically a rich region, western China lags far behind the coastal provinces in economic development. Though Beijing has continually reaffirmed the historical, integral position of western provinces as part of the People's Republic of China, until recently this vast area has received much less support for infrastructure and economic development than the rest of the country. While the Go West campaign promises an influx of investment, the campaign may also exacerbate environmental degradation in the region. Tibet and western Sichuan—areas with rich, yet fragile ecosystems—are perhaps the most environmentally threatened by massive development campaigns. On 5 September 2001 at the Woodrow Wilson Center, nongovernmental organization (NGO) representatives from China and the United States discussed their conservation work in this region. Though engaged in different activities, these three speakers touched on common challenges to their conservation projects in Tibet and western Sichuan, emphasizing the importance of networking, cooperative alliances, engaging government agencies, and the value of targeting small areas for conservation work.

Yang Xin

Sichuan GreenRiver Environmental Conservation Promotion Society

The rich diversity of western China's ecosystem and its threatened existence are well exemplified by the Yangtze River. The world's third largest river originates in the Qinghai-Tibet Plateau, once referred to as the "third pole" because of its extremely frigid temperatures. Created from melted glaciers, the river traverses 3,915 miles of varied terrain until it flows into the Yellow Sea. The river serves as home to a diverse collection of wildlife and provides a livelihood for millions of people. Yang Xin—the founder of Sichuan GreenRiver Environmental Promotion Society—has focused his environmental work on the upper reaches of the Yangtze.

Augmenting his presentation with slides of the region, Yang Xin profiled the unique ecosystem of the Yangtze headwaters, the problems it faces, and his work to maintain the sustainability of the area. Yang Xin began with photos of the plateau wolves. Once living in great numbers across the plateau, the wolves have fallen victim to the cattle industry. The cattle herdsmen have singled out wolves as a direct threat to their economic well being and the viability of the industry. With the encouragement of the government, herdsmen have slaughtered the wolves—sometimes with the promise that evidence of the kill, a wolf tail, can be traded for the delicate meat of a sheep's head. While herdsmen enjoy less threatened cattle herds, and the occasional sheep's head, a new problem has arisen. Rat and rabbit populations, natural prey of the plateau wolf, have multiplied, leading to widespread grassland degradation.

Grasslands also have fallen victim to global warming. Yang Xin noted that the plateau is losing grassland at a rate of two percent a year while glaciers diminish nearly 20 meters annually. Land degradation is forcing those who make a living on the land to move to higher locales. Yang Xin showed one photo of a young girl who was tending to cattle at an altitude of over 5,000 meters—biologically, the highest possible altitude for plant growth and the last option for herdsmen to maintain their subsistence. Quite literally, residents of the plateau are being pushed to the limit.

The Qinghai-Tibetan Plateau shares other great environmental problems with the rest of western China—poaching and deforestation, which pose a considerable threat to local biodiversity. Most notably, Yang Xin reminded the audience, is the plight of the Tibetan antelope. Hunted for their fur that is manufactured into pelt shawls known as "Shahtoosh" and sold around the world, the antelopes are being slaughtered at an estimated rate of 20,000 per year. After 40 years of continuous logging once pristine forest regions on the plateau have been considerably degraded. Such excessive logging has caused soil erosion, which directly contributed to severe floods in the lower Yangtze in 1998.

Yang Xin's environmental work began with the writing of the book *The Spirits of the Yangtze*. Serving as a documentation of his personal exploration, photographs, and a profile of environmental protection activities in the region, the book's sales succeeded in raising funds for the establishment of a nature conservation station at the headwaters of the Yangtze. The conservation station will fulfill several needs:

- Hosting scientists to conduct research and investigations in the region;
- Recruiting volunteers, based in the station to engage in environmental advocacy and training activities;
- Serving as a model of natural conservation for the local population by exclusively using wind and solar power for energy needs;
- Promoting environmental education among tourists traveling along the Qinghai-Tibet Highway; and,
- Issuing reports on wildlife conditions to state agencies.

Four years since establishing the conservation station, it remains the only one of its kind in the region and is the only ecological monitoring station run by an NGO in China. GreenRiver has recently set up a second station in the region. At a cost of $30,000 per year, the stations are expensive to operate and will need external support to continue the work. Book sales alone cannot support these stations. Yang Xin views the stations and his NGO as a work in progress. As a scientific research-based NGO that provides policy recommendations to government and also works to raise ecological awareness at the community level, Yang Xin hopes that GreenRiver can discover a more effective means of promoting environmental advocacy across China—"Environmental activism with Chinese characteristics." The future of environmental protection in China, Yang Xin claimed, lies in productive partnerships between the government and environmental NGOs. Moreover, NGOs' success in motivating local people in China will be an integral link in the "chain of biodiversity protection."

International Fund for Animal Welfare

Since 1993, the International Fund for Animal Welfare (IFAW), a U.S.-based NGO devoted to improving the welfare of wild and domestic animals, has worked in China to reduce the commercial exploitation of wildlife. Grace Ge Gabriel—the IFAW China country director—outlined IFAW's work in China by discussing three animal species that are in distress in western China.

IFAW began its China work with an investigation into the dwindling numbers of wild Asian black bears. Historically, bear bile has been used in Chinese medicine—captured bears have been held in small cages while their stomachs are pumped, harvesting the valuable bile. After persuading the Chinese government to stop issuing bear farm licenses (at the time, 7,000 bears lived on 4,000 bear farms), IFAW then built a bear sanctuary and learning center in Guangdong, which is staffed by doctors (who are paid by IFAW) and government officials. Additionally, IFAW has a continued effort to address the root of the problem, namely dispelling the belief that bear bile has legitimate medicinal benefits. Chinese medical doctors have been employed by IFAW to work on disseminating this information to the Chinese traditional medicine community and the population at large. Working with government officials, IFAW also has helped in the enforcement of CITES (Convention on International Trade in Endangered Species) regulations, distributing posters to warn travelers of restrictions placed on the trafficking bear bile.

Much like the work of Sichuan GreenRiver, IFAW has devoted much effort to rescuing the Tibetan antelope from extinction. Together with WWF, IFAW has sponsored international conferences and trade investigations on the Tibetan antelope in India, the United States, and the United Kingdom. Furthermore, IFAW has:

- Assisted the Chinese government in enforcing CITES regulations applicable to the antelope;
- Trained forestry police on CITES requirements and anti-poaching techniques;
- Lobbied the fashion industries in India and the West to ban the use of Shahtoosh; and,
- Engaged in public awareness campaigns in China and the West.

Grace Ge Gabriel reported that IFAW's Tibetan antelope campaign efforts have begun to pay off. The global market of Shahtoosh has dropped dramatically and only two cases of confiscation of poached furs were reported in 2000. More visibly, thousands of migrating antelopes were found in Xinjiang in August 2001, a number unheard of for many years.

In recent years, IFAW has begun work on habitat protection in China—focusing on identifying reasonable compromises that allow humans and wildlife to live and flourish together. One of their most successful programs has been the Asian Elephant Habitat Protection program in Yunnan Province. In partnership with provincial and local governments, the Xishuangbanna Nature Reserve, and the Endangered Species Scientific Committee, IFAW provided residents of a few small villages in the Simao region of Yunnan with environmental education and farming technical training to promote coexistence of human beings and elephants. This education was augmented by micro-credit loans to encourage locals to seek safe methods for keeping elephants away from crops. One successful strategy has been to plant specific plots of bamboo for elephants to eat. Within a year, the loan return rate on these projects has been 100 percent—more importantly, attitudes have changed. Gabriel noted that "those who used to kill the elephants are now willing to plant bamboo" for their sustenance.

Many of IFAW's smaller, local education activities on wildlife and the humane treatment of animals were made possible by partnering and coordinating with local NGOs, such as Yangxin's GreenRiver and China's first green NGO the Friends of Nature. In order to expand grassroots activities and encourage the growth of indigenous conservation groups, IFAW has offered Chinese NGOs assistance in fundraising and grant application writing. Gabriel noted IFAW's commitment to partner with grassroots organizations in China, for IFAW cannot "be everywhere and do everything." By forming extensive alliances with Chinese NGOs, IFAW not only increases its legitimacy, but more importantly helps to create a stronger foundation for effective animal protection efforts in China.

Conservation International

Focusing on a small portion of "hotspots"—the 1.5 percent of the world surface that holds sixty percent of the world's biodiversity—Conservation International (CI) has recently begun work in China. The Hengduan Mountains, which stretch from the southeast corner of Tibet through western Sichuan and extend into central and northern Yunnan, represent one of the world's 25 ecological hotspots identified by Conservation International. According to Brunner, there exists a need to balance economic growth and environmental protection in the Hengduan Mountains through (1) the expansion and better management of protected areas, (2) mitigation of the negative effects of mass tourism, and (3) the promotion of businesses that both create job opportunities and reduce pressure on the region's remaining biodiversity.

To achieve their goals of hotspot preservation, CI regularly holds conservation workshops around the world. A series of fifty worldwide workshops—over a six to nine month period—provides a great opportunity for scientists from different backgrounds and disciplines to visit, map, and integrate the biological and social data gathered on hotspots.

In order to initiate hotspot preservation work in the Hengduan Mountain region, last October CI signed a memorandum of understanding with the Sichuan provincial government, which established a principal counterpart agency within the provincial planning committee (PPC) to work with CI. Jake Brunner discussed CI's preliminary conservation priority-setting activities in the Tibetan prefecture in southwest Sichuan. CI has initially proposed that 9 to 10 percent of the area in this prefecture be protected and the Sichuan government actually has committed, on paper, to increase that level of protection to 25 percent. In order to protect this single hotspot in China, CI is focusing on four major areas of work:

- Promoting community-based or culture-based tourism or other conservation-friendly businesses;
- Reevaluating logging bans—the bans imposed in 1998 have had negative impacts on the local economy and spurred individuals to turn to wildlife poaching for income;
- Supporting and establishing local partnerships to monitor both habitats and wildlife; and,
- Engaging in continuous policy dialogue with the provincial planning committee to encourage the integration of biodiversity conservation into development planning.

While CI has been networking intensively at county, provincial, and national levels, to be effective in implementing their strategies for protecting biodiversity hotspots in China, Jake Brenner acknowledged that CI must develop a much wider alliance or network of partners. In continuing CI's work, Brenner suggested that the organization must: (1) be modest about what can be achieved given the political framework in China; (2) be aware of the complicated administrative divisions throughout the country and encourage the establishment of a new independent ministry with the exclusive mission to conserve biodiversity; (3) place great efforts into community development and awareness; and (4) engage younger generations in conservation work.

Commentary—Shanghai Greenies

By Fengshi Wu

"This is the spiritual homeland for volunteers, the hopeful homeland
for the marginalized, and the green homeland for the public spirit."
(*Welcome message on the Web site of Grassroots Community, a green NGO in Shanghai*)

On 16 April 2002, Professor Liang Congjie, founder and current president of the oldest Chinese environmental grassroots organization—Friends of Nature (FON)—took a trip from Beijing to Shanghai to meet 35 FON members and many other young environmental activists from a local volunteer organization, the Grassroots Community, which hosted the event. After Liang gave an informative talk on population, green lifestyle, and the importance of environmental awareness, the participants had a heated, yet friendly discussion, about the planned construction of golf courses around Shanghai. Ge Yumei, a journalist from the Wenhui Newspaper (a national daily newspaper headquartered in Shanghai) who attended the meeting, was intrigued with the information that these environmentalists shared on the potential environmental damage from golf courses. Ge subsequently did some research and interviews with government agencies and environmental scientists on the planned golf courses and wrote up her critique in an article for the Wenhui Information—an internal newsletter that circulates among Shanghai municipal officials, as well as her newspaper's editors and journalists. Her article pointed out the probable negative effects of large-scale golf course development in the northern Shanghai Jiangwan territories. A month after publication, the chief editor office of her newspaper gave Ge a letter of recognition from the Shanghai mayor's office and the Shanghai Planning Administration. The letter praised her article and noted that the Shanghai Planning Administration would pay attention to the specific points in her critique when they revise the golf course development plan.

Although they had been working to raise public awareness regarding the negative environmental impact from golf course development, neither Professor Liang nor the dozens of young environmental activists at the April gathering could have imagined that their discussion could have had such a direct impact on golf course development in Shanghai. Notably, Ge Yumei and a colleague had contemplated setting up a journalist salon focusing on environmental reporting and public education. The surprisingly positive response to the Jiangwan golf course critique encouraged them to move ahead with their journalist salon plans. This short anecdote highlights that even in Shanghai (which until recently had been a city bereft of environmental groups) green civil society is progressing in China.

Shanghai, the "Paris of the Orient" in the 1930s and the "leading sheep" of Deng's economic reforms in the 1990s, has a reputation for individualism and entrepreneurial spirit. Yang Dongping—a contemporary writer and co-founder of FON—pointed out in his best-selling book *Seasonal Winds of the Cities* (*Chengshi Jifeng)* that Shanghai's distinctive entrepreneurial spirit has meant policymaking and business in this coastal city is distinct from that in Beijing and Guangzhou. While Beijing is the somewhat stodgy governmental center of China, Shanghai is the dynamic financial and business hub of the country. Shanghai represents China's blueprint for development in the 21st century and the city is renowned for its vibrant job markets, investment opportunities, fast-paced lifestyle, competition, and commercialization. This economic boomtown attracts a tremendous flow of population and investment from inside and outside China. However, while the economy has thrived, civil society forces—embodied by independent social

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(continued from page 99)

associations and public participation in social affairs—have barely emerged in Shanghai. Since the reform era began 20 years ago, intellectuals and social activists have been much more active in Beijing than Shanghai, particularly in the environmental sphere.

The lack of green civil society groups in Shanghai can be partially attributed to improved enforcement of environmental regulations and the effective implementation of community self-governing bodies (*shequ zizhi*). In the 1990s, the World Health Organization ranked Shanghai as one of the ten worst polluted cities in the world and the city's "mother" river Huangpu became toxic and thick with floating garbage. In response to these pollution woes, the Shanghai government began to develop stronger environmental regulations (Shanghai's most detailed and strictest urban environmental clean-up regulations were issued in April 2002). Additionally, in the mid-1990s, the Shanghai municipal government successfully decentralized more authority to community-level district governments, which gave them more autonomy. These self-reliant community-level governments in Shanghai have been very efficient in mobilizing local residents to undertake environmental protection work, creating an outlet for individuals wishing to do green activities.

Efficient community government clean-up campaigns and better environmental law enforcement have not, however, completely chilled off the sprouts of a green civil society in Shanghai. Government-led green campaigns often are limited in resources and NGOs can bring expertise to environmental problems that community groups lack. Some evidence of green civil society activity in Shanghai includes:

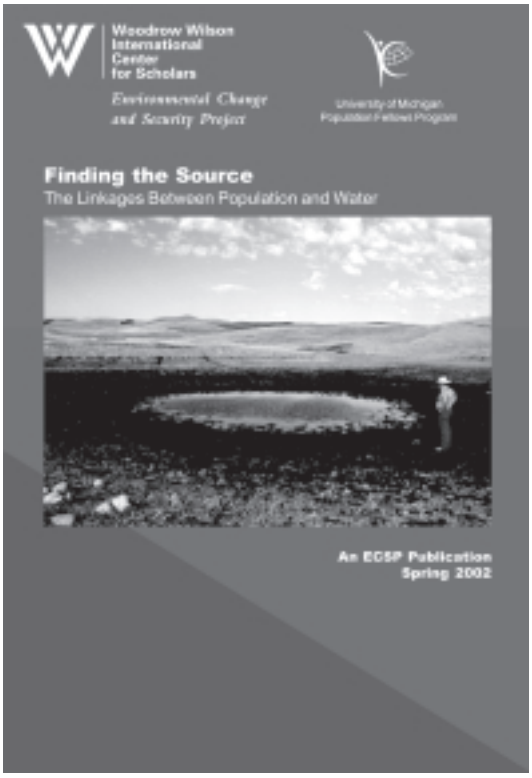
- A chat room created and supported by WWF's China Program enables more than 250 regular "chatters" to discuss serious environmental concerns in Shanghai. Some chatters also have organized themselves "off-line," taking various field trips to learn about environmental problems in their city.
- The Shanghai Wildlife Protection Station, a volunteer organization loosely affiliated with the municipal Bureau of Agriculture, has around 300 professional and expert members. The station is currently searching for grants from both public and private sectors to build an outdoor wildlife education center. In addition to promoting public awareness of endangered species indigenous to Shanghai, this volunteer organization also aims to introduce advanced methods and technologies for wildlife conservation in the city.
- Researchers at Shanghai Tongji University are cooperating with two NGOs—Beijing-based South-North Institute for Sustainable Development and U.S.-based Natural Resources Defense Council (NRDC)—and one Taiwanese research center—Taiwan Institute for Economic Research—to develop and commercialize fuel cell vehicles in China. (*Editor's Note: See NRDC inventory entry in this issue of China Environment Series*)
- While most international environmental NGOs are based in Beijing, a few have found working partners within universities, research centers, and student groups in Shanghai: (1) the Wildlife Conservation Society has been using Shanghai as its base in China since the mid-1990s; (2) some Hong Kong NGOs have supported environmental activists in Shanghai; and (3) Roots and Shoots has a Shanghai office.

While there are some nascent student green groups at Shanghai universities, currently the most dynamic and best-organized indigenous environmental NGO in Shanghai is Grassroots Community (*Re Ai Jia Yuan*). The evolution of this group illustrates the growth of civil society green circles in cosmopolitan Shanghai. In 1996 a student volunteer law association was created to provide legal advice to people, especially the disadvantaged in society. During the first four years of giving legal advice, this group strengthened its reach into local communities. In 2001, a professor from Hong Kong joined the group and suggested the volunteers utilize their skills to focus on environmental issues. This group then adopted the name Grassroots Community and in that same year it received generous financial support from various individuals, which enabled the group to build a stable staff team to support environmental initiatives. Word of this new group led environmental NGOs in Beijing to send moral support and practical advice. The advice from Beijing was timely, for Grassroots Community was in great need of information and ideas on how to mobilize and sustain environmental awareness projects and campaigns. Since September 2001, Grassroots Community has been organizing biweekly discussions for its members ranging from topics covering international environmental issues to local conservation challenges. Additionally, Grassroots Community—in cooperation with the local district government—began to organize a series of green community

development projects in May 2002. Perhaps most importantly, through meetings and Web site (www.community.org.cn) initiatives Grassroots Community is playing a crucial role in facilitating networking among Shanghai environmental activists and researchers.

The meeting with Liang Congjie and friends from Beijing green NGOs in April already has injected a new wave of enthusiasm among the Shanghai environmental activists. Ultimately, the life and strength of civil society lie in its self-reinforcing mechanisms such as networks, dissemination of information, social gathering, moral support from colleagues, and newspaper coverage. The praise from the mayor's office in Shanghai for the golf course issue raised by the NGOs is one small step to help the Chinese people to recognize, understand, and trust nongovernmental initiatives and efforts. Like the Tang verse "spring rain hydrates the earth in silence," the spread of independent voluntary spirits in China has exceeded expectations.

Finding the Source
The Linkages Between Population and Water



Population and fresh water are widely recognized as two of the most important issues facing humanity. Yet too few policymakers are aware of the close links between these two phenomena as well as their ramifications for livelihoods, economic productivity, and political and regional stability.

Finding the Source: The Linkages Between Population and Water takes an important step towards increasing knowledge about these interconnections. Its three articles highlight some of the most critical issues facing environment and development policy today. *Finding the Source* is also a step towards amplifying Southern voices in these policy discussions: by design, the author-team for each of these articles includes one Southern and one Northern writer. Each paper also features substantial treatment of developing-country cases (the Philippines, India, and sub-Saharan Africa). The common message is unmistakable: global water problems are still soluble-but only with concerted international action that includes efforts to address population growth.

Finding the Source: The Linkages Between Population and Water is available on the web at http://ecsp.si.edu/popwater.htm. For a hard copy of the publication, please e-mail ecspwwic@wwic.si.edu

U.S.-Japan Environmental Cooperation: Promoting Sustainable Development in China

20 November 2001

By Jennifer L. Turner and Richard Forrest[1]

One of the key challenges in achieving universal sustainable development will be to assist China, the world's most populous nation, onto a sustainable development path. In light of this challenge, the Woodrow Wilson Center's Environmental Change and Security Project (ECSP), Asia Program, and InterAction's U.S.-Japan Public Private Partnership (P3) Initiative hosted a seminar on 20 November 2001 entitled "U.S.-Japan Environmental Cooperation: Promoting Sustainable Development in China."[2] This one-day seminar was made possible through a generous grant from the Japan Foundation's Center for Global Partnership. (*Editor's Note: A discussion paper that provides background on U.S.-Japan-China environmental relations was prepared for this seminar and is available on the ECSP Web site (http://ecsp.si.edu) or available by contacting Jennifer L. Turner at chinaenv@erols.com*)

Takao Toda

The first keynote speaker **William K. Reilly** (Aqua International Partnership, Inc., and former Administrator, U.S. Environmental Protection Agency) stated that countries in the world should not ignore the progress China already has made in improving energy efficiency and setting up environmental protection infrastructure. If China maintains its current economic growth rate of around seven percent per year, its economy will increase fivefold by 2025—its ability to meet energy demand from domestic sources will fall short by approximately 8 percent in 2010 and 24 percent in 2040. The resulting increased demand for energy imports could result in significantly higher global energy prices. Reilly noted that the Packard Foundation (through its support of the Energy Foundation) has committed $35 million a year for work on sustainable energy projects in China, which complements the work of other foundations and nearly 40 United States-based environmental nongovernmental organizations (NGOs) currently working in China. While private foundations and NGOs can play an important role in assisting China in its sustainable development goals, Reilly and other speakers felt that the U.S. and Japanese governments could make a significant impact by providing more technical assistance, and helping to design pollution control measures, such as pollution monitoring programs and SO_2 cap and trade systems policies.

Masahiko Kiya (The First Secretary of the Economic Section at the Embassy of Japan), providing the second keynote address, stressed that Japan and U.S. cooperation on global issues is very important and supporting China onto a sustainable development path is a common interest for both Japan and the United States. During the Clinton administration Japan and the United States cooperated on global issues under the framework of the Japan-U.S. Common Agenda for Cooperation in Global Perspective. This forum facilitated dialogue and cooperation on environmental issues, especially climate change. First Secretary Kiya stated that the new Bush administration and the Japanese government currently are examining past bilateral initiatives in an effort to create a new cooperative framework at the next bilateral summit. A new framework for cooperation could include two promising elements: (1) coordinating strategies for tackling global challenges such as the environment; and (2) stimulating greater involvement of civil society groups to build a stronger and more effective cooperative partnership between the United States and Japan.

Reflections on U.S. and Japanese Environmental Assistance in China (Panel 1)

Kurt Tong (U.S. Embassy in Beijing) presented the U.S. government's three primary goals in environmental assistance: (1) to help China develop the technical means to prevent environmental degradation; (2) to share U.S. experience in environmental policy and regulation development; and (3) to support China's growing trend of public participation in environmental governance. In support of these goals, sixteen U.S. agencies were undertaking nearly 80 environmental and energy projects in China in 2000 and some agencies, such as the Department of Energy (DoE) were supporting NGO and national laboratory work in China.

Technical assistance is the focal area of bilateral cooperation, and the United States is a leading donor for China's environmental protection—more in terms of expertise than financing. A number of technical agencies, such as DoE, Department of Interior, and the Environmental Protection Agency have been involved in environmental and energy-efficiency technical assistance in China for many years. While there are numerous high-quality domestic and international programs to train Chinese environmental technicians, the development of expertise in environmental public policymaking has been conspicuously lacking.

Turning to U.S.-Japan cooperation in China's environmental protection, Tong identified comparative advantages of each government's current efforts. Both U.S. and Japanese environmental programs in China are characterized by strong technical capacities and a commitment to environmental infrastructure building. However, the U.S. government initiatives tend to emphasize public policy development and implementation, while the Japanese government focuses more on human resources development. The Japanese program also features a much stronger financial element, while the U.S. government is more hamstrung in providing direct financial assistance to entities within China in any policy sphere.

Looking forward to the prospect of U.S.-Japan cooperation in promoting environmental causes in China, Mr. Tong stressed the importance of sustained information sharing and strategic coordination between the two sides over sporadic joint project formation. On the information side, both could draw upon each other's unique experience and contacts established through decades of fieldwork in China. On the strategic coordination side, Tong proposed concentration of limited resources into sectoral and regional priorities. This collaboration could be a sectoral focus such as clean and efficient energy, in which both the United States and Japan have a lot to offer in terms of public and private capacities; or a region-oriented approach to engage both countries' expertise in developing environmental strategies for a region in China.

Japan is the largest provider of environmental official development assistance (ODA) in the world. **Takashi Nakamura** (Japan Bank of International Cooperation—JBIC) commented that JBIC's environmental portfolio in China has increased as growing pollution problems threaten human and ecological health in China and Japan. The amount of environment-related yen loans Japan has made to China increased nearly 50 times between FY1995 (¥2,552 million) and FY1999 (¥124,989 million). In FY1999, around 65 percent of all yen loans to China included environmental objectives.

Japan's vulnerability to pollution from China explains the high level of Japanese public and private interest in promoting environmental protection in China. JBIC is the flagship Japanese agency in leading environmental lending and projects in China. JBIC is the world's second largest multilateral development agency (second only to the World Bank) and China is JBIC's second largest client, next to Indonesia.

The JBIC environmental portfolio in China features urban environmental improvement (the 'brown' agenda) and nature conservation (the 'green' agenda). Pressing urbanization problems in China involve many sectors from water and gas supply, to sewerage and solid waste treatment. JBIC therefore has initiated over 70 urban environmental projects in some of the world's most polluted cities in China. These projects range from introducing clean energy production technology and facilities to ensuring efficient monitoring and implementation of the facilities. Commenting on the challenges for future urban projects, Takashi noted that a broader economic rather than pure technical solution might be in order, since a major contributor to urban pollution is the state-owned industrial sector which is undergoing a painful restructuring process. In the area of nature conservation, JBIC is actively engaged in afforestation and grassland redevelopment efforts in China, mostly in the western province of Shaanxi.

While Japan provides significant environmental assistance to China, particularly through the Green Aid Plan (GAP), **Peter Evans** (Massachusetts Institute of Technology, MIT) stated that one of the shortcomings of Japan's GAP is that it has not led to significant diffusion of Japanese clean technology. The fact the commercial market for environmental goods and services in China is weak has meant that the GAP assistance has led to few

orders for Japanese firms.

Peter Evans draws his observations on Japan's aid from five years of work on a large MIT-Tsinghua-Tokyo University project that examined Japan's Green Aid Program (GAP) and other international efforts to introduce cleaner and more efficient-energy technologies into China.

Within China, there is a huge demand for subsidized financing to help develop environmental goods and services to clean up China's industries and environment, but a weak demand for such goods and services sold on commercial terms. In lieu of a market, various foreign governments are providing a considerable amounts of aid into this sector, but, as noted above, face the challenge of translating this aid into later export sales.

Peter Evans examined 253 environmental aid projects from around the world into China between 1993 and 1998. Not surprisingly, Japan's ODA dominated and totaled nearly 1 billion dollars at a subsidy level in development assistance terms of 70 percent—which means it was cheap money with officially 9 percent untied. Japan's GAP is also large—300 million dollars over the same five years, but it was 100 percent tied and 100 percent subsidies, so it consisted of grants to China. In his research, the United States devoted only 4.9 million dollars toward China-environment work during that time period. Unlike Japan, this money is not considered ODA, for it was spent on U.S. organizations doing work in China and not given directly to Chinese agencies.

While GAP projects have created useful demonstration projects and provided some technology with a grant, it has been difficult to get the Chinese to buy the second unit at the commercial rate. Another problem is that these projects focus on end users, such as helping a power plant buy a technology, but the assistance does not train manufacturers who would like to produce this technology. Therefore the GAP is not really a technology transfer program. There also have been many disputes within the GAP over intellectual property.

Peter Evans than briefly expanded his discussion to address how a binding agreement in the OECD is shaping the terms and conditions of aid and assistance—both commercial and non-commercial. The OECD's 1992 agreement on export credit arrangements (the Helsinki arrangement) established a commercial viability test for tied aid, which has had a significant influence on aid programs to China. The current OECD negotiations are about reaching common environmental standards on commercial export credit financing globally, which will have an impact on China, which is one of the biggest buyers of environmental technology using export credit.

Japan created a special environmental ODA program, which represents Japan's concern about the environment and desire to take a leadership role. Evans notes, however, that this program came about after the Helsinki agreement was set in place and Japan might have set up this special environmental ODA to escape the Helsinki rules, because the terms of this aid became over 80 percent concessionality, which freed Japan to tie this aid in China.

In 1993, some environmental NGOs in the United States were successful in putting higher environmental standards on the U.S. Export-Import Bank relative to other export credit agencies (ECAs) in the world. Because the U.S. Exim Bank had environmental standards higher than China, it became impossible for the United States to provide financing to U.S. exporters interested in the lucrative Three Gorges Dam project. However, ECAs in Japan, Germany, and Brazil did finance the dam, which inspired some international NGOs to begin a campaign to put environmental standards on all export credit financing agencies. Evans noted that if OECD passes strict environmental guidelines for ECAs this will create a common level playing field and potentially make cooperation between countries (such as the United States and Japan) wishing to promote environmental technologies in China (and other developing countries) much easier.

In his talk questioning whether Japan's environmental technical cooperation with China is but "a drop in the ocean," **Takao Toda** (Japan International Cooperation Agency) described how the aid and projects that Japan directs at China emphasize the development of human resources—especially training environmental specialists—and technology. The long-term commitment of Japan's environmental technical cooperation with China is symbolized in the Japan-China Friendship Environmental Protection Center, which was built in 1992 to promote the transfer of basic environmental technology. When the friendship center was built, mistrust colored Sino-Japan joint cooperative programs. Toda noted that in the environmental realm, the friendship center has demonstrated Japan's commitment to working in China, which has immeasurably improved cooperative initiatives.

During the first five years of the center, the Japanese focused on environmental capacity building to transfer basic technology. Over the most recent five years the emphasis has been on disseminating the technologies transferred to China's local governments. Some policy work has begun on water and air pollution, but Toda notes that the United States is much further in this area with China. Some concrete outputs from the friendship center include Sino-Japan cooperation setting up air

pollution monitoring systems in 46 cities, work on improving China's environmental management systems, and water quality monitoring in key lakes.

In looking to the future, projects at the friendship center will address green issues—especially in China's western regions—and tackle the problem of acid rain in a more holistic way. Moreover, Toda noted that they aim to enlarge the city air quality network from 46 to 100, as well as cooperate with the World Bank's 30-city air quality network.

Toda shared a chart that mapped the trends of various Japanese organizations active in environmental work in China. While still the largest player, Japan's central government role has been slightly decreasing in recent years, but the activities of universities, the private sector and local governments grew steadily in the 1990s.

The initiatives and dynamism of Japanese local governments working in China to help promote environmental management in Chinese cities is one distinctive component of Japan's approach to environmental cooperation in China. These municipal and prefecture governments notably are working outside of Japanese central government China projects. For example, in Shanghai, the Osaka municipality is doing considerable air quality work, while in Sichuan, Hiroshima prefecture and other Japanese cities are undertaking energy-saving projects.

Regarding the activities of Japanese NGOs, Mr. Takao Toda mentioned that Japan is increasing assistance to NGOs, although he sees large-scale foreign aid activities crowding out the activities of NGOs. Mr. Nakamura of JBIC added that JBIC is preparing to finance NGO afforestation activities; their research has already revealed some 60 Japanese NGOs or private citizen initiatives undertaking anti-desertification and tree planting activities in China.

As commentator for Panel 1, **Miranda Schreurs** (University of Maryland, Department of Government) was struck that while the presentations focused on the diversity of important technical projects, no one dealt with how the debate surrounding the Kyoto Protocol may have implications for China. The United States is clearly walking down a different path from Japan (and the European Union, EU) on how to deal with such global environmental issues. Japan and the EU tend to focus on the short-term pollution control measures (e.g., end-of-the-pipe solutions) needed to improve climate change problems. Conversely, the United States is focusing on how to move beyond short-term fixes to the climate change problems and push society to the next set of technologies. For example, foreign assistance can put scrubbers on plants in China, but as China's economy grows, more dirty factories will be built. It is difficult to create incentives for industries to develop technologies that do not yet exist.

The verdict on Kyoto will impact how each country deals with China. For example, as the rest of the world moves forward on Kyoto, opportunities will open up for EU and Japan to work with China on the Clean Development Mechanism to get offset credits for their own domestic climate change emissions. Dr. Schreurs pondered where U.S. industry fits into this picture if the U.S. government does not move forward on Kyoto.

Dr. Schreurs noted that the United States has been much more involved in promoting NGO participating in China than has Japan. She noted that the United States has a political, as well as an environmental goal, to help change China's political culture through slowly increasing civil society involvement in decision-making. Japan does not like touching such sensitive political issues and therefore Japan's environmental programs do not (yet) push NGO involvement.

Work at the Local Level Promoting Sustainable Clean Energy Projects (Panel 2)

In the seminar's second panel, speakers introduced their energy projects with Chinese NGOs and local-level institutions and communities as another means of promoting successful environmental assistance in China.

United Nations Foundation (UNF)

In her description of UNF's Climate Program in China, **Wang Xiaodong** (Program Officer for Climate Change) highlighted their innovative work in designing financing mechanisms for renewable energy projects at the local level in China. Similar to the NGO representatives at the meeting, she identified that the key to the program's success has been building a broad range of partnerships among local government agencies, research centers, and community groups.

Ms. Wang outlined a variety of barriers that have prevented the large-scale deployment of renewable energy technologies in China and other developing countries: (1) institutional barriers, such as the lack of sustainable human infrastructure to translate the potential for renewable energy into commercially viable project activities; (2) the lack of financing and prohibitively high up-front costs; and (3) the lack of a supportive regulatory framework. UNF has worked to surmount these barriers in China, Brazil, and India by providing "enterprise development support," which includes partnerships with banks (both local and multinational) and advisory services

to promote community-level-funded model renewable energy utilization systems. As an example, Ms. Wang cited the CREED project in Yunnan Province, in which UNF provided micro-finance—an equity loan guarantee (not the traditional grants normally provided by foundations)—as well as capacity building services to local entrepreneurs. The UNF would like to work with NGOs on their project in Yunnan Province, but Ms. Wang indicated that it has been hard to find Chinese NGOs on-the-ground in Yunnan that focus on energy issues. Therefore, UNF funded the U.S.-based organization The Nature Conservancy to assist in the work.

William Reilly

Natural Resources Defense Council (NRDC)

Barbara Finamore provided the Natural Resources Defense Council's (NRDC) China Clean Energy Program as an illustration of how innovative partnerships among nongovernmental environmental organizations are providing another model of successful environmental assistance to China. NRDC is interested in promoting energy efficiency, renewable energy technologies, and tighter emissions standards in China's building, utility, and transportation sectors. One major NRDC project has created a tripartite partnership of American, mainland Chinese, and Taiwanese institutions to promote the diffusion of fuel cell-powered vehicles, especially motor scooters, in China. Taiwan was chosen as a partner in this initiative because its government has promoted the goal that two percent of all motor scooters must be electric-powered. Moreover, Taiwan has set up a public-private fuel cell partnership that was modeled on the experience of California and augmented by a memorandum of understanding with the California environmental protection agency to cooperate on issues related to low-emission vehicles.

NRDC worked with NGOs in Taiwan, (e.g., the Taiwan Institute for Economic Research) and China (e.g., the South-North Institute for Sustainable Development), as well as brought together businesses and the municipal governments of Taipei (where mayor had campaigned on an environmental platform) and Shanghai (a city with a progressive environmental policy agenda). Shanghai was chosen as the project location because it has become a national center for investment in research and development of fuel cell vehicles in China. Additionally, the Taipei-Shanghai "brother city" relationship that this initiative spurred helps elevate the environment on the political agendas. Ms Finamore noted that NRDC's local NGO partners were key in making contacts with the government officials and facilitating the diverse fuel cell scooter initiative.[3] She added that bringing together cross-strait groups resembled a kind of "track-two" diplomacy effort.

One of the main lessons learned from NRDC's experiences in the fuel cell project is that human linkages are crucial. Beyond promoting fuel cell research, the project's value also lies in the process of bringing together a group of Taiwanese and mainland Chinese from the government, business, scientific and NGO sectors. Such local-level, small-scale environmental cooperation clearly can provide a framework for tearing down barriers between sectors and regions. While environmental NGOs in Mainland China are few in number and somewhat limited by the government, these NGOs also have the advantages of avoiding the "political baggage" of other higher-level state organizations that could never have individually initiated a cross-straits environmental initiative. While promoting local-level diverse environmental cooperation in China can produce impressive results, such initiatives require patience, a long-term view, and flexibility.

Beijing Environment and Development Institute (BEDI)

Ma Zhong (director, Beijing Environment and Development Institute, BEDI) outlined how his NGO is working with the U.S.-based Environmental Defense (ED) to assist two medium-sized Chinese cities to create SO_2 emissions trading programs. Since 1997, BEDI and ED have cooperated on local-level SO_2 research and pilot projects and in creating the SO_2 emissions trading programs they have discovered that environmental pricing issues are key. To address this pricing challenge their strategy has been to address total emissions control, as well as supporting the introduction of pollution levies. Their projects have experienced setbacks within each city, caused by the lack of implementation tools for these market-based environmental protection approaches and the existence of conflicting policies and regulations. Their projects are ostensibly trying to change each city's

approach to pollution problems from a local, short-term strategy to a transboundary and long-term sustainable strategy.

Dr. Ma acknowledged that their emissions trading projects are improving, due in great part to the rising commitment to the environment within each city's government. Similar to Barbara Finamore's experiences, Ma Zhong felt that the key to the BEDI-ED success has been to patiently "learn by doing" together with Chinese collaborators and to prioritize building of diverse partnerships.

Panel 2 discussant **Elizabeth Economy**, Senior Fellow for China for the Council on Foreign Relations, noted that there has been a "sea change" in China in the 1990s that opened up opportunities for international environmental efforts. The changes are characterized by three trends:

- The growing role of the market and integration of China into the global economy;
- The growing role of international environmental NGOs that lack political baggage and can therefore bring creative solutions and the ability to build networks within China; and,
- An emphasis among Chinese officials on practical approaches to solving problems.

Dr. Economy feels that future needs for environmental cooperation with China should include focusing on policy design, including strengthening currently weak incentives and, especially, enforcement structures. The labor-intensive and difficult process of replicating successful environmental and energy-efficiency demonstration projects should also be addressed by Japanese and U.S. organizations and agencies working in China. Building the human infrastructure is therefore essential.

Conclusion

U.S.-Japan exchange of information on lessons learned in China or undertaking some joint efforts to assist China in these energy-efficiency, pollution, or conservation areas could contribute not only to the solution of some environmental problems, but also could help to build trust and cooperation among the three nations. Moreover, this type of "green cooperation" between Japan and the United States could also become a model for U.S.-Japan cooperation to assist the sustainable development of various nations and regions across the globe. In addition to proposals made during the presentations, discussions after each panel raised some suggestions on how the United States and Japan could build environmental cooperation to promote sustainable development in China:

- Coordinate or exchange information on current U.S. and Japanese initiatives to disseminate clean technologies and promote energy efficiency in China;
- Build information exchange opportunities between U.S. and Japanese organizations and agencies that are addressing challenging conservation work in Western China (e.g., JICA is supporting some research in Xinjiang for biomass energy sources and The Nature Conservancy is undertaking a major conservation project in Yunnan Province);
- Create a trilateral sister-city program, in which one U.S. and one Japanese city could promote environmental infrastructure development in a Chinese city;
- Establish joint NGO activities to create more networks for diverse organizations in the state and non-state sectors in China to meet, exchange views, and cooperate;
- Create a network (using face-to-face meetings and internet technology) linking American, Japanese and Chinese environmental experts to share information and lessons learned on projects in China;
- Initiate American and Japanese support for programs that will improve the infrastructure to monitor environmental concerns and promote the capacity building of local governments, citizens and NGOs, legal reforms, and training of lawyers, scientists and other specialists.

Endnotes

[1] We would like to thank Liang Sun and Fengshi Wu for assistance in this summary.

[2] The Wilson Center and InterAction held another meeting on this topic in Tokyo in March 2002. See this issue of the *China Environment Series* for the meeting summary

[3] In Taiwan where the long-ruling Nationalist Party must share power with the Democratic People's Party, one challenge NRDC faced was avoiding giving advantage to one political party over the other

(R)evolution of Rural China

11 December 2001

Zhou Qiren, Beijing University

Marilyn Beach, National Committee on U.S.-China Relations

Baoqing Zhao, Chinese Embassy in Washington, DC

By Liang Sun and Jennifer L. Turner

Joining the World Trade Organization (WTO) is both a continuation and a breakthrough in China's decades-long process of reforming and integrating its economy into the global market. An examination of the challenges facing China's rural sector as the country enters WTO highlights the complex interactions between global economic integration and domestic policy dynamics. The three speakers on this panel stressed that while China's accession into WTO offers some benefits for rural residents and agricultural production, stable and sustained rural prosperity will depend much more on the ability of the Chinese government to complete land, labor, and financial market reforms while adequately enforcing natural resource protection laws.

Growth, Change, and Poverty in Rural China

For over 50 years China's agricultural sector has been heavily taxed to finance the country's intensive industrialization program. Decollectivization of agricultural production and the return of family farms in the 1980s heralded China's broader national reform program and created opportunities for greater rural prosperity. These rural reforms stimulated both growth and diversification of crop production besides releasing many from agricultural labor. By 1997, however, growth rates for both rural income and productivity had stagnated. Since the 1980s, roughly 150 million agricultural workers have left farming, several million of which have migrated to the lower tiers of the urban services sector. Despite the reforms and mass migration to the cities, rural areas, home to 70 percent of the Chinese population, capture only 30 percent of the country's GDP. Income for farmers rose barely 1.8 percent in 2000, the lowest increase since the beginning of reforms 22 years ago. It is perhaps not surprising that the major root of discontent in rural areas is unrelieved poverty. In fact, in its 2000 year-end review of domestic affairs, the Communist Party leadership singled out rural unrest as the biggest threat to its rule. In internal talks, President Jiang Zemin gave top priority to three overriding tasks in the countryside: boosting agricultural production, increasing farmers' incomes, and maintaining stability in villages.

The Need for Stable Land Tenure

In light of the rapid expansion of the industrial and service sectors, the trend of a declining share of agricultural value-added in the national economy is likely to continue in the coming decades. It is therefore crucial for the Chinese leadership to create new sources of income for China's rural population. Besides moving more rural laborers out of agriculture into industrial and service sectors, the government needs to create a new land use system that will enable rural residents to share the benefits of rapid industrialization. Currently rural residents rent the land from the state and easily lose user rights when local governments opt to lease farmland to industrial or urban development companies.

The Potential Shift to High Value, Labor Intensive Crops

Since abundant labor supply remains an important comparative advantage for China's rural sector, under WTO farmers could enjoy income gains through the development of labor-intensive, value-added farming activities (e.g., vegetables, horticulture, and organic farming). However, such a transformation in agricultural production patterns must be supported by the creation of a sound market-based distribution system. Specifically, four types of market mechanisms are necessary to help farmers break into new niche markets:

1) An open and competitive agricultural product market;
2) An integrated labor market;
3) A mature land market with clearly defined property

rights; and,
4) A competitive financial market for more efficient resource allocation.

The WTO and Rural Change

It is in this context of half-completed rural economic reform that China now enters WTO. The main components of WTO agreements that will affect China's agricultural sector include:

1) Elimination of sanitary and phytosanitary barriers on U.S. exports of wheat, citrus, and meat;
2) Elimination of China's subsides to agricultural exports;
3) Adoption of a tariff-rate quota (TRQ) system for grain imports;
4) Reduction of tariffs on agricultural products to well below 20 percent for major agricultural imports from the United States; and,
5) Liberalization of state monopoly and allowing private companies to engage in agricultural trade.

The impact of WTO on agricultural production and the lives of rural residents initially will not be as great as the immediate changes the agreement will have on the industrial sector. Previous agricultural reforms already have cut subsidies to agriculture, so China's WTO commitment to decrease agricultural subsidies will have little impact. Increased grain imports are expected to enable many of China's farmers to shift from low-profit crops, such as wheat, corn, rice, and cotton, to the more lucrative and less state-controlled fruit, vegetable, and meat markets. For example, WTO's tariff-cutting measures are expected to boost China's vegetable export market by as much as five percent a year. Certainly, rural workers will benefit if they find employment opportunities in these new niche markets or in agricultural production sectors that thrive as a result of WTO's lower restrictions for China's export goods.

WTO and Rural Reforms in China

Marilyn Beach from the National Committee on U.S.-China Relations stressed that while allowing farmers to change from food-security crops to higher value crops may raise rural incomes, the economic impact of such shifts would vary widely throughout the country. In less prosperous areas—such as wheat, maize, and soybean growing regions, as well as forest and timber producing areas—the effects of WTO on the rural quality of life will depend on how successful poverty alleviation efforts are in the countryside. The fear in some rural areas is that WTO will only attract funds to already wealthy areas, leaving poor, interior regions to lag further behind.

Many of the rural structural reforms needed in China are not directly tackled in the WTO framework. In fact, many of the potential gains of WTO membership in the agricultural sector—particularly the long overdue liberalization of the state monopoly of grain production and permission for private companies to engage in agricultural trade—can be fully realized only when new rules of fair and open competition are combined with sustainable investments in agricultural technology, market expansion, and education. China's farmers also need access to a greater share of the benefits of rising land values.

The rural people who may be displaced by WTO will need access to information and training on how markets work. The Chinese government therefore needs to put a premium on investments in education and technical training on how domestic and international markets function and how to promote post-harvesting technologies such as food processing, packaging, and transportation. While setting up and funding such training programs for rural farmers would be challenging, such capacity-building activities (as well as agricultural environmental investments) are exempt from WTO restrictions on subsidies. Zhou Qiren from Beijing University noted that a potential solution to the dilemma of abundant labor supply and low productivity would be for the government and business communities in China to create a contract-based system that links modern, economy-of-scale agricultural businesses with the labor-intensive farmer households.

Impact of the Sanitary and Phytosanitary Agreement

In his presentation, Zhao Baoqing from the Chinese Embassy in Washington, DC highlighted the Sanitary and Phytosanitary (SPS) Agreement's (part of China's WTO accession packet) important effects on the adequacy of animal, plant, and human health standards in China's agricultural sector. The SPS agreement restricts China from potentially trade-distorting inspection and border control measures and imposes higher transparency criteria. These requirements pose challenges to the country's limited technical and administrative capacities to protect China's farmlands and pastures from alien (including genetically-modified) products and species while complying with international SPS norms. Moreover, Chinese farmers, especially those in less developed inland areas, are not equipped with adequate knowledge or technical support to identify and combat these risks. Notably, these gaps in capacity are addressed in the 1999 U.S.-China Agricultural Agreement. This bilateral

agreement provides the framework for bilateral cooperation for training and information sharing on environmental protection issues in the agricultural sector—ranging from measures to improve pest and disease management to sustainable irrigation and land use.

Local Governments Lack Resources for Rural Reform

While Beijing is committed to fulfilling WTO requirements, domestic policy dynamics potentially hinder rural areas from taking advantage of WTO-related adjustments. Specifically, over the past twenty years the central government has decentralized considerable administrative and economic powers to the provincial and sub-provincial governments. While they possess greater authority, local governments often lack sufficient resources (and incentives) to carry out the necessary structural reforms and policies that could help the agricultural sector. In short, local governments in China face daunting challenges in improving the livelihood of rural inhabitants, 15 percent of which are unemployed and underemployed. Prior to the reform era, rural and urban inhabitants had little freedom of movement due to a household registration system that tied them to their workplaces. Throughout the 1980s and 1990s rural citizens have been moving to urban areas without being granted the legal right to live in cities. This meant they faced difficulties in acquiring housing and access to other urban social services. The current proposed household registration system reform to loosen registration requirements in cities might accelerate the already significant trend of rural unemployed migrating to cities and further straining urban infrastructure.

Ultimately, difficult policy reforms in rural areas will be key to ensuring a smooth transition for farmers adjusting to more open markets and moving successfully to new crops. For instance, the government has made tentative legislative moves to redefine rural property rights to encourage more efficient and sustainable land use and conservation. Economic welfare of the farmers can only be achieved when the farmers themselves have a bigger say in the allocation and use of rural resources in such forms as farmers associations. However, the increased fiscal burden on local governments, particularly in poor inland regions, hinder their ability to institute the needed agricultural reforms, especially investments in infrastructure, sustainable production, and conservation.

WTO has outgrown the simple formula of numerical free trade. In November 2001, at the same WTO ministerial meeting where China was formally accepted as a member, WTO put new emphases on the environment and development programs in the organization's agenda. While it is difficult to predict how tariff reductions in primary commodities such as timber and minerals will affect China's rural sector, it is clear that domestic policy choices in the changing international environment may more directly and more profoundly impact the livelihood of China's rural population in the coming decades than the fulfilling of WTO agricultural agreements.

Difficult policy reforms in rural areas will be key to ensuring a smooth transition for farmers adjusting to more open markets and moving successfully to new crops

This panel was part of a larger conference—China Joins the WTO Domestic Challenges and International Pressures—held at the Wilson Center. The Environmental Change and Security Project, The Asia Program and Project on America and the Global Environment cosponsored this conference. For information on the full conference summary contact Jennifer L. Turner at chinaenv@erols.com or 202-691-4233.

The Challenge of Reforming and Environmental Legal Culture: Assessing the Status Quo and Looking at Post-WTO Challenges for the People's Republic of China

By Richard J. Ferris Jr. and Hongjun Zhang
(Georgetown International Environmental Law Review (14), 430, Spring 2002)

China continues to make strides toward a "rule of law" approach to environmental regulation. Nevertheless, progress in formulation and enforcement of China's environmental laws remains somewhat erratic and slow. Membership in the World Trade Organization (WTO), however, should prompt more rapid progress in the sphere of environmental lawmaking. To provide a foundation for assessing the rapid legal and cultural changes that China faces as a new member of WTO, this article provides an overview of China's environmental challenges and an outline of key WTO obligations placed on China as a member. Additionally, the article—drawing on extensive interviews with Chinese officials—reviews current developments in China toward certain WTO-consistent changes in its legal regime, focusing on changes in the environmental law system by exploring:

- Background information on important WTO requirements that will affect China's legal system, particularly key aspects of China's regulatory system;
- WTO requirements that may spark the development of clear and effective notice of environmental laws and greater public participation in the lawmaking process in China; and,
- How WTO measures may strengthen the formulation and enforcement of China's environmental, health, and safety standards.

The authors argue in the conclusion that in order to increase the personal and political capacity in China to accept and accommodate China's WTO commitments and translate these commitments into workable legal reforms, intensive training will be needed for national, provincial, and local lawmakers. Specifically, these lawmakers would benefit considerably from training to improve their legislative skills and enhance their knowledge of both environmental issues and WTO requirements.

Powering Up the Dragon: World Bank and NGO Energy Efficiency Projects in China

1 February 2002

Denise Knight, International Institute for Energy Conservation

Robert P. Taylor, World Bank

Pam Baldinger, Baldinger and Associates (discussant)

By Timothy Hildebrandt and Jennifer L. Turner

Since the 1997 financial crisis, many Asian countries have struggled with stalled economies, however China—perhaps proving itself as a resilient dragon—has seen only a modest drop in its economic growth. China's economic dynamism is well known, but another little heralded aspect of China's growth has been the significant drop of energy consumption as the economy has expanded. The quadrupling of China's GDP from 1980 to 1995 resulted in only a doubling of energy demand. Despite this drop in energy intensity, China's economy still could benefit from energy efficiency improvements in the industrial and housing sectors. The past progress and the current commitment of the Chinese leadership to increase energy efficiency have motivated international organizations—governmental, bilateral, and nongovernmental alike—to offer their assistance to promote energy efficiency in China. This Wilson Center meeting highlighted the progress and challenges the World Bank and the International Institute for Energy Conservation have faced in implementing energy efficiency projects in China.

The World Bank and Energy Service Companies

In the 1990s, the World Bank began undertaking studies in China to explore opportunities for stimulating investment in energy efficient technologies. These studies emphasized the potential for cost effective retrofit projects—namely, small-scale projects adding a single piece of energy efficienct equipment to industries or improving management skills, rather than investing in projects to restructure a whole industry. Even though such small projects would generate fast and significant rates of return, such projects were not being undertaken in China. Through interviews Robert P. Taylor learned that Chinese factory managers either were unfamiliar with energy efficiency technologies or they did not believe that installing such technologies could generate a big rate of return. Investing in energy efficiency technology generates an estimated savings for factories (e.g., reduces operating costs by .1 percent), which is not as tangible an activity as taking out a loan to expand a factory or develop a new product line.

Not only do Chinese factory managers view installing such equipment as a low priority, but domestic banks also do not perceive these projects as attractive. Such small projects create high transaction costs, generate low returns, and utilize complex technology; so Chinese banks have difficulty in appraising the value of energy efficiency investment projects. At the more macro level, however, small investments into energy efficiency technologies could add up to large energy savings for Chinese industries and significant environmental benefits nationwide. Moreover, argued Taylor, a considerable amount of money could be made if these small investment projects could be packaged together.

In 1995, the World Bank spoke to officials in the Chinese State Economic Trade Committee (SETC), who were interested in moving China from a planned energy efficiency system to a free market structure. As an alternative to the usual World Bank energy efficiency loans to a large number of enterprises, Taylor suggested developing energy service companies (ESCOs) to perform energy performance contracting. ESCOs specialize in performing detailed energy audits of the client's buildings or factories. These audits lead them to propose designs for new energy systems, as well as suggest improvements to operating practices that will improve energy efficiency. In addition to acting as a consultant, ESCOs also can provide investment for energy efficiency projects within their client's company. By developing and financing projects the ESCOs take on high levels of risk with the hope of earning high returns on their investment. While ESCOs are common in industrialized countries, few developing countries use such companies and until 1995 ESCOs were an unknown in China.

In order to help China develop stronger institutions

to facilitate financing and encourage the adoption of energy efficient technologies in Chinese industries, SETC officials were willing to join the World Bank in an experiment to create ESCOs (dubbed energy management companies—EMCs—in China). Together with the Chinese government, the World Bank organized three joint stock companies (located in Liaoning and Shandong Provinces and Beijing). The first phase of the project consisted of the shareholders putting up equity of 30-50 million RMB and the provision of significant World Bank technical assistance to: (1) teach these companies how ESCOs worked in the United States and Europe; (2) help the Chinese ESCOs develop pilot projects; and (3) assist the ESCOs in creating contracts that suit the Chinese market and legal system.

After the technical assistance phase, these three ESCOs were given Global Environment Facility (GEF) support of $15 million and a World Bank loan of $60 million (with an additional $20 million line of credit) in 1998. These funds enabled each company to establish more pilot projects and increase their equity position. Through 1999-2000 the three ESCOs (1) acted as consultants and investors for approximately 50 projects; (2) developed more energy efficiency product lines to offer clients; and (3) hired more staff. By late 2000 each company began to earn some profits, which was significant since the World Bank loans had a high interest rate and carried a heavy foreign exchange risk. The companies are growing and next year plan to invest $26 million in another 80 projects.

Building on the ESCOs success, the World Bank is in the process of initiating the China Energy Conservation Phase II Project that will seek to build an ESCO/EMC energy efficiency industry. This second project aims to engage the Chinese financing community as the key financier for ESCOs/EMCs. This project is developing an EMC service group to train new companies and to provide policy advocacy services to the EMCs. The World Bank also is providing training programs to help Chinese managers set up ESCO/EMC businesses. In addition the project will create a guarantee fund, since the financial sector in China is half reformed and very risk adverse. The guarantee fund can provide partial credit for loans to the EMCs, which would lower banks' perception of risk.

International Institute for Energy Conservation's Efficient Motors Program

While the World Bank focused primarily on strengthening the financing opportunities for industries to install more energy efficient technologies, the International Institute for Energy Conservation (IIEC) (a nongovernmental organization that aims to promote sustainable energy in industrializing and transition economies) sought to focus on one industry and to facilitate policy development and cooperation among stakeholders that would help to develop a market for an energy efficient product. Led by Asia Director Denise Knight, IIEC developed a systematic plan of action to promote market transition in China:

1. IIEC undertook a comprehensive market assessment of three high-energy using technologies in China—motors, transformers, and ballasts. The market assessment examined the existing institutions and legislation supporting energy efficiency development, current technological capabilities in China, and available financing for these three energy efficient technologies;
2. After choosing a specific technology (motors), IIEC developed strategies to overcome current market and policy barriers;
3. With this information, IIEC then sought to build collaboration with all interested parties in the government and business sectors; and,
4. IIEC and its partners began implementing specific policies (standards and labeling), market training programs, and financial development measures to help promote the growth of the market for the chosen technology.

IIEC and its partners all agreed that motors were a cost effective technology, offering terrific savings potential and an untapped market for investments. This market was ideal for development in China, because prior to the IIEC program only 15 percent of Chinese motor manufacturers were producing products that actually met U.S. efficiency standards. These plants, however, focused on export products.

IIEC together with the government and business stakeholders confirmed that the key obstacle to energy efficient motor markets in China was that there was no way for motor manufacturers to differentiate their motors as efficient, for there existed no government policy or standards for energy efficient motors. Financing for such investment was also short. Therefore, IIEC needed the motors program to help prove that the savings in installing efficient motors would create real savings and that the motors would perform as expected. Chinese research institutes helped create the standards that were integral to the design of national energy efficient motors certification programs and efficiency standards. IIEC also

initiated a demonstration of a very successful energy efficiency motors project with Shengli Oil—the second largest oil company in China.

Uncovering Obstacles

One notable similarity in the World Bank and IIEC approaches to energy efficiency work in China was that both began their work by exploring why the energy efficiency markets remained untapped. Understanding the fundamental challenges to market development was integral to mapping out an effective strategy for their energy efficiency programs. Both Taylor and Knight discovered similar barriers to energy efficiency markets in China:

- *Insufficient knowledge of energy efficiency and its benefits.* Taylor noted that industry leaders often were unaware of projects already in existence that could result in significant savings and a possible rise of profits. Knight noted that the lack of clear standards for energy efficient products and widespread misunderstanding over what defines energy efficiency meant that many end users in China thought they already were purchasing energy efficient products.
- *Perception of high risk.* With so many opportunities for secure investments in China, there is great reluctance to invest in energy efficiency improvements, which do not produce immediate large cost savings to the producers and consumers. The lack of incentives to enter the energy efficiency markets and the perception of high risk are strong barriers to the development of an energy efficiency market in China. Taylor's conversation with one Chinese state-owned enterprise executive was quite telling: In investments in the company "I am not rewarded if I am successful, but, if I fail, I will face consequences."
- *Lack of financing opportunities.* Producers who opt to take the risk of investing in energy efficiency improvements or technology face one other stumbling block—limited financing.

Keys to Success

Although they employed different approaches to improve energy efficiency within China's manufacturing industries, the World Bank and IIEC both were relatively successful in developing energy efficiency markets. Pam Baldinger noted in her comments that while Taylor's project was more narrowly focused than IIEC's, both projects employed three basic strategies that help explain their successful work in China:

- *Focused work.* Knight emphasized in her talk that a narrow, clear project focus was paramount for successful work in China, for if a project can demonstrate concrete results in a single sector, this will create a model for others. Taylor also adopted a narrow focus in his work, for he believed success in creating a small number of demonstration projects would have a bigger impact than trying to implement a larger unmanageable financing project.
- *Sustained dialogue with government and business stakeholders.* Communicating with all levels is crucial for fruitful collaboration in China. For both Taylor and Knight, solely using Western-proven methods, or best practices in other Asian countries, would result in a model ill fit for the unique needs of Chinese stakeholders. For Knight, questions were posed at every stage. To assure clarification, IIEC asked collaborators very literal questions: "This is what we learned from you. Are we right? Here are some strategies. Are we on target?" It was also important to listen to the concerns expressed by users. In order to make investment rational, users wanted a proof of savings. IIEC responded by spelling the savings out. Constant discussions also revealed the danger of assumptions. Knight and her colleagues originally placed branding issues as priority number one; collaborators were quick to insist that government support, crucial for successful business ventures of all kinds in China, should be the top priority. (Knight also suggested that dialogue with international partners, and other organizations working in China can help avoid conflict. Talking with all other parties assures that there are no mixed signals in the market, no tripping over each other in an effort to do different work, no stepping on the toes of groups by redoing work already done.)
- *Strong relationship with the central government policymakers.* Perhaps not unexpectedly, central government support is crucial for the success of international organizations, for high-level approval eases implementation and facilitates sufficient assistance from lower level governments and the business sector. Robert Taylor suggested that only with the help of the SETC was the World Bank able to create the three ESCOs. Having created a wholly new type of company, Chinese auditors and local governments were confused as how to categorize and tax service providers, equipment sellers or finance businesses. Through nine months of government dialogue led by SETC all of these stakeholders made decisions on how to treat ESCOs.

Accomplishments

In their respective energy programs both Taylor and Knight aimed to create a successful model to prompt the development of energy efficiency markets that could be duplicated in industrial sectors throughout China. While the World Bank and IIEC projects were small in scale, they did demonstrate to key stakeholders in China that energy efficiency could produce great savings and give producers a tremendous competitive advantage. The success of the three ESCOs under the World Bank project could be measured by the return on their investments. Of 200 project loans, Taylor reported only three defaults and an average rate of return over 20 percent.

In the case of IIEC, the program succeeded not simply in demonstrating savings in production costs to the participating industries, but more importantly the program changed industry and energy policy. For example, prior to the motor market program there was a limited awareness of energy efficiency products in China among industry leaders and consumers. The program helped generate general knowledge on energy efficiency and motivate Chinese oil industry leaders to request a similar energy efficiency program in their sector. In the policy realm, the IIEC program led to the establishment of a high efficiency voluntary standard for motors in July 2001, followed by high efficiency product certification guidelines, and in January 2002 a minimum efficiency standard.

Other Energy Efficiency Project Work

The World Bank and IIEC are just two of many organizations involved in energy development in China. While insufficient funding has somewhat limited the extent of U.S. government energy efficiency cooperative projects, the foundation and multilateral communities have been key supporters of NGO and multilateral energy efficiency projects in China (For information on current U.S. government and NGO energy efficiency projects in China, click here). The UN Foundation, for example, has dedicated significant funding for renewable energy and energy conservation in China (and has parallel programs in India and Brazil). In China, the UN Foundation's support of energy efficiency projects includes: (1) increasing energy efficiency of industrial boilers and electric motors; (2) accelerating energy efficient appliance standards; (3) increasing energy efficiency financing; and (4) promoting distributed power. The UN Foundation has encountered the same barriers as did the World Bank and IIEC and, notably, employed many of the same strategies to create successful programs. Similar to the World Bank and IIEC, the UN Foundation also has sought to demonstrate market-oriented approaches in select areas and industries, which encourages interested industries to replicate the successful models.

Future Issues

The success of energy efficiency programs in China, demonstrated by the World Bank and IIEC illustrates the potential for similar programs. While the Chinese government has focused much of its regulatory efforts on the industrial sector, household-level energy use has been relatively ignored. For example, most apartments in China lack wall and ceiling insulation, double-glazed windows or individual temperature controls. Robert Taylor suggested that the best strategy for improving energy use in the household sector would be to focus on an agenda of code enforcement and heating policy reform. Beijing issued building energy efficiency codes—first in 1985 and more recently, 1996—yet neither code has been implemented. In conjunction with code enforcement, heating reform is integral to furthering the advancement of energy efficiency in the household sector. The main obstacle to reform in this sector is that heating still is provided as welfare in China and not treated as a commodity. Generally, employers, not individuals, pay heating bills. Moreover, Chinese consumers have no control over the meter, the price, or the bill. With no individual responsibility in the heating system, there is no way to motivate conservation or promote energy efficient heating at the consumer level.

Forging an Energy Efficient Economy

In addition to World Bank, IIEC, and UN Foundation programs, the development of energy efficiency markets in China should be facilitated by China's entry into the WTO. To truly reinvent its economy as more energy efficient the Chinese government must: (1) help create the right incentives to attract China's domestic banking industry as a source of financing; (2) encourage Chinese industries to prioritize energy efficiency; (3) take ownership of already established energy efficiency programs; and (4) together with the business sector prioritize the role of energy efficiency in building and maintaining a competitive economic advantage

Green Activism and Civil Society in South Korea

26 February 2002

Seo Wang-Jin, Citizen Movement for Environmental Justice

Kim Je-Nam, Green Korea United

Stephen Costello, The Atlantic Council (Commentator)

Editor's Note: Periodically, the China Environment Forum devotes meetings to environmental issues in other Asian countries that might offer insights into environmental developments in China. There are certainly great differences between the Korean environmental movement that began a decade before the Chinese environmental NGO community emerged—one striking difference is that the Korean green organizations have been much more protest and anti-industry oriented than any of their Chinese counterparts. Chinese and Korean environmental movements do, however, have some commonalities—today environmental activists in both countries appear to be searching for a clear mission for the future and the means to strengthen their influence in the political sphere. For more in-depth information on the Chinese NGO movement, see the Wilson Center's Green NGO and Environmental Journalist Forum publication available at http://ecsp.si.edu.

By Yon-ho Kim (Atlantic Council)

The environmental movement in Korea is characterized by grassroots activists seeking to influence policy and challenge powerful polluting industries. In response to the environmental degradation caused by South Korea's high-speed industrialization, small anti-pollution groups arose in the early 1980s. In the 1990s as more "green" groups emerged, Korean environmental activists created larger umbrella organizations to empower themselves.

This meeting held at the Wilson Center and cosponsored by the Atlantic Council's Program on Korea in Transition brought Korean environmental activists together to discuss the strength of the environmental movement in South Korea and the challenges they face in carrying out their work. The discussion also addressed the broader role of green organizations and other civic groups in Korea and their potential influence in the upcoming elections.

Fighting Development Forces and Raising Public Awareness

Seo Wang-jin started his remarks with an introduction of his organization, Citizen Movement for Environmental Justice (CMEJ). In 1999, Mr. Seo founded the CMEJ, which has since become one of Korea's fastest growing NGOs focusing on environmental justice and the fair distribution of natural resources. The group's activities have concentrated on promoting children's environmental rights and stemming the environmental degradation from large-scale construction projects initiated by the government. In describing the trends of the South Korean environmental movement, Mr. Seo pointed out that his and other groups fight against the construction of dams, housing complexes, canals, and reclamation projects.

Since the 1960s these projects have been a stronghold of development-oriented bureaucracies—the Ministry of Construction and Transportation and Ministry of Agriculture—and government contracted private engineering and construction companies. Although there is not a desperate need for many of these large-scale construction projects, the government and business development-oriented "forces" keep pursuing the projects to serve vested interests. Mr. Seo noted, however, that growing concern for the environment in Korea has led to severe frictions between these forces and environmental civic groups.

The campaign to save Dong River on Korea's east coast from dam construction in 1999 is an excellent example of this hostility. The government emphasized the necessity and importance of the project due to water shortages made worse by a short rainy season in that area of the country. The green civic groups opposed the project because the ecology in the Dong River area was exceptionally well preserved. Moreover, such a large-scale dam could threaten the safety of surrounding communities. Seo explained that the efforts of several civic groups to educate and mobilize citizens through the news media led President Kim Dae Jung to announced the cancellation of the project on World Environment Day in June 2000. The Dong River case proved to be a major turning point for the Korean environmental civic group

movement, for it was one of the first times they succeeded in such a large public awareness and mobilization campaign. The case also illustrated the changing political environment in which sustainable development issues rose to the level where the Korean president became directly involved.

While the Dong River case was a battle environmental civic groups won, the Saemankeum wetland case was one they clearly lost. Despite protests, the Ministry of Agriculture proceeded with a large-scale reclamation project in Korea's southwest region, claiming the project would create 28,300 hectares of farmland. Farmland is a major concern, for 30,000 hectares of agricultural land disappear every year in Korea due to changes in land use. Despite the need for agricultural land, environmental civic groups pointed out that the Saemankeum area is one of the world's five most ecologically important mudflats and a crucial feeding ground for migratory birds. In 2001, the government decided to go ahead with the controversial project with strong support from the local government and residents who were seeking economic development benefits from the project.

Stephen Costello

With growing public awareness and strong vested interests of the development-oriented forces, conflicts over large-scale government-initiated construction projects should become even more pronounced and receive a greater amount of attention from the Korean public. In an effort to redirect government policies, Korean environmental civic groups are planning to influence the next administration's organization of the cabinet following its inauguration in February 2003.

Political Activism of Korean Green Groups

In 1994, Kim Je-nam joined Green Korea United (GKU), the second largest environmental NGO in Korea, which acts as an umbrella organization for many smaller green groups. In her work Ms. Kim coordinates every NGO's stance on currently debated environmental issues, mediates agreements among environmental NGOs, government agencies, and businesses, as well as informs the Korean President on the outcomes of these dialogues. Ms. Kim described GKU an example of environmental NGOs working at the intersection of environmental and political issues. Among this NGO's major activities is the environmental monitoring of U.S. military bases in Korea—GKU has collected data on noise, water, and soil pollution problems, which the Korean government has not previously tracked. Last year GKU exposed an incident in which Yongsan Base, located in the heart of Seoul, illegally discharged toxic chemicals into a river. As a result of GKU's publicizing of the pollution, the commander of U.S. Forces Korea apologized publicly for the illegal discharge—the first apology of its kind in fifty years of U.S. military presence in Korea.

GKU and other green groups have been involved in drafting laws and trying to influence legislation in the National Assembly. Such work is particularly challenging for most environmentalists believe the Kim Dae Jung government's "vision" is insufficient to protect natural resources. One positive action did occur in 2000 when the Kim government formed a "sustainable development committee," which brought together industry, government, and environmental group leaders for consultations. The Korean environmental ministry now holds these consultations four times per year with twenty leading green NGOs, but the committee is perceived to be a weak force within the government.

In addition to policy efforts and environmental campaigns directed at the national government, Korean environmental civic groups are involved in various grassroots political activities. For example, the Civil Action for the 2000 General Election (CAGE)—consisting of 423 civil organizations (including a number of green groups)—successfully launched a "blacklist" campaign in 2000. The blacklist campaign was established to single out politicians they felt were "not qualified to run" due

to positions on environmental and social issues. Of 86 blacklisted candidates, more than 60 percent failed to win their election. In the upcoming 2002 local elections, environmental civic groups are planning to politicize green forces even further by establishing a Green Party and supporting green candidates—ostensibly creating a "white list" rather than a black list campaign.

While working locally is central to Korean environmental activists, Ms. Kim noted that their contacts with international organizations grew considerably in the late 1990s, due in part to the openness that accompanied the Kim Dae Jung government when NGOs were legalized and their political participation sanctioned. Ms. Kim also discussed how environmental degradation in North Korea is an increasingly important issue for the South Korean green movement, which supports current government efforts to plant trees in North Korea and protect the environment surrounding the DMZ. She believes the South Korean groups could best help the North by advocating the provision of small-scale, renewable technologies for industry. One challenge for such work, however, is the current lack of NGO counterparts in North Korea.

Korean green civic groups undertake activities beyond the environmental sphere. In fact, Ms. Kim noted that Korean environmental groups are sometimes criticized for being "department store" advocacy groups, because they attempt to address a large number of issues both within and outside the environmental sphere. While Ms. Kim agreed that Korean environmental NGOs need more focused missions, she was a strong supporter of how active some green groups are in the anti-war and peace movement. Some green groups joined other civic groups in the anti-war movement at the onset of the war in Afghanistan. Kim expressed the Korean civic groups' hope of seeing the Korean peninsula become part of an "axis of peace" as opposed to an "axis of evil."

Civic Groups and Korean Democratization

In a brief review of the role of environmental groups in the Korean democracy movement, Stephen Costello noted the connection between a lack of democratic institutions and environmental degradation that can be found in Russia, China, Eastern Europe, and other one-party states in transition. In Korea, the authoritarian structure and rapid industrialization of recent decades have created similar environmental problems as are occurring in other one-party states.

As the Korean government now becomes more accountable and more responsive to interest groups—on all sides of environmental questions—the civic leadership must try to organize and set priorities. The "department store" advocacy noted by Kim may serve to weaken the movement. Effective policy advocacy will also rely to a great extent on dialogue with the government and industry groups. How such a dialogue is conducted will often make the difference between having influence and just blowing off steam.

Added to this is the question of "green" involvement in party politics. As Ms. Kim Je-nam noted, some Korean green groups do not want to become direct participants in the political system and instead wish to rely on public participation and support for their power and legitimacy. Costello noted, however, that the formation of a Green Party and the participation of individual activist leaders as candidates in other parties will be an essential element in keeping these issues on the public agenda in Korea.

The Atlantic Council of the United States and the Wilson Center's ECSP China Environment Forum and the Asia Program cosponsored this meeting. Funding for this meeting was provided by the Korea Foundation.

Tokyo Workshop on U.S.-Japan Environmental Cooperation: Promoting Sustainable Development in China

6 March 2002

By Richard Forrest and Jennifer L. Turner

This second workshop in the series complemented the 20 November 2001 workshop in Washington DC by adding new voices and proposals for future U.S.-Japan cooperation. The Tokyo workshop, hosted by the Woodrow Wilson International Center for Scholars with the cooperation of the U.S.-Japan Public-Private Partnership (P3) and the Japan Civil Society Organization (CSO) Network, brought together some 40 experts from foundations, corporations, government, academia and NGOs to explore prospects and opportunities for U.S.-Japan cooperation to address environmental challenges in China.

Participants were welcomed to the workshop by **Yukio Oshida**, on behalf of the Japan Foundation Center for Global Partnership (GCP), which provided financial support for both the Washington and Tokyo workshops and the meeting venue for the Tokyo workshop. Mr. Oshida noted that sustainable development has emerged as a priority area for CGP support.

U.S. and Japanese Environmental Cooperative Activities in China

In the workshop's first panel the speakers provided overviews of the status of environmental cooperative efforts in China by the United States and Japan.

United States Green Work in China

Jennifer L. Turner of the Wilson Center summarized U.S. governmental and nongovernmental activities on the environment in China. According to Dr. Turner, based in large part on the U.S.-China Science Technology Cooperation Agreement (signed in 1979), 30 protocols guide U.S. activities on conservation, atmosphere, ocean, air pollution, and renewable energy, with 16 agencies undertaking 80 projects in 2001 and 103 projects in 2002. However, due to the lack of Congressional funding, U.S. environmental and energy-efficiency activities mainly consist of workshops, trainings, and joint research. This stands in stark contrast to the large number of loans and grants provided by the Japanese government to China for environmental activities.

Despite the limited governmental funding, U.S. government environmental and energy activities in China have helped to design policies and regulations, set standards for energy-efficient products, and investigate global atmospheric trends. Examples of U.S. government projects include the Air Quality Monitoring Network established in 40 Chinese cities, which has promoted greater access to information about the problematic state of China's air quality. Training courses by U.S. agencies have covered a broad range—including natural gas utilization, energy and environmental modeling, ecotourism, and air quality and health impact assessments. Since January 2001, some new congressional funding has been made available to the U.S. Trade Development Agency (TDA) for feasibility studies for environmental and energy technological assistance to China. Additionally, the law granting permanent normalized trade relations with China promotes support for increasing the rule of law in China, which led to support for the American Bar Association (ABA) China environmental governance project. This ABA project began in February 2002 and will set up environmental law training programs in three Chinese cities for lawyers, judges, and local policymakers. Drawing from within its own budget, the U.S. Department of Energy also provides numerous grants to U.S. NGOs and national laboratories to do energy work in China.

U.S. NGOs are very active in China, with at least 40 American NGOs undertaking projects. Their major foci are energy-efficiency, biodiversity conservation, and environmental education. These NGOs have been very innovative in promoting policy developments, standard setting, market creation for energy efficiency technologies, and more efficient nature reserve protection strategies. U.S. NGOs also have played an important role in building bridges and cooperative relations between local governments, Chinese NGOs, and Chinese industries.

Japanese Green Work in China

Naohiro Kitano of the Japan Bank for International Cooperation (JBIC) outlined Japan's policy on Official Development Assistance (ODA) for China. In particular, the Japanese government's policy for economic cooperation for China announced in 2001 and JBIC's "Medium-term Strategy for Overseas Economic

Cooperation Operations" both emphasize the importance of environmental protection, along with education and poverty alleviation. JBIC began supporting environmental projects in China in 1989, with a cumulative total of $4 billion already provided. A very significant share—20 percent—of all Japanese ODA for China is for "environmental" projects, such as sewage treatment plant construction and water supply projects.

JBIC does not provide technical assistance directly, but coordinates collaboration between municipal governments to supply aid. One example of a JBIC supported project was the Beijing Sewage Treatment Plant Construction Project, which involved collaboration with local governments, including the Tokyo municipal government. Another more recently JBIC-supported activity has included comprehensive pollution control in river basins. The Environment Model City Project—supported by an experts committee and numerous Japanese government agencies—has promoted the diffusion of pollution prevention strategies and technologies in Chongqing, Guiyang, and Dalian. Future challenges for JBIC's cooperation with China include setting up projects in new areas such as energy efficiency, automobile pollution reduction, solid waste management, and recycling. In general, JBIC has been expanding its relationships with NGOs and the JBIC Beijing office is eager to participate in international NGO meetings.

Hidefumi Imura, professor at Nagoya University and a researcher with the Institute for Global Environmental Strategies (IGES), concluded the overview session by explaining the need to take into account the difficult historical relationship between Japan and China in conducting cooperative activities. He also believes there is a great need to create a new relationship for the 21st century. Sino-Japanese trade and exchanges in various policy sectors, especially the environment, have increased significantly in recent years. To facilitate exchanges and joint research in the environmental sphere, the Japanese government provided grants for the construction of the Japan-China Friendship Environmental Protection Center in Beijing.

Dr. Imura noted that, whereas the role of NGOs is important in U.S. environmental cooperation with China, local governments, in contrast, play a significant role in Japanese environmental cooperation with China. The sister city relationship between Kitakyushu and Dalian has included considerable training and exchanges on municipal environmental management and policies. Commercial firms are also likely to be a promising channel for transferring environmental technologies from Japan to China. In terms of bilateral government cooperation, Japan's relations with China are overshadowed by historical strains. Therefore multilateral cooperation will be a more promising venue for Japanese government environmental work in China. As an example, he cited the East Asia Acid Deposition Monitoring Network, which consists of ten countries, including Japan and China, and the trilateral Environment Ministers meeting involving Japan, China, and Korea, which already has convened three times. Dr. Imura felt that for future Japanese environmental work to be more successful in China, activities should shift from economic and infrastructure assistance to education and human skills development. Japan should shift from "aid" to "cooperation," engaging in a common search with China for solutions to pollution and natural resource degradation issues.

Professor Imura concluded that U.S.-Japan cooperation for the environment in China is possible, but that government-level cooperation would be difficult due to divergent environmental policies and priorities in both countries. Technology transfer through commercial channels would be much more promising, although it may induce U.S.-Japan competition. U.S.-Japanese NGO cooperation could therefore play a key role in the future, but unlike the United States, the number of environmental NGOs in Japan is small and funding is scarce. Imura felt that a framework that could promote both governmental and NGO partnerships for the environment should be established to promote U.S.-Japan joint environmental initiatives in China. (*Editor's Note: See the Inventory of Environmental Projects in China in this issue of the China Environment Series for an extensive, up-to-date list of U.S. and Japanese government projects and international NGO activities in China*)

OVERVIEWS OF ONGOING ACTIVITIES

The second panel at the workshop—Overviews of Ongoing Activities—delved deeper into the progress and lessons of energy and climate change assistance to China, which hold potential for future U.S.-Japan environmental cooperation. **Aki Mauryama**, research associate of IGES, gave a presentation on "Issues in International Cooperation for Climate Change Mitigation in China: The Case of Power Generation." She noted that while special mechanisms were agreed to under the Kyoto Protocol for developed countries to provide assistance to developing countries, technology transfer for CO_2 mitigation to China is hampered by: (1) the fact that domestically abundant coal is widely used in China; and (2) the predominance of small, old, inefficient power plants. She explained that China's share of CO_2 emissions

in the region is large, and the largest contributor of CO_2 emissions in China is fossil fuel use, especially coal—80 percent of which is used for power generation. Over the last six years, CO_2 emissions in China have been shrinking, but economic growth and population increase will lead to greater electricity consumption and coal will continue to be used. Therefore, shifting power generation to renewable sources and promoting energy efficiency are urgent tasks for China. Funding mechanisms also are needed to finance the additional costs of clean coal technology (CCT).

China's domestic policies should be reformed to promote improved and more sustainable energy production in areas such as: (1) fuel pricing (e.g., eliminating governmental subsidies for coal); (2) providing favorable tax treatment for environmental investments; (3) improved environmental regulation, monitoring, and compliance mechanisms; and (4) government support for research, development, and coordination with nongovernmental organizations. Lack of clarity in policies and regulations—particularly insufficient protections for intellectual property rights and convoluted approval processes—currently discourages innovative investment in the energy sector, although China's entry into WTO may improve the situation. Dr. Aki Mauryama concluded that to promote future investment and technology transfer for environmental protection in China, environmental legal assistance to improve the legal framework would be crucial. The United States and Japan could play an important role in this area if there was cooperation on environmental law and governance, akin to the newly initiated American Bar Association training program.

Kevin Maher, minister counselor for science and technology at the U.S. Embassy in Tokyo, noted in his presentation on "U.S.-Japan Cooperation on Global Environment Issues," that the scientific research on atmospheric issues promoted through U.S.-Japan cooperation might be beneficial for application in China in the future. Nevertheless, he indicated that the U.S. government does not recognize sufficient scientific basis behind numerical CO_2 reduction targets, challenging the consensus of scientific experts. In the subsequent discussion, it became evident that the U.S. stance on the Kyoto Protocol is considered a major hindrance to enhanced and expanded U.S.-Japan environmental cooperation.

Professor **Hideki Shiroyama** of the University of Tokyo in his presentation "Analysis of Japan's Green Aid to China" explained that while Japan has supported financing for the construction of more efficient boilers for coal power plants in China, plant maintenance (critical for maintaining efficiency) is not well supported. Improvements for boilers in small- and mid-sized industries, of which there are an estimated 300,000 to 400,000 in China, is a necessary but difficult task due to high costs. Dr. Shiroyama reiterated that China's low priced coal, lack of regulations, and shortage of financing provides disincentives for energy-saving investments. The combination of environmental challenges and the transition to the market economy mean that pollution problems are difficult to solve. Assisting technology transfer, especially through innovative financing arrangements, would appear to be one of the most promising areas for future U.S.-Japan cooperation on the environment in China.

Kenji Otsuka, of the Institute for Developing Economies (IDE), presented "Research Cooperation to Promote Capacity Building for Sustainable Development in China." He noted that cooperation between Japanese and Chinese social science research institutes and environmental policy research centers is taking place. Such collaborative efforts have led to surveys of public attitudes toward the environment and green activities of businesses—the latter surveys could be especially useful in designing technology transfer programs. It will be important to transfer the results of these bilateral research efforts to the policymakers in China and Japan. IDE also cooperated with the Center for Legal Assistance to Pollution Victims (CLAPV), which conducts telephone counseling and legal support for pollution victims in China. He concluded that social science research cooperation with Chinese environmental institutions is vital, given the limitations imposed on investigation by foreigners and inaccessibility of original data. Moreover, Chinese partners have a better understanding of the local political and social dynamics and such collaboration promotes capacity building for Chinese research institutions. (*Editor's Note: For more information on CLAPV and cooperation with Japan see Kenji Otsuka's commentary in this issue of the China Environment Series*)

Opportunities for New Cooperation

The workshop's concluding session, a roundtable discussion, invited participants to: (1) identify sectors that should be prioritized in U.S.-Japan environmental cooperation to benefit China; (2) highlight next steps that should be taken to promote such cooperation; and (3) identify potential obstacles to U.S.-Japan collaboration in China.

Roundtable presenters included **Chimaki Kurokawa**, managing director of the Toyota Foundation, who

explained that the Toyota Foundation supports environmental research activities, including funding for afforestation efforts in Inner Mongolia by Tottori University and protection of the Yangtze River dolphin. Mr. Kurokawa noted that the environment provides a favorable sector in which to promote bilateral cooperation between China and Japan, but multilateral frameworks and the cooperation of NGOs is important and should be much further developed, which could open up initiatives with U.S. organizations and agencies.

Senro Imai of the Japan International Cooperation Agency (JICA) indicated that China's central government is eager to avoid environmental and pollution problems becoming political controversies. Whereas in Japan the political system worked as a safety valve to bring pollution problems to the attention of the government and thereby led to solutions, there are few opportunities for electoral or public pressure to influence the government on environmental issues in China. Nevertheless, China allocates 1.03 percent of its GNP, an exceptionally high proportion for a developing country, to environmental investments. He believed that supporting the role of local governments and participation by citizens in environmental protection activities will be a crucial task for Japan and other countries working in China. Supporting environmental legal reforms, as well as the training of lawyers, are also promising areas of U.S.-Japan collaboration.

Manabu Tani, president of the Green Blue Corporation, discussed how his company aims to help develop the market for environmental monitoring in China. Mr. Tani recalled that careful monitoring of industry and environment allowed Japan to overcome severe pollution problems in the 1960s and 1970s. Such monitoring and data collection should be able to play a similarly beneficial role in China. While Japan has 2,000 automatic air-monitoring stations, China only has 98 in sixteen cities. He proposed that U.S.-Japan environmental cooperation for China focus on developing the market for environmental monitoring systems.

Byron Sigel, Japan representative for The Nature Conservancy (TNC), explained how around the world TNC undertakes conservation of biological diversity in a collaborative, science-based, and entrepreneurial manner. TNC has a project in Yunnan Province in southwest China that focuses on promotion of alternative energy, tourism, and reforestation, while also being mindful of the cultural diversity of the area. He suggested reforestation and ecotourism projects that benefit local communities would be especially promising areas for U.S.-Japan cooperation. He stressed, however, that to promote U.S.-Japan cooperation—particularly between NGOs—Japan's ODA system would need to be made less bureaucratic and more decentralized to help promote such cooperative initiatives.

Asuka Jusen, professor of Tohoku University, indicated that it would be difficult to convince Chinese authorities to tackle the climate change issue when Japan and the United States have not demonstrated a model of success, such as through the introduction of a carbon tax to reduce their own greenhouse gas emissions. For U.S.-Japan environmental cooperation in China and elsewhere to succeed, information exchange and joint study and research should be promoted, including the joint development of international markets for carbon emissions reductions credits.

FUTURE ACTION

The workshop concluded with recommendations for future action. While participants agreed that U.S.-Japan cooperation for the environment in China would be valuable, they recognized that difficulties remain, and that steps would need to be taken to improve prospects for the future. Such steps could include:

- Creation and support of networks to share information within Japan, between Japan and the United States, and between Japan, the United States, and China. Such networks could speed up the diffusion of knowledge, catalyze partnerships and "match-make" among NGOs and government agencies for effective joint activities;
- Internet-based information exchange systems in multiple languages;
- Creation of a joint research forum for American and Japanese experts to evaluate and promote environmental technology transfer to China;
- Increased cooperation with local governments in China, such as "sister city" relationships—trilateral "sister city" cooperative projects that focus on municipal environmental infrastructure and financing could be one promising avenue for U.S.-Japan environmental cooperation in China;
- The Japan-China Friendship Environmental Protection Center in Beijing could be used for matchmaking of NGOs and other U.S. and Japanese institutions working for environmental issues in China;
- Promote joint U.S.-Japan environmental education initiatives, which in the long term will help build domestic Chinese support for improved environmental policies and investments, and,

• Joint training projects by U.S. and Japan law associations and NGOs to promote better enforcement of environmental laws in China.

The workshop organizers concluded that the Tokyo workshop was successful in identifying many views and challenges regarding U.S.-Japan environmental cooperation in China, and that future workshops should be undertaken and include broader participation of local government officials and researchers from the United States and Japan.

Editor's Note: The Wilson Center and P3 would like to acknowledge the efficient assistance of Yoshiko Hattori and Kumiko Mima from the translation company Diplomatt in writing the initial transcript for this meeting summary.

We are also grateful to Shunsuke Sogo (CGP) for his enthusiastic assistance in helping the meeting run smoothly.

Film Screening of *Herdsmen* at the Environmental Film Festival in the Nation's Capital 15 March 2002

ECSP's China Environment Forum screened the film *Herdsmen* during the 2002 Environmental Film Festival in the Nation's Capital (http://www.dcenvironmentalfilmfest.org). The film is a documentary that tracks a Kazak family in Xinjiang—China's western-most province—with two cameras over the course of a year from spring to winter. The Kazaks are ethnically related to the people of Kazakhstan and speak the same language. While Kazakhstan was molded by the Soviets into a nation of farmers and workers, the Kazaks of Xinjiang have retained their nomadic life and their bond with nature and love for animals, especially horses. The Kazaks are a small minority among the many more tenacious peoples of Xinjiang. Therefore to survive, the Kazaks went their way among the mountains and plateaus of the most remote region of China.

The 90-minute film was cut from 2,500 minutes of footage, a four-year effort by an all-Chinese film crew (Wei Bin, executive producer; Luo Ming, producer; Chen Jianjun, director; Shen Jian, photojournalist). The crew followed a typical nomad Kazak family of 11 children as the family moved wherever there was grass for their beasts. The family endured incredible hardships, sometimes going several days without food. In spite of these challenges the film shows the family enjoying many moments of joy and beauty—sustained by faith that nature will support them. The film is stunning in its cinematic style, taking a classic ethnographic approach—purely observational with no interviews and no outside narration.

(Information on the film available at: http://www.der.org/films/herdsmen.html)

The Integrated Energy Options and Health Benefits Study for Shanghai, China

22 March 2002

Chen Changhong, Shanghai Academy of Environmental Sciences

Fu Qingyan, Shanghai Academy of Environmental Sciences

Li Jia, Center for Clean Air Policy

Susan Wickwire, U.S. Environmental Protection Agency (Opening Remarks)

By Collin Green (NREL), Timothy Hildebrandt, and Jennifer L. Turner

For the past three years, the U.S. Environmental Protection Agency (EPA) has supported a cooperative project with the Chinese State Environmental Protection Administration (SEPA) to estimate how the implementation of clean energy and transport technologies, policies, and programs could benefit local air pollution and linked human health problems, as well as reduce greenhouse gases (GHG). This program falls within EPA's integrated environmental studies (IES) program, which promotes an integrated environmental policy analysis framework by linking policy analysis and implementation of air pollution and GHG mitigation measures through analyses of emission inventories, air quality modeling, and air pollution health effects (See Box 1). The object of this comprehensive policy analysis framework is to provide decision-makers with robust information on the costs and benefits of specific policy measures. Members from the Chinese team presented the results of this study at a March China Environment Forum meeting at the Woodrow Wilson Center.

The initial phase of this China IES project was implemented in Shanghai in cooperation with the Shanghai Academy of Environmental Sciences (SAES) and the Public Health Department of Fudan University. The project received support from the China Council for International Cooperation on Environment and Development (CCICED), World Resources Institute (WRI), National Renewable Energy Laboratory (NREL), EPA, and the Shanghai Environmental Protection Bureau (SEPB).

The Shanghai project team has recently completed a comprehensive study—*Integrated Assessment of Energy Options and Health Benefits*—for Shanghai for the period 2000 to 2020. This is the first time Chinese experts have carried out an integrated study linking analysis of energy options, air quality, and economic value of anticipated health impacts.[1] The study demonstrates that fuel substitution, efficiency improvements for boilers, and a city-wide cap on SO_2 (sulfur dioxide) emissions provide effective pollution reduction opportunities to improve local air quality with significant health benefits while simultaneously reducing GHG emissions. The analysis estimates that these measures would prevent 3,000 deaths/year and provide a range of other health benefits, with a total economic value of over $500 million per year by 2010. The Shanghai municipal government already has incorporated results of this study into their planning and policies including the "10th Five-Year Development Plan for Shanghai Social Economic Development."

Current Environmental Quality in Shanghai

To fuel China's economically dynamic cities energy demand has been increasing considerably. As a result of high energy consumption and the use of low energy-efficient technologies, polluting emissions have risen in many Chinese cities. Air pollutants have caused serious environmental problems in China and growing CO_2 emissions have contributed to the worldwide increase in greenhouse gas concentrations. Aware of the unsustainability and environmental damage of current energy consumption, the Chinese government has made great efforts in energy conservation, energy efficiency, and population control. For the past few years the rate of energy consumption in China has been increasing more slowly than the rate of national economic growth.

With a high rate of economic growth, the living standards, per capita gross domestic product (GDP), per capita energy consumption, and energy application technology of citizens in Shanghai are higher than the national average and among the most advanced in China.

Box 1. U.S. EPA's Integrated Environmental Strategies (IES) program

Many countries are struggling to balance economic development, long-term environmental risk minimization (i.e., global change), and critical near-term environmental concerns (i.e., improvements in air quality and human health). Effective integration of climate change and local environmental strategies can make use of limited resources for greenhouse gas emissions reduction and other national and local environmental protection programs simultaneously. To assist developing countries in meeting this need, the U.S. EPA's International Capacity Building Branch of the Office of Atmospheric Programs initiated the Integrated Environmental Strategies (IES) (www.nrel.gov/icap) in 1998 to support and promote the analysis of the public health, environmental, and economic benefits of integrated strategies for GHG mitigation and local environmental improvement in developing countries. Government agencies and research institutions in Argentina, Brazil, China, Chile, South Korea, India and Mexico are participating in the IES program, and South Africa is considering joining soon. The International Energy and Environmental Applications Office of the National Renewable Energy Laboratory assists EPA with the implementation of the IES program.

For years, the Shanghai municipal government has made great efforts in energy and environmental protection. Many of the implemented policies have increased energy savings, as well as strengthened controls on coal consumption, fuel content, smoke and dust, and end-of-pipe technologies. The experiences and lessons of Shanghai in economic development, energy consumption, and environmental protection will inevitably influence other major cities in China.

Shanghai lacks energy resources and depends on energy delivered from other provinces in China, mainly in the form of coal and crude oil. From 1996 to 1998, total average end-use energy consumption was 1813 PJ (peta joules) per year. By 2020, total end-use energy consumption is expected to increase to 1907-2744 PJ. Shanghai strictly controls the sulfur quantity in fuel, and although energy consumption has increased over the past years, SO_2 emissions have not; in fact the 1998 emissions were lower than in 1996 and 1997. However, total CO_2 emissions from fossil fuel burning have increased by more than 100 million tons each year since 1994. Moreover, coal-burning pollution control measures intended to reduce NO_x (oxides of nitrogen) emissions have not been effective.

Projections of Energy and Air Pollution in Shanghai

Chen Changhong and Fu Qingyan from SAES provided a succinct overview of how the projections for the study were set. The project used 1995 figures as the basis for projecting energy demand per sector and GDP. The projected GDP growth rate of 9 to 11 percent for the short-run was taken from "The Tenth Five-Year Plan." The energy demand levels per sector were forecasted by using historical data on the elasticity of final energy consumption; the figures were then translated by applying the energy efficiencies for current energy technologies. Assumptions regarding energy and fuel supply availability included the following:

- Natural gas availability was constrained by existing supplies, that is, natural gas from sources outside China was not considered;
- Availability of coal was assumed to be unlimited; electricity supply would be met by sources from Shanghai;
- Additional imports from nuclear and hydro sources outside Shanghai were not considered; and,
- No additional changes were assumed in energy and environmental policy such as those being developed in the Tenth Five-Year Plan.

The alternative energy and emission scenarios were derived from China's *Agenda 21-Shanghai's Plan of Action,* and Shanghai's Tenth Five-Year Plan. Three types of alternative scenarios (main assumptions are summarized in Table A) were developed from the base case (BC):

(1) Implementation of alternative energy options—Energy Option Scenario
(2) Setting new environmental emission targets—Environmental Targets Scenario
(3) Implementation of carbon emission control through a carbon tax—Carbon Control Scenario

Analysis of Health Impacts Resulting from Changes in the Energy Structure and the Enforcement of Environmental Policies

Li Jia from the Washington DC-based Center for Clean Air Policy discussed the health analysis part of the

Table A. Characteristics of Future Energy and Environmental Policies

Scenario	Future Energy and Environmental Policies	Indicators
Energy Options	Energy efficiency in coal facilities	5-10% improvement 1995-2020
	Limit total coal consumption in Shanghai	Less than 50 Mt, 2000 onward
	Limit total capacity of coal fired power generation	Less than 12 GW, 2000 onward
	Import natural gas from Western China	3-4 billion cubic meter per year starting at 20003 (117-156 PJ)
	Import electricity from 3 Gorges Dam	3 GW, 2010 onward
	Import electricity from Qinshan Nuclear Power Station	0.3 GW 2010 0.65 GW 2015
	Import liquefied natural gas (LNG)	5-6 million tons 2010 onward
	Build wind turbine	0.06 GW, 2005 0.30 GW 2015 0.60 GW, 2035
	Substitute coal with natural gas	35% of end-use coal (2005); 90% (2035)
Environmental Targets	Reduce 20% SO_2 emissions by 2005 on base year 2000	Emission limit of 372 kiloton (kt)/yr, 2005 onward
	NOx emission control targets for transportation sector	Emission limits: 61 kt/yr, 2005; 25 kt/yr, 2020 onward
	NOx emission control targets for all sectors	Emission limits: 391 kt/yr, 2005; 325 kt/yr, 2020 onward
	PM_{10} emission control targets for mobile sources	Emission limits: 7 kt/yr, 2005; 3.5 kt/yr, 2020 onward
	PM_{10} emission control targets for non-mobile sources	Emission limits: 100 kt/yr. 2005; 70 kt/yr, 2020 onward
Carbon Control	CO_2	200 Yuan/t, 2015 onward

study. She explained that the health-based risk assessment approach (including hazard identification, exposure assessment, dose-response assessment, and risk characterization), combined with an increase in health damages per unit increase of air pollutant, was used to estimate the health effects associated with air pollution in Shanghai. Based on the Shanghai Environmental Geography Information System, the human exposure levels to PM_{10}[2] and SO_2 associated with energy consumption were assessed for each four-km^2 grid across the entire city of Shanghai. By combining the change in population exposure levels to PM_{10}, (which was used as an indicator of total air pollution, exposure-response functions, and baseline rates for the health outcomes) the health effects under various energy scenarios relative to the base case scenario were estimated for 2010 and 2020. This portion of the study indicated that the implementation of various energy scenarios in Shanghai could have significant positive impact on the health status of Shanghai residents. Table B shows the range of potential

health benefits from the energy options and environmental scenarios.

The effect of air pollution on mortality was assessed by using the value of a statistical life (VOSL). The effect of income on the VOSL also was taken into account for the value transfer. Prior to this study there were no willingness-to-pay (WTP) studies for different endpoints of morbidity in China. Therefore, an alternative approach was taken to infer a WTP value. The unit values for various endpoints are expected to increase annually using a constant growth in per capita income of four percent, which was estimated according to the Shanghai GDP growth scenario and the relationship between resident income and GDP growth in China. The value of a change in the incidence of a given adverse health outcome was calculated as the change in incidence multiplied by the unit monetary value.

Table C presents the average economic benefits of different scenarios with respect to the base case scenario. Estimates for the economic benefits and potential avoided health impacts were calculated for both mortality and morbidity end points. The analysis was mainly based on the result of a study on the WTP for a reduction in mortality risk related to air pollution, which was conducted in Chongqing, China. Air pollution also affects human morbidity and therefore the valuation of illness and disability is important for assessing the total social costs of air pollution. This analysis used either the WTP approach or the conflicts of interest (COI) approach to value the morbidity outcomes associated with air pollution.

Conclusion

Energy and health policy under high economic growth conditions is one of the biggest challenges facing Shanghai. The *Integrated Assessment of Energy Options and Health Benefits* study provides an opportunity for Shanghai to assess future environmental risks and potential responses. The results illustrate that an effective energy and environmental policy could play a key role in emissions reduction, air quality improvement, and health benefits.

This analysis emphasizes the need to consider air pollution-related health effects as an important impact of energy policy options in Shanghai and illustrates that close collaboration between public health and energy policy could prevent serious health hazards. Moreover, the approaches recommended in this analysis could be applied to other regions of China for local and nationwide air pollution-related health risk assessments.

A policy workshop was held in Shanghai in February 2002 to review the results of this study, discuss policy implications, and identify priorities for further cooperative efforts. The workshop included

Table B. Health benefits in Different Scenarios with Respect to Base Case (BC) Scenario

Health Endpoint	Number of cases prevented in 2010 (mid-range values)	Number of cases prevented in 2020 (mid-range values)
Premature avoidable deaths	647-5,472 deaths	1,265-11,130 deaths
New cases of chronic bronchitis	1,1315-11,100 cases	2,580-22,620 cases
Cases of respiratory hospital admission	260-2,260 cases	486-4,485 cases
Cases of cardiovascular hospital admission	260-2,260 cases	486-4,485 cases
Internal-medicine outpatient visits	27,080-237,900 visits	49,850-468,600 visits
Pediatrics outpatient visits	2,807-24,660 visits	5,173-48,590 visits
Cases of acute bronchitis	49,490-414,200 cases	98,520-850,000 cases
Asthma attacks	1,508-12,790 cases	2,937-25,960 cases

representatives from the national (SEPA and CCICED) and local (SEPB and the Shanghai Public Health Bureau) levels, as well as technical experts from Shanghai and the United States.

Study results and actual measurements presented at the workshop indicated that fuel substitution, efficiency improvements for boilers, and a city-wide cap on SO_2 emissions provide effective reduction opportunities to improve local air quality with significant health benefits while simultaneously reducing GHG emissions. In addition to improving health in the city, Shanghai's CO_2 emissions would be reduced by 37 million tons in 2010 (more than a 20 percent reduction from the reference case). Shanghai city officials have incorporated results of this study into their planning and policies. During the final stages of the Shanghai IES project, the study team was commissioned by the Shanghai Municipal government to prepare a series of background reports for the air quality portion of the Shanghai Tenth Five-Year Plan.

Senior officials from the SEPB credited the Shanghai IES team for major contributions to air quality improvement measures in the Tenth Five-Year Plan. These measures included: (1) identification of fine particle control as a high priority, influencing levels of five-year goals for SO_2, NO_x and PM_{10}; and (2) identification of specific technology and fuel mix goals for the Shanghai energy system. SEPB officials also have commented that the IES work has improved the coordination among energy, environment, and public health organizations and policies of the municipal government. Officials from SEPA and CCICED made strong statements about the value of this work, including the groundbreaking efforts to assign monetary values to air pollution related health effects. Moreover, these officials view this work as a powerful model and are discussing ways to promote its replication throughout China.

The study team proposes further work in Shanghai to enhance the transparency and certainty of the Shanghai analysis. For example, no dose-response data were available specifically for Shanghai, but it also would be important to consider research to: (1) develop concentration response functions for Shanghai; (2) consider a time-series study in Zhabei District, an urban district in Shanghai to analyze the effects of air pollution on mortality; and (3) conduct a contingent value methods (CVM) study to obtain willingness-to-pay information for Shanghai specifically. Additional proposals for future work include:

- Developing an improved decision support system for air quality management in Shanghai, including air quality model improvement, and analysis of PM_{10} and O_3;
- Estimating the health benefits of mitigation options and the benefits that pollution mitigation policies may have for the ecosystem;

Table C. Average Economic Benefits of Different Scenarios with Respect to Base Case Scenario (in millions of 2000 US$)

Health Endpoint	Economic Benefits in 2010	Economic Benefits in 2020
Premature avoidable deaths	104.0-873.2	300.4-2646.0
New cases of chronic bronchitis	7.5-60.7	21.6-188.8
Cases of respiratory hospital admission	0.4-3.5	1.1-10.2
Cases of cardiovascular hospital admission	0.4-3.5	1.1-10.3
Internal-medicine outpatient visits	0.6-4.9	1.5-14.4
Pediatrics outpatient visits	0.1-0.5	0.2-1.5
Cases of acute bronchitis	0.5-4.1	1.5-12.8
Asthma attacks	0.0-0.1	0.0-0.3

• Considering other measures and options in future analysis such as the potential for economic incentives to promote environmental controls (e.g., SO_2 levy); and,
• Reevaluate the health effects from various energy options adopted in Shanghai in three to five years in order to assess the actual impact of the policies.

The study's leaders also seek to expand the area of study outside Shanghai and:

• Conduct a regional air quality study for Shanghai and surrounding provinces for SO_2, NO_x, PM_{10}, O_3, and other secondary pollutants so that transboundary and long-range pollutant transport may be investigated and included in the analysis;
• Replicate this study with similar analysis in other cities in China and undertake a national-level assessment. As part of the ongoing EPA-SEPA cooperation, a similar study is now in process for Beijing and designs for a national-level assessment are being developed;
• Expand the study topics to include more detailed energy scenarios and options, air pollutants, and water quality issues; and,
• Include the U.S. Center for Disease Control and Chinese health officials on a team to develop methodologies for health impact assessment in future Sino-U.S. projects.

Endnotes

[1] Prof. Chen Changhong of SAES led the energy, emissions, and exposure study team, assisted by Mr. Zhang Junliang, Miss Fu Qingyan, Miss Shen Hong, Miss Bao Xianhua, and Mr. Chen Minghua. Prof. Chen Bingheng of Fudan University led the health effects and economic valuation study, assisted by Prof. Hong Chuanjie, Prof. Zhu Huigang, Prof. Song Weimin, Mr. Kan Haidong and Prof. Wang Hong.

[2] Particle matter with a mass median aerodynamic diameter less than ten micrometers. PM_{10} is one of seven pollutants EPA regulates in the United States.

Call for Papers
Feature Articles and Commentaries for the Woodrow Wilson Center's *China Environment Series* Issue 6

The editor of the *China Environment Series* invites submissions for feature articles (20-25 double-spaced pages) and commentaries/notes from the field (2-4 double-spaced pages) for the 2003 issue.

I. Feature article themes of particular interest include:
• Water issues: scarcity, pollution, conflict
• Energy—Energy efficiency, policy, financing
• Green consumerism—nascent environmental protection industries, selling Green culture
• Cross-border environmental problems and cooperation—Hong Kong-Guangdong, Cross-straits, China-Russia

Authors wishing to propose feature articles focusing on other topics relating to environmental and energy issues in China or how these issues impact U.S.-China relations should not hesitate to submit a proposal.

II. For the commentaries/notes from the field section of the *China Environment Series* we welcome any topic relating to environmental or energy issues in China, Taiwan, or Hong Kong (See issues 4 and 5 for examples of previous commentaries at http://ecsp.si.edu). Commentaries based on current field research are of particular interest.

Proposal abstracts for feature articles and commentaries of not more than 250 words are due before **15 September 2002**. Please email abstracts to Jennifer Turner at chinaenv@erols.com or fax to 202-691-4184.

Authors will be given guidelines after proposals are accepted. Final drafts will be due **15 November 2002**.

Regional Integration of Hong Kong and Guangdong: Hopes and Fears

8 April 2002

Christine Loh, Civic Exchange

By Timothy Hildebrandt

Five years after the international community scrutinized the July 1997 handover of Hong Kong to the People's Republic of China the city now is comparatively ignored by the worldwide news media. Economically, while not the force of years past, the region is in good health; Hong Kong and south China weathered the Asian financial crisis without devaluing their currencies. Politically, the former colony has maintained stability; pessimistic predications of a Beijing stranglehold on the region have, as yet, not come to fruition. This relative stability in Hong Kong, with no presence of global terrorist activity and limited interests in the Enron debacle means Hong Kong is not the hot topic it was a few years ago. But, according to Christine Loh of Civic Exchange, this is no reason to ignore the region. The integration of Hong Kong and Guangdong offers an intriguing story involving interlinked political, economic, and environmental factors. This Woodrow Wilson Center meeting introduced the issue of regional integration of Hong Kong and Guangdong, highlighting environmental issues in the region and the importance of collaboration in solving problems.

Self-Determination and Economic Windfall

Politically, Hong Kong residents have accepted reality. The city-state that grew from a small fishing village to a world economic powerhouse while a member of the British Commonwealth is back under the control of its historical "birth mother," China. Economists urged China's leaders not interfere with Hong Kong's economic success and instead preserve the open door policy that has been integral to south China's economic boom. When China began to open in the late 1970s, Beijing declared south China the proving ground for a free-market economic policy in China, inviting Taiwan, Macao, and Hong Kong to invest freely in Guangdong Province. Possessing the freedom to make economic decisions themselves, Guangdong authorities have transformed their province, particularly the Pearl River Delta, into the most economically dynamic and successful area of China.

While perhaps not as romantic as Shanghai, the "Paris of the East," the Pearl River Delta is unquestionably the economic emperor of China. Interregional cooperation has been essential for Hong Kong and Guangdong's common success:

- Since the early 1980s, virtually all of Hong Kong's light manufacturing moved into southern China;
- Southern China manufacturing operations have resulted in dramatic growth for Hong Kong-based companies, along with increased value and quantity of production;
- The shift in production plants into southern China has meant Hong Kong exports fewer products than in the past. However, Hong Kong businesses now control the more lucrative end of manufacturing: production management, product design, and marketing;
- While Guangdong presently constitutes 40 percent of China's exports, Hong Kong businesses control 60 percent of Guangdong's export capability; and,
- Guangdong's per capita GDP is double that of the rest of China, while Hong Kong's GDP is over six times the size of all of China's provinces combined.

The Danger of Competition

Traditionally, Asia's economic centers (Hong Kong, Seoul, Singapore, Taipei, and Tokyo) have competed with each other. These cities often attempt to outbid each other for Olympic Games, corporate headquarters and, most recently, the new Hong Kong Disneyland theme park. (*Editor's Note: See following commentary on this topic*) Guangdong and Hong Kong, like the rest of Asia, also compete with each other. While this competition has spurred economic growth in the Pearl River Delta, it also has led to extreme cases of waste (in terms of duplicative infrastructure) and detrimental environmental impacts in the region. Clearly, as Hong Kong and Guangdong move toward economic integration, local governments on both sides of the border need to contend with similar "side effects" of development and pollution problems—as Loh noted, environmental issues "respect no political

borders."

Uncontrolled Development

Looking at transportation networks, Ms. Loh reported that the Pearl River Delta is home to five fairly major airports—two of which are "hardly doing anything at all." For regional integration that is economically *and* ecologically sound, Hong Kong and Guangdong must avoid such waste and environmental destruction. Loh suggested a regional "spatial database" be created in order to identify areas that are suitable for development—and those that simply should not be touched. The key, according to Loh, is cooperation among policymakers on regional development planning. While scholars and scientists in the region understand responsible development, it will be a challenge to raise such awareness among city, county, and provincial government leaders.

Christine Loh

As the region continues its rapid growth, observers hope the Pearl River Delta will not commit the developmental sins of Hong Kong. Christine Loh, however, fears the Pearl River Delta is on track to repeat Hong Kong's failure to adopt a conservation policy. She envisions the push for economic growth through massive infrastructure projects will lead to less conservation and more irresponsible development in Guangdong. Ms. Loh provided one telling example: Guangdong government officials have issued plans to construct the "Guangdong-Hong Kong-Macau (GHM) Major Bridge," to connect the eastern side of the Pearl River Delta to the west. A capstone of the project would be the Macao Immigration Check Point. This development would necessitate a vast reclamation project to create enough land for the checkpoint and a massive housing project—the latter would be developed to provide financing for the bridge. Massive infrastructure initiatives like the Delta Bridge and Hong Kong Disneyland have incurred a high financial cost and, according to Loh, a high ecological one as well. Loh lamented the public indifference in Hong Kong to the "deletion" of an entire bay for the theme park construction, a stark contrast to a similar situation in the United States. "I know that people in Virginia are very proud of themselves because they rejected Disney. This does not happen in our part of the world. People see these [large infrastructure projects] as ways to generate economic returns."

Insufficient Infrastructure, Inadequate Information

Responsible development is, according to Loh, dependent upon reliable information making its way to the policymakers who are in a position to affect change. These individuals in Hong Kong and Guangdong, however, have yet to receive a comprehensive picture to create environmentally friendly development policy for the whole region. Clear data on the long-term costs of inefficient development and environmental degradation will be needed to convince policymakers on both sides of the border to commit politically and financially to regional development research and planning. One current obstacle is that data is difficult to access in Guangdong, as many local governments are only willing to sell such information.

There is a great need for adequate water and solid waste processing investment and planning in the region. Despite being a developed city on par with Toyko and Sinagpore, Hong Kong still suffers from inadequate infrastructure for wastewater and solid waste disposal. Loh declared that Victoria Harbor is "*still* half a cesspit [after] many years [being treated as] a public toilet." In some areas of Guangdong, wastewater lacks advanced treatment while solid and hazardous waste disposal facilities are often nonexistent.

Public Awareness Factor

The general population in Hong Kong grossly neglects environmental problems. Environmental issues that do capture public attention are approached from a shortsighted perspective. For instance, with the growing energy shortages in Hong Kong residents care only about avoiding brownouts, not the larger, more sophisticated problems such as carbon loading, energy-efficient buildings, and renewable energy. Loh insists a change in the environmental mindset of the region must be made to improve the ecological situation of the Pearl River Delta. Loh's think tank Civic Exchange has partnered with a Shenzhen academic institution to conduct a study examining people's attitudes in the Pearl River Delta

toward the environment and what efforts they as individuals make to promote environmental protection in their area.

Public awareness is also low, Loh contends, due to the lack in Hong Kong and Guangdong of enough environmental "champions" to affect large-scale change. The well-known personalities that champion other causes in the region have yet to attach themselves to ecological issues (except, perhaps, Loh herself). The most influential, well-known people in the region—many in business—are fixed in the mindset of competition within the Pearl River Delta rather than collaboration on sustainable development.

Financing

Perhaps the biggest roadblock to solving environmental problems in Hong Kong and Guangdong is a lack of funding. Options for the region are constrained by preferences for continued economic autonomy and its great wealth—accepting money from the Chinese government would implicitly obligate Hong Kong and Guangdong to follow Beijing's directions, while multinational lending organizations like the World Bank and Asian Development Bank would not chose to operate in such a rich area. This leaves the Pearl River Delta with only two viable options for funding—private money and regional government support. Private funding of public projects is not uncommon in the region. Hong Kong-based investors already own a big chunk of infrastructure on both sides of the border—the Zhejiang expressway in eastern China is listed on the Hong Kong stock exchange. Few private groups, however, are willing to fund the ugly "underbelly" of city infrastructure like wastewater treatment. Government funding can be equally difficult to secure for these less appealing projects. The necessary infrastructure projects, integral for the ecological health of the region, thus lose out to the grander, more profitable, often environmentally detrimental schemes.

ENVIRONMENTAL MOVEMENTS AND REGIONAL COOPERATION

According to Loh, environmental movements in the Pearl River Delta region are "few and far between." One significant problem for nongovernmental organizations (NGOs)—especially within Mainland China—is a lack of expertise. Too often green groups do not possess the necessary scientific knowledge to accompany their advocacy work, making themselves vulnerable to criticism. The burden of proof lies on the green NGOs, which means that scientific expertise and intellectual capacity are crucial for the survival of south China's environmental movements. Regional environmental work among NGOs also is complicated by the difficulty of self-organization on the mainland. Ms. Loh noted, however, that since environmental protection is relatively non-political compared to contentious issues like constitutional reform and human rights, the Chinese government has allowed for the development of green groups.

While the number of green NGOs is still small in mainland and Hong Kong, environmental research is strong within universities and research centers on both sides of the border. Consequently, some intra-regional ecological work is underway. Air quality research and monitoring provide particularly promising areas for collaboration. While the Hong Kong and Guangdong governments jointly embarked on a groundbreaking study on air pollution, university-supported environmental research is even more prolific. For example, in Hong Kong the University of Science and Technology and Polytechnic University have collaborated with Beijing University and the Guangdong government on an air quality study. Georgia Tech has done significant work on ground-level ozone in Guangdong as well. More recently, Civic Exchange has initiated research on regional environmental issues by bringing together a research team to propose innovative management and financing options for water and wastewater infrastructure in the Pearl River Delta. The team will produce a report in summer 2002. This collaboration of academics and practitioners is integral, according to Loh, for the successful application of environmental research in the policy sector.

THE PROMISE OF COOPERATION

The growing economic, social, and political integration between Hong Kong and Guangdong offers a unique opportunity to address shared infrastructure and environmental problems throughout the Pearl River Delta. To more effectively solve the area's troubles, Christine Loh suggests that residents must change their mindset from one that is city-centered, stressing intra-regional competition (Hong Kong versus Guangdong) to one that is region-centered, focusing on unified efforts within the Pearl River Delta.

Hong Kong and Guangdong have the luxury of an "executive-led" government. Once the governments have resolved to embark on a project, the process is completed *post haste*. While this can easily result in irresponsible infrastructure projects, it could just as easily benefit ecologically sound development activities and conservation projects. Ms. Loh recounted one fast acting Hong Kong government move to concrete the slopes around the island to prevent destructive landslides during

rainstorms. Though happy with the protection provided by the project, residents complained of the unsightly concrete slopes—just as quickly as the original concreting was complete, the government had beautified the slopes with new vegetation.

Christine Loh reminded the audience of the admiration held for the Pearl River Delta's beauty, " I was with a Chinese official in Shanghai…and he said to me, 'You know, you're so lucky in Hong Kong. We have the water, but you have the mountain and the water.' I came home and I thought I better go up to the peak and have a look. And my god, Hong Kong is beautiful." "But," Loh continued, "we do stupid things. We go…fill in the harbor and ruin the skyline…we do silly things." A history of unchecked development and a ceaselessly competitive attitude makes ecologically responsible regional integration in Hong Kong and Guangdong a daunting task. While "silly" decisions have degraded the environmental health of the region, residents like Christine Loh have resolved to make a change for the better.

This Wilson Center meeting was cosponsored by ECSP's China Environment Forum and The Asia Program.

Commentary: A Wonderful World of Disney? The Environmental Implications of the Hong Kong Theme Park Construction

By Timothy Hildebrandt

Flanked by Mickey Mouse on one side and his life partner, Minnie, on the other, Tung Chee Hwa announced on 2 November 1999 an agreement to build the Walt Disney Company's third theme park outside of the United States in Hong Kong. Chief Executive Tung insisted the nearly $4 billion deal was evidence of Hong Kong's resiliency, proof positive that the cosmopolitan Special Administrative Region (SAR) could overcome a slow economy and political uncertainties. November second was the climax to a lengthy competition among Asian economic powers to secure the theme park. Hong Kong's bid successfully beat out Shanghai, South Korea, Taiwan, Singapore, and Subic Bay in the Philippines. The competition was heated for the Disney theme park; a project viewed by Asian governments and investors as an automatic economic windfall and guaranteed tourist attraction, which could stimulate the flagging tourist industries in Asia.

An Unequal Treaty?

Some contend the big winner is not Hong Kong but the Walt Disney Company. At $3.6 billion, the theme park will be the biggest spending commitment from the government since the 1997 construction of the ultramodern Chep Lap Kok airport. Hong Kong will bear 88 percent of the park's construction costs (including land, transportation, and loans) but will receive only 57 percent of the park's equity. Disney contributes 12 percent of the initial costs, while enjoying 43 percent of the equity on top of a management fee. Many observers have cried foul. Christine Loh—a former legislator and currently CEO of the public policy think tank Civic Exchange—noted, "This deal is being presented as a fait accompli in the most flashy way to pump up the public-relations value. By the time we get the numbers, people will already have been given the impression it is a great deal."

While this expensive plan is a risk—an estimated 80 percent of the theme parks built in China over the last five years have since closed—the Hong Kong government is quick to rationalize the high cost. Officials contend 16,000 jobs will be created in the first phase of construction, with 35,800 within 20 years; $1 billion in first year annual revenue is expected to double annually over the next 20 years. While the investment may generate revenue and employment in Hong Kong, environmentalists contend that the region's environment is shouldering an even higher cost than the burden on government coffers. A central issue is the pollution of nearby waters, which is affecting fish populations and the citizens whose livelihood rests on the fishing industry.

Environmental Concerns

"Hong Kong Disneyland," as it will be officially known, is being constructed on 311 acres of reclaimed land at Penny's Bay, an inlet on Lantau Island, famous for the new Hong Kong airport and the world's

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largest sitting bronze Buddha. The intense dredging to create more land for the park began in 1999 and this land reclamation has raised concern among the area's local fish farmers, who claim:

- Since dredging began some fish, like groupers, have stopped spawning, while other species, such as red crabs and flower crabs, have simply disappeared;
- Prior to dredging, local fishers would haul 130 pounds of catch a day, whereas they are now lucky to net 33 pounds;
- Fish stocks have dropped 80 percent since 1999; and,
- The reduction in food stocks by the dredging have led to fears that the endangered Chinese white dolphin will at best move from the area, at worst dwindle in numbers.

The economic effects of environmental degradation are also of grave concern:

- Local fishing industry sources estimate $4 million losses in 2001 alone; and,
- The number of fishing families has fallen from 70 prior to the reclamation project to 30 today.

A local fisherman, frustrated with the situation, declared, "Polluted waters from the Pearl River Delta reduced fish stocks in the last few years, but Disney was the last straw." The largely uneducated, illiterate fishing families fear there are no employment opportunities outside of fish farming.

In addition to anxiety over the impact of recent land reclamation, future phases of the project also raise concerns over potential environmental degradation. A particularly troubling problem lies at the former Cheoy Lee Shipyard. Decommissioned in 2001 to ease in the movement of construction infrastructure near Penny's Bay, the shipyard poses a logistical headache to government officials and an environmental nightmare to observers. Dismantling the yard to make room for Disneyland will involve the movement of 87,000 cubic meters of contaminated soil, 42,100 cubic meters of soil and rock, and a massive decontamination effort. Consultants have warned that this phase of the Disney park construction will "cause high level impacts on ecological resources." Rice-fish habitats and plant species potentially will suffer the most from the soil contaminating the bay waters.

Government Reaction

The Hong Kong government insists that some of the environmental claims made in public are misleading and/or false. Addressing the Chinese white dolphin issue, government officials claim the construction is environmentally sound and the waters near the reclamation area are not "highly utilized" by the species and thus are not under a serious risk. Despite their insistence of minimal environmental degradation from the Disney park construction, government civil engineers admit that some problems are expected: "To some extent, the water quality will be affected." Officials insist, however, that every effort will be employed to minimize the impact:

- A 2-mile long silt curtain and a 200-yard barrier of rocks have been installed in Penny's Bay in an effort to keep contaminants out of surrounding waters; and,
- Artificial reefs will be constructed after park construction is complete in hopes of luring back native fish species.

In a further indication that government officials quietly own up to the environmental problems associated with Hong Kong Disneyland, 1,144 fish farmers have received funds in exchange for a promise to move their fishing elsewhere. From the beginning of reclamation until January 2001, the Hong Kong government had already distributed $38.5 million in compensation for farmers who gave up their livelihood.

Disney Reaction

With such intimate government involvement in the theme park construction, the Walt Disney Company has the luxury of avoiding much discussion of environmental concerns associated with the project. When

asked for reaction, Disney officials generally reiterate the government's role in the construction, insisting that reclamation (and, seemingly, all problems associated with it) is solely the responsibility of the Hong Kong government. That being stated, Disney still contends that the project is eco-friendly, "To date there's no evidence that links the current issues that the fishermen are saying to the reclamation at Penny's Bay."

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The Asia Program at the Woodrow Wilson Center

Scholars under Siege? Academic and Media Freedom in China

Beijing's detention of several overseas Chinese scholars for spying has aroused renewed concern about academic and media freedom in China and the personal security of foreign scholars working in the PRC. Where are the lines in China separating "spying" from legitimate scholarly inquiry and media coverage?

At an October 2001 seminar titled "Academic and Media Freedom in China" sponsored by the Asia Program, four speakers explored the constraints under which scholars and journalists operate in China. Speakers agreed that Chinese intellectuals have gained a certain degree of freedom in academic discussion and media reportage, but cannot challenge official ideology in public discourse or through regular media. Perry Link of Princeton University attributes the ingrained habit of self-censorship among academics and journalists to Beijing's psychological control system, which he characterized as resembling a giant anaconda coiled in a chandelier overhead. A full report on this meeting is available at: http://wwics.si.edu/asia/support/asiarpt_102.pdf

China's "Credibility Gap": Public Opinion and Instability in China

To what extent must China's leadership take public opinion into account in making policy? While it is difficult to measure, there appears to be a growing gap between public opinion and government policies in China. Understanding the magnitude of this gap will be crucial for the government to know whether it has lost the support of the populace. The last decade has seen an increase in new channels for the expression of public opinion, but the importance public opinion will play in Chinese politics remains uncertain.

An Asia Program seminar on public opinion and instability in China on 6 March 2002 featured four experts on Chinese politics who examined public opinion in China, and its implications for China's social stability. One of the common themes of the presentations was the role of rampant corruption and growing economic inequality as engines of increasing discontent within the Chinese populace. The future survival of the current authoritarian regime in China, while ultimately uncertain, may be contingent upon how the government embraces public opinion and undertakes the necessary reforms to address the people's concerns.

For more information on these or other Asia Program China meetings and publications
E-mail asia@wwics.si.edu or call 202-691-4020.

Crouching Suspicions, Hidden Potential: U.S. Environmental and Energy Cooperation with China

By Pamela Baldinger and Jennifer L. Turner

This special publication, published June 2002, provides a succinct summary of U.S.-China cooperation in the areas of energy and environmental protection. The authors highlight the current barriers to such cooperation, as well as explore how and why U.S. policymakers and nongovernmental organizations should have a keen interest in the energy and environmental policies China adopts, given the potential impact of these policies on the United States and the rest of the world.

Executive Summary

Perhaps no country besides the United States will have greater impact on global energy and environmental strategies in the coming years than the People's Republic of China (PRC). The world's most populous nation already consumes more energy and emits more greenhouse gases than any country except the United States, and may surpass the United States in both categories within two to three decades. If China maintains economic growth rates of 5 to 7 percent per year its economy will increase three- to five-fold by 2025—with enormous consequences for the rest of the world. Chinese experts predict that China's ability to meet energy demand from domestic sources will fall short by approximately 8 percent in 2010 and 24 percent in 2040—the resulting increased demand for energy imports could result in higher global energy prices. Moreover, China's breakneck pace of modernization already has left it with nine of the world's ten most polluted cities and its sulfur emissions have led to acid rain throughout Northeast Asia. Even countries halfway around the globe are feeling the impact of China's pollution problems and inefficient use of natural resources.

Despite these alarming trends and the growing role China undoubtedly will play in shaping future global energy markets and environmental trends, energy and environmental issues have not occupied a prominent position in U.S.-China relations. To the extent that energy and environmental issues have been considered at all, U.S. policy regarding cooperation with China in these areas has not been sustained or consistent, reflecting tensions in the U.S.-China relationship, disagreements between past administrations and Congress, and the higher priorities given to other issues in the relationship. The perceived incoherence of U.S. policy has not served well U.S. firms and citizens, the people of China, and key allies in the strategic East Asian region.

This paper explores the opportunities and challenges for the United States to develop a coherent approach to energy and environmental relations with China. This exploration begins with an overview of China's impact on global energy markets and environmental quality. In addition to a discussion of the scope and challenges to Sino-U.S. environmental and energy cooperation, the paper also includes an in-depth discussion of commercial opportunities and challenges for U.S. environmental technology and energy efficiency companies. The conclusion highlights some of the advantages Sino-U.S. energy and environmental cooperation could offer both countries.

Specifically, the authors argue that strengthening Sino-U.S. governmental energy and environmental cooperation could promote collaboration on environmental agreements at the international level, bolster opportunities for U.S. energy and environmental technology firms, and help prevent U.S. isolation from the rest of the international community on environmental issues. Greater bilateral cooperation and information sharing on common environmental and energy problems not only improves bilateral governmental relations, but also could facilitate environmental and energy collaboration among NGOs, research centers, and news organizations in the United States and China. Such networks could better highlight the extent of U.S.-China economic and ecological ties. Cooperation on common environmental and energy challenges also could build confidence in the overall Sino-U.S. relationship and enable the two countries to work together on other pressing issues.

To obtain a copy of this publication contact Jennifer L. Turner at chinaenv@erols.com or 202-691-4233.

Inventory of Environmental Work in China

In this fifth issue of the *China Environment Series*, the Inventory of Environmental Work in China has been updated and we made extra effort to add many new groups, especially in the Chinese organization section. To better highlight the growing number of U.S. universities and professional associations active in China we have created a separate section. In the past inventories we have gathered information from U.S. government agencies; from this year forward we will be inventorying the work done by other governments as well.

This inventory aims to paint a clearer picture of the patterns of aid and investment in environmental protection and energy-efficiency projects in the People's Republic of China. We highlight a total of 118 organizations and agencies in this inventory and provide information on 359 projects. The five categories of the inventory are listed below:

Since we have expanded the inventory, even *more* people than last year contributed to the creation of this inventory. We are grateful to all of those in U.S. government agencies, international and Chinese nongovernmental organizations, universities, as well as representatives in foreign embassies who generously gave their time to compile and summarize the information their organizations and agencies undertake in China. Timothy Hildebrandt, Wu Fengshi, and Sun Liang at the Woodrow Wilson Center deserve praise for devoting countless hours to compiling, formatting, and proofreading this seemingly endless stream of information. While doing his dissertation fieldwork in China, Eric Zusman provided considerable help by contacting dozens of foreign embassies in Beijing and requesting project information for this inventory. We have made every attempt to verify that the projects inventoried are actually taking place or soon will begin. Any updates, corrections, or inquiries regarding the inventory should be directed to Jennifer L. Turner (Editor) at chinaenv@erols.com . This inventory also can be viewed on the Environmental Change and Security Project Web site: http://ecsp.si.edu.

Glossary

ADB	Asian Development Bank
DoE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
GEF	Global Environment Facility
GHG	Greenhouse Gases
LBNL	Lawrence Berkeley National Laboratory (United States)
MoA	Ministry of Agriculture (China)
MoF	Ministry of Finance (China)
MOST	Ministry of Science and Technology (China)
NREL	National Renewable Energy Laboratory (United States)
SDPC	State Development and Planning Commission (China)
SEPA	State Environmental Protection Administration (China)
SETC	State Economic Trade Commission (China)
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme

Editor's Note: Unless otherwise noted, all currency noted in the inventory is in U.S. dollars

PART I. U.S. GOVERNMENT ENVIRONMENTAL AND ENERGY ACTIVITIES

BATTELLE-ADVANCED INTERNATIONAL STUDIES UNIT (AISU)

http://www.pnl.gov/china http://www.pnl.gov/aisu http://www.battelle.org

Beijing Energy Efficiency Center (BECon)

Focus: Energy Efficiency Research

Partners: Energy Research Institute, Lawrence Berkeley National Laboratory, Environmental Protection Agency (EPA), World Wildlife Fund, Department of Energy

Schedule: Initiated 1993, Ongoing

BECon was established in 1993 in cooperation with three organizations—Battelle, Lawrence Berkeley National Laboratory, and the World Wildlife Fund. Today, BECon has a fulltime staff of 12 professionals and many consultants. BECon is leading high-level market-driven projects for the World Bank and United Nations Development Programme, and has contributed to many influential policy recommendations to the Chinese government.

Chinese Environmental Project Finance Competition

Focus: Environmental Finance Development

Partners: Patricia Chernoff Charitable Trust, University of Maryland, Chinese universities, research institutes, and private companies

Funding: Patricia Chernoff Charitable Trust

Schedule: Initiated 2001, Targeted Completion October 2002

The Battelle Memorial Institute has received funding from the Patricia Chernoff Charitable Trust to sponsor a series of Chinese scholars and entrepreneurs to develop projects to help solve energy and environmental problems in China. Funding will be awarded through a competitive process to support up to three months of work with Battelle's Advanced International Studies Unit (AISU) to develop project plans and to organize financing to reduce pollution related to energy consumption. AISU and its partner, the University of Maryland, will provide *ad hoc* training and logistical support to enable the winning applicants to develop their project ideas. Competition winners will be highly motivated, young individuals whose work would likely combine efforts to improve energy efficiency, reduce local pollution levels, and catalyze market reforms.

Economic and Environmental Modeling

Focus: Energy Research

Partners: Beijing Energy Efficiency Center, Energy Research Institute, Chinese Academy of Social Sciences, Development Research Center of the State Council, Qinghua University

Funding: Environmental Protection Agency (EPA)

Schedule: Ongoing

Economic, energy, and environmental modeling will become increasingly important in China as market reforms continue to reshape the economy. Policymakers will need realistic models to explore energy and climate change policy options and to minimize total development expenditures. The EPA is supporting a series of modeling workshops to share information on computable general equilibrium, optimization, and hybrid models in order to: (1) analyze potential scenarios aimed at reducing climate change and pollution mitigation costs; and (2) build a community of Chinese and international modelers.

Expanding Natural Gas Utilization in China

Focus: Energy Policy

Partners: EPA, Chinese State Development Planning Commission (SDPC), University of Petroleum-Beijing

Schedule: Initiated 1999, Completed April 2002

Natural gas has many advantages over coal, yet historically natural gas has played a minor role in China's energy sector. Chinese policymakers are developing a renewed interest in natural gas as a way to fuel growth without the environmental and health impacts of coal combustion. To boost natural gas availability, a number of barriers must be removed to make it more competitive. This study—one of the ten agreements reached in 1999 between then-EPA Administrator Carol Browner and her Chinese counterparts—is now complete, and will be published in full in summer 2002.

Bureau of Reclamation (Department of Interior)

http://www.usbr.gov http://www.doi.gov

Memorandum of Understanding: Water

Focus: Water Management

Partners: Chinese Ministry of Water Resources

The Bureau of Reclamation (BoR) and the Chinese Ministry of Water Resources (MWR) have a two-pronged Memorandum of Understanding (MOU): (1) the exchange of ideas, information, skills, and techniques on water resources management and conservation; and (2) the exchange of information and technology for preserving and enhancing the environment. Under Annex I of the MOU, BoR helped facilitate U.S. irrigation equipment manufacturers (through the Irrigation Association) to set up three demonstration projects around the city of Zhaoyuan in Shandong Province. The object of the demonstration program was to compare the effectiveness and water savings of different types of irrigation equipment. A three-year demonstration program was begun after equipment installation was completed in spring 1997. Under Annex II of the MOU, BoR and MWR established a cooperative training program with the following objectives: (1) to further cooperative relations between the two organizations; (2) to promote exchange of technical personnel and ideas between the two countries; and (3) to train administrative and technical personnel in all aspects of water resources management. In September 2000, BoR and MWR signed an amendment to the MOU that extended it through 15 December 2005.

Department of Agriculture/Foreign Agriculture Service/International Cooperation and Development (USDA/FAS/ICD)

http://www.usda.gov

China Water Quality Monitoring, Wastewater Re-use, Watershed Management

Focus: Water Management, Agricultural Research

Partners: EPA, Chinese State Environmental Protection Administration (SEPA), China Environmental Protection Foundation (CEPF), China's Ministry of Water Resources (MWR), Shandong and Henan Provincial Environmental Protection Bureaus (EPBs)

Funding: USDA, EPA, CEPF, MWR

Schedule: Initiated 2000, Ongoing

After the successful implementation of the drinking water demonstration projects under the Shandong Watershed Monitoring Project (1996-1999), CEPF, USDA, and EPA proposed further cooperative efforts through research involving various aspects of watershed management focused on real-time data collection and systems management. The proposed research is comprised of two initiatives: (1) pilot demonstration of a wastewater re-use package plant; and (2) development of a surface water monitoring station. Project sites are located at various points along the Yellow River. One site was installed in Henan Province (November 2001) and one in Shandong Province (April 2002).

Consortium of U.S. and Chinese Agricultural Universities

Focus: Agricultural Education, Natural Resource Management

Partners: IDEALS; U.S. universities (Cornell, Maryland, University of California, Ohio State, Texas A&M, Michigan State, Penn State, University of Wisconsin, North Carolina State); Chinese agricultural (Ag.) universities (Northwestern Science and Tech University of Ag. & Forestry, Zhejiang University, China Ag. University, and Nanjing, Huazhong, Southwest, South China, and Shenyang Ag. Universities); Chinese Academy of Agricultural Science

The consortium of U.S. and Chinese agricultural universities promotes the advancement of agriculture in both countries. Objectives of the consortium include: (1) creating specific ways to develop collaborative research, education and outreach projects; and (2) creating opportunities that involve cooperation among partners to address practical needs of agriculture where there is an expectation for making a difference; and (3) building a network for empowering significant personnel exchanges. These objectives shall be reached through training courses; (sabbatical leaves; short-term visits; seminars/workshops; summer institutes for undergraduate students in both countries; a possible joint Ag. MBA program; initiating input into agricultural education reform in China; and research, education and outreach centers. In 2002, the consortium will present a WTO technical seminar (summer) and a natural resource seminar (fall).

Ministry of Water Resources Exchange Program

Focus: Water Research, Agricultural Research
Funding: USDA/FAS/ICD, Chinese Ministry of Water Resources
Schedule: Targeted Initiation 2003

The USDA's Foreign Agriculture Service and the Chinese Ministry of Water Resources are in the process of establishing an agreement on scientific collaboration, including short-term scientific exchange visits and technical symposia. This scientific collaboration will provide agricultural and water officials, scientists, and technical experts from both China and the United States with the opportunity to establish contacts with counterpart officials, research laboratories, and institutions, and to develop and implement projects of mutual scientific interest. Selected activities for cooperation may include, but are not limited to: (1) short-term technical scientific exchange visits; (2) long-term project collaboration; and (3) technical symposia. The working agreement will be signed July 2002.

Oregon Seeds Project

Focus: Conservation Management, Agricultural Research
Partners: Oregon Seed Council, Oregon Department of Agriculture, Oregon State University, USDA/ Agricultural Research Service (ARS)
Schedule: Initiated February 2001, Ongoing

This project both addresses issues of grassland degradation in China that have accelerated erosion and caused serious air pollution and promotes the opening of a new market for U.S. grass seed. A conference is proposed for fall 2002 to exchange information relating to availability of suitable germplasm and technology for grassland restoration. U.S. and Chinese specialists will: (1) address a plan to reverse the degradation of grasslands in the low rainfall regions of northern and western China; (2) discuss methods for restoring grasslands; and (3) develop a cooperative plan of action for implementing this technology in appropriate areas. The program will involve the U.S. seed supply sector to address issues that have limited the progress of Chinese grassland conservation programs in the past. Following an exchange of information, the conference will approve a program to demonstrate the effectiveness of U.S. germplasm in appropriate grassland management systems and provide an introduction for U.S. seed companies to the Chinese market for dry-land grass species.

U.S.-China Agro-Environmental Center of Excellence

Focus: Natural Resource Management, Agricultural Management
Partners: Johns Hopkins, USDA/CSREES, U.S. Composting Council, Ministry of Agriculture (MoA), Chinese Academy of Agricultural Sciences (CAAS), Livestock Waste Management Center (Pingtung, Taiwan)
Funding: USDA/Foreign Agricultural Service, Chinese Academy of Agricultural Science
Schedule: Initiated 2000, Ongoing

Following a series of five technical exchange visits by U.S. experts to China, the establishment of a compost demonstration site at CAAS (July 2001), and the presentation of an Agro-Environmental Seminar in Beijing (November 2001), FAS/ICD and CAAS proposed to further Sino-U.S. agricultural cooperative efforts through the establishment of an Agro-Environmental Center of Excellence that will serve as a catalyst for research and discussion on the issues of environmental problems in agriculture. The center will aim to: (1) coordinate the efforts of American and Chinese experts, academics and others in the development of cleaner production practices; (2) the coordination of field research, demonstration projects, and policy recommendations; and (3) the stimulation of trade opportunities for U.S. trade associations and U.S. companies.

DEPARTMENT OF AGRICULTURE/FOREST SERVICE

http://www.fs.fed.us/global

Building Policy and Economic Analysis Capacity

Focus: Agricultural Economics Research
Partners: Chinese Academy of Sciences, Center for Chinese Agricultural Policy, Chinese State Forestry Administration (SFA)
Funding: $10,000 (1999-2001 USDA support)
Schedule: Initiated 1999, Ongoing

The USDA Forest Service is working with its Chinese partners on a project that helps their staff and others in China perform sound agricultural economics policy analysis that can be used by decision-makers. As part of this effort, the USDA Forestry Service is supporting topic specific seminars and case studies. For more information on this and most other USDA Forest Service projects contact Gary Man (202) 273-4740.

Carbon Storage and Accumulation in Forests of China

Focus: Forestry Research, Climate Research

China and Russia make up most of the Eurasian landmass yet little is known about the carbon budget, especially in China. The Forest Service has initiated a project that aims to estimate the total carbon stored in China's forests. The project is in the preliminary stages of identifying appropriate collaborators. The intent is to apply the methods used in previous U.S. and Russia forest carbon studies in order to estimate carbon storage in China's forests.

Code of Forest Harvesting Practices

Focus: Forestry Management

Partners: Chinese State Forestry Administration

Funding: International Labor Organization, UN Food and Agriculture Organization, USDA Forest Service

Schedule: Ongoing

The Chinese State Forestry Administration, with some support from the USDA Forest Service, has a project to develop and test codes of forest harvesting practices that can help lead to improved forest management in China. The International Labor Organization in cooperation with the Food and Agriculture Organization provided funding for the initial development phase. The USDA Forest Service provided harvesting specialists to comment on the draft codes of practice and some funding ($10,000) in the development phase and plans to continue to provide technical assistance. The State Forestry Administration is currently seeking support to further test and demonstrate their forestry codes of practice.

GIS-Based Soil Erosion and Sediment Transport Model

Focus: Water Research

Partners: Beijing Forestry University

Funding: $30,000 (2000-2001 USDA Forest Service support)

Schedule: Initiated 2000, Targeted Completion 2003

Using data collected from the Quxi watershed in the Yangze River Basin in southern China, the project partners aim to validate a newly developed geographic information system based on a soil erosion and transport model. The data for the model has been collected and is currently in the validation stages. For more information on this project contact Steve McNulty (919) 515-9489.

Invasive Pests Collaboration

Focus: Pest Research

Partners: Chinese State Forestry Administration

Schedule: Initiated 1998, Ongoing

The USDA Forest Service and Chinese State Forestry Administration are collaborating on threatening pests. Examples of collaborative efforts include: (1) providing information on specific pests; (2) hosting information gathering trips; and (3) working together on solutions that control invasive species from each other's country. Some form of collaboration has occurred on the red turpentine beetle (*Dendroctnus valens*), pine mealybug (*Oracella acuta*), and the hemlock wooley adelgid (*Adelges*). The fist two pests are introductions from the United States to China and the third from China to the United States.

Invasive Species—Asian Long-Horned Beetle

Focus: Pest Research

Partners: USDA Animal and Plant Health Inspection Service, Chinese Academy of Forestry, Chinese State Forestry Administration, Chinese Academy of Sciences, Beijing Forestry University

Funding: $458,000 (1998-2001 USDA Forest Service support)

Schedule: Ongoing

This project is part of a larger effort to eradicate the Asian long-horned beetle (ALHB) in the United States. Specifically, this set of activities includes: (1) working on a trap and survey design for ALHB; (2) evaluating insecticides and application methods for suppressing adult and larval stages; and (3) developing a bibliography and information database of ALHB and its close relatives. To date, work has isolated pheromones and kairomones for potential trap attractants, and evaluated three insecticide application methods. The chemical control results are now being applied in the United States. Future work is expected to continue for a number of years. An ALHB conference in China is planned to take place in spring 2002 to help facilitate information sharing and collaboration that results in the eradication and control of this damaging pest in both countries.

Kudzu Biocontrol

Focus: Plant Research

Funding: $150,000 (1999-2001 USDA Forest Service support)
Schedule: Initiated 1999, Ongoing

A set of activities are being implemented to search for effective biological control vectors that reduce the impact of Kudzu in the southern portion of the United States. Currently the project is in its third year of screening potential control agents. A number of stem and root-boring beetles stem feeding weevils and three defoliators and a fungal disease were tested in 2001 but did not pass the host preference tests. The Chinese and U.S. researchers will search for potential natural enemies in 2002.

Mile-a-Minute Weed Control

Focus: Plant Research
Partners: Sino-American Lab
Funding: $445,000 (1997-2002 USDA Forest Service support)
Schedule: Initiated 1997, Targeted Completion 2004

Under this cooperative project, which has the full title: "Determining the Potential for Using Natural Enemies Found in China to Control Mile-a-Minute in the United States" Chinese and U.S. partners are: (1) conducting surveys for natural enemies; (3) establishing colonies of promising natural enemies; and (3) conducting host range tests in China. Based upon initial host testing, potential natural enemies will be further tested in the United States.

Nature Based Tourism Workshop and Manual

Focus: Conservation Management
Partners: Sichuan Forestry Department, Conservation International, World Wildlife Fund-China
Funding: $35,000 (2000-2002 USDA Forest Service support)
Schedule: Initiated 2000, Targeted Completion 2002

A workshop was held in Sichuan in fall of 2000 to discuss the components of nature-based tourism, specifically ecotourism. The workshop served as an opportunity for park and reserve managers to share experiences and develop a group to address issues of mutual interest. A general users manual to assist managers in developing nature-based tourism enterprises is currently being developed. The manual is tentatively scheduled for completion in spring 2002. In a related project, USDA Forest Service together with the Forestry Bureau in Zhongdian Prefecture, Yunnan Province developed a bilingual brochure that highlights the natural features of the area and incorporates an environment ethic to "tread lightly" and "leave no trace." The brochure was published in 2001.

Restoration/Forest Health

Focus: Forestry Management
Partners: Chinese State Forestry Administration, Memphis Zoo
Schedule: Initiated 2001, Ongoing

The State Forestry Administration in collaboration with the USDA Forest Service, the Memphis Zoo and others are beginning a project that will look at various strategies and practices that can be implemented to facilitate and restore healthy forests. The approach is to start with three demonstration areas with different conditions and needs. Primarily working at the village or farmer level, the project will explore various treatments to move demonstration areas toward a more healthy state while having a strong consideration for the needs and livelihoods of the local villagers and farmers. Assuming the demonstrations are successful, the Chinese State Forestry Administration intends to expand this process in to other areas in China. As a part of the project, a national level workshop will be held toward the end of 2002 to share the concept of the project, progress of the demonstration areas, and broader strategies for approaching healthy forests through restoration and other management practices.

Use of Remote Sensing Technologies to Monitor Fires

Focus: Forestry Management
Partners: Chinese Academy of Forestry
Funding: $40,000 (2000 USDA Forest Service support)
Schedule: Ongoing

The Chinese Academy of Forestry and the USDA Forest Service are collaborating to test remote sensing technologies that can help in the efficient monitoring of wildfires. Initial exchange visits have occurred and specific joint activities are now underway. Data collection has been completed for a study to measure and model the distribution of particulate matter from fires and other sources. Another activity validating imagery from Moderate Resolution Imaging Spectroradiometer (MODIS) and testing its utility in monitoring fires is just beginning.

Department of Commerce/International Trade Administration

http://www.environment.ita.doc.gov http://www.ita.doc.gov

Environmental Technologies Industries (ETI)

The Environmental Technologies Industries (ETI) office is the principal resource and key contact point within the U.S. Department of Commerce (DoC) for U.S. environmental technology companies. ETI's goal is to facilitate and increase exports of environmental technologies, goods, and services by providing support and guidance to U.S. exporters. ETI staff covers key countries, with an emphasis on designated emerging markets, including China. ETI and EPA's Office of International Activities co-chair the bilateral U.S.-China Joint Commission on Commerce and Trade (JCCT) Environment Subgroup. ETI recently published the *Partnering in China for Environmental Companies* and an updated, comprehensive report, *China Environmental Technologies Export Market Plan*." For copies of these or other publications see www.usatrade.gov (Search "Market Research"). For more information about resources for environmental companies seeking business opportunities in China, contact Susan Simon, E-mail: Susan_Simon@ita.doc.gov, phone: 202-482-0713.

Export Assistance Services

The four main areas of DoC's export assistance services include: (1) Environmental Technologies Industries (See above); (2) Market Access and Compliance; (3) Advocacy; and (4) the U.S. and Foreign Commercial Service. The U.S. and Foreign Commercial Service (FCS) at the Department of Commerce is a global network of offices strategically located in more than 220 cities worldwide, offering U.S. exporters a comprehensive range of export facilitation services. In China FCS offices serve American companies in Hong Kong, Beijing, Shanghai, Guangzhou, Chengdu, and Shenyang. China services include market analyses, business counseling, market and policy information, and introductions to Chinese government officials and business contacts. U.S. FCS Contacts:

China

Beijing Phone: (86-10) 8529-6655: Kellie Holloway, Commercial Attaché (ext. 819, Kellie.Holloway@mail.doc.gov) or Xiaolei Wan, Commercial Specialist, (ext. 839, Xiaolei.Wan@mail.doc.gov)
Chengdu Phone: (86-28) 558-3992/9642: Helen Peterson, Principal Commercial Officer (Helen.Peterson@mail.doc.gov) or Chen Ling, Commercial Specialist (Ling.Chen@mail.doc.gov)
Guangzhou (86-20) 8667-4011: Ned Quistorff, Principal Commercial Officer (ext. 15, Ned.Quistorff@mail.doc.gov) or Christine Huang, Commercial Specialist (ext. 18, Christine.Huang@mail.doc.gov)
Hong Kong (852) 2521-1467: Joel Fischl, Commercial Consul (Joel.Fischl@mail.doc.gov)
Shanghai (86-21) 6279-7055: James Mayfield, Commercial Officer (James.Mayfield@mail.doc.gov) or Gerry Zhao, Commercial Specialist (Mobile Phone: 86-130-0418-9928, TsingsongChao@mail.doc.gov)
Shenyang (86-24) 2322-1198: Erin Sullivan, Principal Commercial Officer (ext. 140, Erin.Sullivan@mail.doc.gov) or Hongmei Yu (Mobile phone: 86139-0982-6379, Hongmei.Yu@mail.doc.gov)
Philippines
Manila (63-2) 887-1345: Stewart Ballard, Senior Commercial Officer, Foreign Commercial Service Liaison to ADB (Stewart.Ballard@mail.doc.gov) or Cecile Santos, Commercial Specialist, Cecile.Santos@mail.doc.gov

U.S. Joint Commission on Commerce and Trade (JCCT)

Established in 1992, the mission of JCCT is to facilitate development of commercial relations between the United States and China with the direct objective of promoting bilateral commercial agendas. JCCT, which meets annually in a plenary session, is led by the U.S. Secretary of Commerce and the Chinese Ministry of Foreign Trade and Economic Cooperation (MOFTEC). The JCCT's Environment Subgroup organizes, and supports events and programs such as technology demonstrations, training workshops, trade missions, exhibitions, conferences, and seminars that foster environmental and commercial cooperation between the two countries. For information about official activities of the Environment Subgroup, contact Susan Simon (Susan_Simon@ita.doc.gov).

Department of Energy

www.doe.gov www.international.energy.gov www.oit.doe.gov/international/china.shtml

(*Editor's Note: For more information on DoE supported projects in China see entries under Battelle-Advanced International Studies Unit, Environmental Protection Agency, Lawrence Berkeley National Laboratory, and National Renewable Energy Laboratory in the government activities section; see also Institute for International Energy Efficiency, Export Council for Energy Efficiency, Center for Clean*

Air Policy, U.S.-China Energy and Environment Technology Center, Tulane University in the U.S. and international NGO activities section)

Capacity Building: Natural Gas Training and Certification

Focus: Energy Capacity Building, Energy Training

Partners: China Petroleum and Chemical Industries Association; Energy Environmental Technology Center (EETC) at Tulane University; Gas Technology Institute; Shanghai Shenzhen Group (Shenzhen)

Schedule: Initiated 2001, Targeted Completion 2003

This proposed Sino-U.S. project would address the need to enhance the broad-based adoption of natural gas in the vast urban areas of China, while simultaneously enhancing the market share of U.S.-made equipment and components. The Chinese government is embarking on the construction of a major gas pipeline (targeted for completion in 2003) that will deliver natural gas from west China to the eastern coast. In anticipation of the completed pipeline, this project is designed to systemically and effectively build a team of certified regulators, managers, engineers, planners, marketers, and technicians for the Chinese natural gas industry. As the first step in this capacity-building work, in November 2001 U.S. and Chinese teams worked together to identify the most important topics to develop course outlines for a week-long workshop, which will be delivered in China by a U.S. instructor. The workshop will be offered to 200 Chinese natural gas industry representatives in October 2002. This workshop will lead to the development of future courses. Future courses will be offered to Chinese natural gas industry representatives for a fee, so as to establish a self-supporting training program.

Climate Science Study

Focus: Atmospheric Research

Partners: Chinese Academy of Sciences; China Meteorological Administration; State University of New York at Albany; State University of New York at Stony Brook; Portland State University; Oregon Graduate Center, Lawrence Livermore National Laboratory; Pacific Northwest National Laboratory; Oak Ridge National Laboratory; U.S. National Climatic Data Center; U.S. National Center for Atmospheric Research

Schedule: Initiated 2000, Targeted Completion 2005

Under Annex V of the Protocol on Cooperation in the Field of Fossil Energy Technology Development and Utilization, Chinese and U.S. government and university researchers are undertaking a broad range of joint climate studies which aim: (1) to prepare climate data for validating and improving global and regional general circulation climate models; and (2) to use the improved models to project regional climate changes and the associated impact caused by increasing greenhouse gases and aerosols. The climate studies focused on four research areas: (1) analysis of general circulation models; (2) climate data preparation and analysis; (3) measurements of atmospheric trace constituents; and (4) impact of climate change on human and natural systems.

U.S.-China Oil and Gas Industry Forum

A U.S.-China Oil and Gas Industry Forum was established in 1998 to promote exchange that will assist China in its efforts to secure reliable and economical sources of oil and natural gas. The forum is helping to identify and facilitate new opportunities for U.S. industry in China's petroleum development. The forum has held major meetings, in November 1998 (Beijing), in July 1999 (Houston), and in September 2001 (Beijing). A major focus has been on sharing technical expertise with China in its effort to enhance natural gas development and use and incorporate natural gas strategies into the Tenth Five-Year Plan (2001-2005). A U.S. government natural gas technical experts team visited Beijing in February 2000 and a return visit to Washington by a group of Chinese natural gas experts occurred in May 2000. Participants in the forum are discussing plans to convene a fourth major meeting.

U.S.-China Protocol for Cooperation in the Field of Fossil Energy Technology Development and Utilization

This protocol was signed in April 2000 and aims: (1) to identify the developing export and international business opportunities in partnership with U.S. private industry in China; (2) to develop technical programs and implementing policy that will enhance U.S. energy industry's competitiveness in the Chinese market; and (3) to promote technologies and solutions that will improve the global environment and increase U.S. energy security. Two conferences were held in China in August 2001 after the signing of the protocol: (1) U.S.-China CO_2 Emission Control Technology and Science Conference (Hangzhou); and (2) U.S.-China Clean Energy Technology Forum and Technology & Equipment Exhibition (Beijing). The five annexes in this protocol are:

Annex I (Power Systems): Three activities are being planned in the areas of: (1) integrated gasification combined cycle; (2) a seminar on electric grid modeling; and (3) a handbook on flu gas desulfurization.

Annex II (Clean Fuels): Draft of joint activities still under negotiation.

Annex III (Oil and Gas): See Capacity Building: Natural Gas Training and Certification entry above.

Annex IV (Energy and Environmental Technologies): Under this annex the National Energy Technology Laboratory is planning several activities for implementation in fall 2002 or early 2003. These activities include: (1) developing flue gas desulfurization technology manual and training sessions in China; (2) conducting low-NOx combustion and sulfur dioxide control workshops; and (3) studying CO_2 sequestration by spraying concentrated aqueous NH_3, and production of a modified NH_4HCO_3.
Annex V (Climate Science): See Climate Science entry above.

Department of the Interior/Fish and Wildlife Service (FWS)

http://www.fws.gov http://international.fws.gov

Cooperation Agreement: U.S.-P.R.C. Nature Conservation Protocol

Focus: Conservation Management, Conservation Training
Partners: Chinese State Forestry Administration, Ministry of Agriculture, Chinese Academy of Sciences
Schedule: Initiated 1986, Ongoing

The Fish and Wildlife Service (FWS) administers activities with China under the bilateral Nature Conservation Protocol, signed in 1986 and recently extended through 2006. Funding comes principally from appropriations to the FWS Division of International Conservation. Exchanges carried out in 2001 included: (1) training of Chinese specialists in New York and San Francisco on techniques for inspecting shipments of wildlife and their parts under the Convention on International Trade in Endangered Species (CITES); (2) evaluation by a U.S. team of aquatic habitat quality in the Yangtze and Pearl rivers; (3) visit by U.S. specialists to northwest China to observe measures to conserve argali sheep; and (4) visit to China by American wildlife agency and zoo staff for talks on policies governing panda loans to U.S. zoos. In the near future, FWS work in China will focus on: (1) special problems associated with international trade in amphibians and reptiles; (2) wetlands evaluation and conservation; and (3) comparative assessment of wild sheep habitat management in western regions of the United States and China.

Environment Protection Agency (EPA)

http://www.epa.gov

(*Editor's Note: All EPA activities listed below are subject to appropriated funds and resources*)

Air Quality Improvement in Shanxi

Focus: Air Quality Management, Air Quality Policy
Partners: Resources for the Future, Norwegian Institute for Air Research, RCA Associates, Chinese Research Academy of Environmental Science, Shanxi Provincial Government, Taiyuan Municipal Government
Funding: Asian Development Bank
Schedule: Initiated 2001, Targeted Completion December 2002

Resources for the Future (RFF) leads the project team to carry out an emissions trading demonstration pilot project in Shanxi Province. The EPA is providing technical assistance in the design of the demonstration project and delivering emissions trading training courses in Shanxi. At a meeting in July 2001, project stakeholders determined that success for the demonstration project would depend on the establishment of compliance infrastructure (e.g., standardized emissions measurement, tracking systems, enforcement guidelines) that would form the basis for a future emissions trading program among the participating enterprises. Another aspect of the study will be to analyze the costs of making emissions reductions and to estimate potential cost savings of a trading program.

Air Quality Management Assessment Project

Focus: Air Quality Management
Partners: State Environmental Protection Administration (SEPA), Shanghai Environmental Protection Bureau (EPB)
Schedule: Initiated November 1999, Ongoing

The EPA initiated a joint assessment of China's air quality management process with SEPA in November 1999. The main objective of phase I of the assessment was to analyze the various components of the Chinese and U.S. systems and identify techniques and technologies that could reduce air pollutant emissions in large urban areas. The technical exchanges have focused on: (1) current U.S. and Chinese programs for ambient air monitoring; (2) emission inventory development; (3) air quality dispersion modeling; and (4) development of air quality improvement strategies. Critical outputs of the assessment will include recommendations for strengthening the technical and regulatory infrastructure of the existing program in Shanghai and identification of potential implementation projects that demonstrate application of an integrated air quality management (AQM) process.

Because of the increasing concern of the impacts of transboundary air pollution from Asia on domestic air quality, EPA will focus support on China's efforts to enhance its capacity to manage air quality by providing assistance with building capacity in the areas of: (1) monitoring; (2) modeling; (3) emission inventory development; (4) application of source apportionment techniques; (5) development of integrated control strategies and technology; and (6) information transfer (training, public participation, and outreach). Phase II for this project will focus on the development and implementation of demonstration projects for the pilot city of Shanghai. An English language version of the project report will be available in May 2002. (*Editor's Note: The Shanghai Team gave a presentation at the Wilson Center on 22 March 2002 and the meeting summary is in this issue of the China Environment Series*)

Building Energy Efficiency

Focus: Energy Efficiency Capacity Building
Partners: Ministry of Construction (MOC), China Center for Energy Conservation Product (CECP)
Schedule: Initiated October 2000, Ongoing

This effort promotes improvement in building energy efficiency through the application of EPA's building energy-efficiency benchmarking tool. The internet-based tool, which is a core element of the *U.S. Energy Star for business program*, provides an energy-efficiency score that allows building owners and managers to easily measure building energy efficiency and track it over time. The tool facilitates comparisons between dissimilar buildings, and adjusts for size, occupancy, operating hours, climate and weather, and other factors that affect energy use. The EPA and its Chinese partners also are considering additional future activities to develop institutional capacity in China to improve building energy efficiency through voluntary, profitable measures.

Cleaner Air and Cleaner Energy Technology Cooperation

Focus: Energy Technology Development, Energy Policy
Partners: State Development Planning Commission (SDPC), Tsinghua University, National Renewable Energy Laboratory
Schedule: Initiated 1999, Targeted Completion 2002

This project expanded work under the Technology Cooperation Agreement Pilot Project (TCAPP), a collaborative effort sponsored by the EPA, USAID and DoE, with partners in seven countries around the world. The global TCAPP work has been influential as a model of an effective, strategic approach to technology transfer and market transformation under the UN Framework Convention on Climate Change. The technology cooperation work in China has focused on development and implementation of investment and commercial market strategies, and clean energy technology projects in four key areas: (1) efficiency improvements in industrial coal-fired boilers; (2) clean coal technology for electric power generation; (3) high-efficiency electric motors and motor systems; and (4) grid-connected wind electric power. The project also included support to the Chinese partners in evaluating a wide range of technology opportunities and in identifying additional technology priorities based on potential for greenhouse gas reductions, sustainable development benefits, and commercial market deployment. Major activities in each of the four technology areas have included: (1) the formation of expert teams; (2) identification of barriers to technology market development; and (3) creation of preliminary market development strategies. During 2000-2001, the primary focus was on implementation of the initial wind and energy-efficient motors strategies. Investment workshops were conducted in both sectors, with international competitive bids for large-scale wind farm concessions as the focus of the wind workshop. Investment projects also were developed, with two phases of new and retrofit high-efficiency motors in the petroleum sector competed in 2001 and a third phase to be implemented in 2002 with a great potential to expand to many petroleum companies. Clean coal technology and industrial boiler efficiency work plans were developed during joint U.S.-China team meetings in 2001. In 2002, initial market and project development actions will be undertaken for these technology areas. In addition to capacity building and market development actions for industrial boilers and clean coal technologies, strategies for all four key technology areas will be fully documented and, where possible, connected to longer-term sources of support. The partners will compile a report documenting the experience, successes and lessons learned from the project for wide distribution within the UNFCCC and other international fora. EPA and SDPC have agreed to continue technology cooperation in a follow-on project, which will focus available resources on implementing the technology transfer and market transformation strategy for grid-connected wind power. For further information on TCAPP and its China component, see http://www.nrel.gov/tcapp.

Coal Mine Methane Market Development Plan

Focus: Air Quality Policy
Partners: State Administration of Coal Industry
Schedule: Initiated December 1999, Completed 2001, Currently transitioning to new project

On 6-8 November 2001, 130 Chinese and foreign experts participated in the 2001 International Coal Mine Methane Investment and Technology Symposium in Shanghai. The symposium was the culminating event in a two-year project designed to identify market opportunities for developing projects at Chinese coal mines to use the methane gas that otherwise would be

vented. The symposium included presentations by industry and government officials that reflected recent progress in methane reduction. Papers presented at the symposium reflected the progress made at identifying, developing, and financing methane reduction projects. Several reports on project opportunities at a number of coal mine administrations reflected the work of the China Coalbed Methane Clearinghouse and mine experts under the joint Sino-U.S. Coal Mine Methane Market Development Project. Under this project, market opportunity reports for eight Chinese coal companies were prepared which pointed to a number of profitable project options at each company. Cosponsored by the former State Administration of Coal Industry and EPA, this project reflects seven years of ongoing cooperation between the EPA and the China Coalbed Methane Clearinghouse in the China Coal Information Institute. The partners are preparing a new joint project aimed at helping coal companies and other companies to turn the coal mine methane opportunities identified into reality. For more information, visit www.epa.gov/coalbed, www.ravenridge.com/china.htm, http://www.coalinfo.net.cn, or contact Karl Schultz of EPA's Coalbed Methane Program at schultz.karl@epa.gov or the Clearinghouse at cbmc@public.bta.net.cn.

Cooperation to Assess Benefits of Programs to Reduce Air Pollution and Protect Public Health in China

Focus: Air Quality Management, Health Policy

Partners: SEPA, Shanghai Environmental Protection Bureau, Beijing Municipal Government, Environmental Engineering Department at Tsinghua University, Beijing Medical University

Schedule: Initiated 2000, Targeted Completion December 2003

This project supports cooperation and capacity development for evaluation and implementation of policies, programs, and investments that reduce local air pollution and greenhouse gas emissions while promoting economic development in Chinese cities. Of key concern is to study the impacts of air pollution on public health. This project is part of the global Integrated Environmental Strategies (IES) program sponsored by EPA, USAID, and other agencies working in 8 developing countries around the world. The program also is coordinating with regional clean air initiatives (sponsored by the World Bank, Asian Development Bank, and other multilateral organizations), and with ongoing efforts of the World Health Organization (WHO), UN Environmental Programme (UNEP), and the OECD. During 2000 and 2001 experts from the China project have made presentations and participated in expert workshops and study tours in India, the United States, Chile, and Germany to promote information sharing and cooperation on air pollution control methods. The central goal of these presentations is to encourage broader efforts to address environmental global problems with solutions that simultaneously meet local needs. The first case study was carried out in Shanghai. In August 2000, the Shanghai Academy of Environmental Sciences (SAES) and the Shanghai Medical University produced a preliminary analysis of the health effects of air pollution in Shanghai. Energy and air quality modeling experts from Shanghai traveled to the United States in April 2001 for technical assistance and training. The Shanghai Municipal government has commissioned SAES to conduct a project develop and analyzes effective strategies for improving air quality management in Shanghai, including a specific component on reducing transport emissions, which is also expected to include applications of the IES tools and methods. For further information on this project and related work under the Integrated Environmental Strategies (IES) program see: http://www.nrel.gov/icap. (*Editor's Note: The Shanghai Team gave a presentation at the Wilson Center on 22 March 2002 and the meeting summary is in this issue of the China Environment Series*)

Cooperative Study of Natural Gas Utilization in China

Focus: Energy Policy

Partners: State Development Planning Commission, Pacific Northwest National Laboratory, University of Petroleum in Beijing

Schedule: Initiated 2000, Targeted Completion 2002

A team of experts from government and key technical institutes in China and the United States has been assessing the potential policies and programs for expanding natural gas production and imports into China. The EPA and its partners also are investigating appropriate applications of gas production across the Chinese economy, as well as analyze the climate, environmental, and health benefits of increased gas use. The assessment also may identify opportunities for which international greenhouse gas emissions credits could help finance natural gas projects in various industrial sectors. A draft report was produced in early 2001 by the joint research team led by the University of Petroleum in Beijing and Pacific Northwest National Laboratory (PNNL) in the United States. A workshop was held in Beijing during September 2001 to get feedback from public and private sector stakeholders and discuss in greater detail collaborative opportunities to overcome some of the barriers identified in the study. Findings and comments from the workshop have been incorporated into the draft. The final report (available at http://www.pnl.gov/aisu) includes recommendations: (1) for future actions on business and finance training and capacity building; (2) to promote technology transfer and expanded foreign investment; and (3) on policy and regulatory development to support expanded natural gas utilization goals in China. Discussions during and after the September 2001 workshop have indicated significant interest by stakeholders and donor organizations in these recommendations.

Feasibility Study on the Use of Market Mechanisms to Achieve SO_2 Emissions Reduction in China

Focus: Air Quality Policy, Air Quality Management
Partners: SEPA, Chinese Research Academy of Environmental Sciences (CRAES)
Schedule: Initiated June 1999, Ongoing

The object of this study is to cooperate on examining possibilities for using market-based mechanisms for sulfur dioxide (SO_2) emissions control in three phases: (1) workshops to examine the U.S. SO_2 emissions trading program and the current SO_2 related problems and policies in China; (2) a pre-design study of the nature and effects of the SO_2 problems in China, available control technologies and costs, and regulatory and institutional issues relevant to the design of an effective emissions trading program; and (3) recommendations on using emissions trading and an exploration of design options for the framework of an SO_2 emissions trading program in China. In the first phase of this project EPA and SEPA met in June 1999 during which SEPA set up a series of briefings with various stakeholders and other government ministries to enhance EPA's understanding of the current SO_2 policies and practices in China. Discussions began on how to work collaboratively to assess the use of emissions trading in China. At the official kick-off workshop held 15-18 November 1999 in Beijing, current SO_2 related policies were discussed along with the use of emissions trading in the United States and results of pilot trading projects in China. A second workshop was held in Washington DC in October 2000 and included a site visit at EPA to view emissions and allowance tracking systems. The Chinese study tour included an inter-ministerial group of Chinese officials (from SEPA, SDPC, and MoF) and practitioners from two municipal EPBs (Benxi and Nantong). Workshop topics included a comprehensive review of the U.S. SO_2 emissions trading program and its key design features, the cost and availability of SO_2 controls in China, the state of environmental modeling, and an analysis of Chinese policies towards air pollution and the revisions to the 1996 Total Emissions Control law.

A first draft of the SO_2 reduction feasibility study was exchanged during meetings in Beijing in July 2001 and working meetings are being arranged for EPA and the Chinese Research Academy of Environmental Sciences (CRAES) to complete the final draft in spring 2002. The final bilingual document will be printed and distributed to interested stakeholders in late 2002. The feasibility study contains: (1) information tracing the evolution of emissions trading and provides a detailed account of the U.S. SO_2 cap and trade program; (2) an analysis from MIT examines options for interfacing the existing levy system in China with emissions trading; (3) background on SO_2 related policies in China; and (4) a recommended framework for an emissions trading program in China. The emissions trading framework in the study focuses on large utility sources (with emissions greater than 5,000 tons/year and/or capacity equal to or greater than 600 MW) in China's Two Control Zones. The Two Control Zones include: (1) an acid rain control zone (where pH of rainfall is less that 4.5 which occurs mainly in southwest China); and (2) an SO_2 control zone (where SO_2 concentrations exceed 60 ug/m3, the Class II WHO standard, which occurs in many large cities throughout China but generally concentrated on the east coast). A final workshop may be held in China (summer 2002) to release the findings of the feasibility study and to outreach to other key Chinese environmental officials on the subject of SO_2 emissions trading in China.

Potential next steps include: (1) training sessions focused in the Two Control Zone Area; (2) technical assistance in development of an emissions and allowance tracking system; and (3) assistance with developing guidance for emissions trading in China. The tracking system collaboration would revolve around the construction of an integrated electronic emissions and allowance tracking system. Such a system would help organize and standardize emissions measurement and reporting. The allowance-tracking component could be used if trading was introduced.

Minimum Energy Efficiency Standards

Focus: Energy Efficiency Policy
Partners: China National Institute of Standardizations (CNIS), Lawrence Berkeley National Laboratory
Schedule: Initiated January 2000, Ongoing

This project supports technology cooperation between CNIS and the Lawrence Berkeley National Laboratory (LBNL). The project funds training sessions (typically 2 to 4 weeks in duration) in Berkeley for CNIS staff, who are trained in the methods used in the United States to establish minimum energy efficiency standards—including data gathering and analysis of engineering, economic, energy and financial factors. As a result of this effort, minimum energy-efficiency standards have been established or strengthened for electronic ballasts (a component of fluorescent lights), refrigerators, and room air conditioners. In fiscal year 2002, work is beginning on a multiyear plan to develop standards for new product classes. Work also is beginning on higher refrigerator standards and a new standard for commercial central air conditioners. The project is expected to continue until LBNL has comprehensively provided training to CNIS in the U.S. standards-development methodology.

Study of the Effect of Particulate Matter on Children's and Adults' Respiratory Health

Focus: Health Research, Air Quality Research

Partners: SEPA, China National Environmental Monitoring Centre
Schedule: Initiated August 1999, Ongoing

This project is a follow-up to a previous cooperative Sino-U.S. epidemiological study (known as "The Chinese Children's Lung Function Study") that assessed respiratory health in children and adults, and lung function growth in children, in relation to outdoor and indoor air pollution exposure. The original study was conducted from 1993 to 1996 in the four large Chinese cities of Chongqing, Guangzhou, Lanzhou, and Wuhan. These cities exhibit a wide gradient of exposure to outdoor particulate matter and other air pollutants. The original study was conducted in relatively polluted and unpolluted districts in each city (total eight districts), thus providing intra-city exposure gradients in addition to the overall inter-city gradient. The main purpose of the follow-up is to assess changes in the respiratory health status of the children and adults in relation to changes in outdoor air pollution concentrations and indoor air pollution sources within and across the study districts. A contract is currently being negotiated with the Chinese side to begin work in the original four cities. Data collection and analysis in both the China and the United States are scheduled for completion in 2004.

Studies on Health Effects of Arsenic in Inner Mongolia

Focus: Water Quality Research, Health Research
Partners: Inner Mongolia Center for Endemic Disease Control and Research
Schedule: Initiated November 1999, Ongoing

EPA's Office of Research and Development (ORD) is conducting and sponsoring research to enhance the scientific basis for understanding the health risks associated with arsenic in drinking water with support from EPA's drinking water program. The groundwater in western Inner Mongolia is naturally contaminated with arsenic. This arsenic endemic area provides a unique opportunity for assessing health risk of arsenic in humans because the residents have been exposed to a wide range of arsenic concentrations and have become ill with cancer and non-cancer-related diseases. For exposure assessment, it is possible to assess arsenic exposure at individual levels because each family in Ba Men has their own well. Over the past 8 years, Chinese health officials have accumulated a great deal of arsenic exposure and health effects data useful for conducting such epidemiological studies. The investigators in the National Health and Environmental Effects Research Laboratory, EPA/ORD, and the Chinese investigators in Inner Mongolia have established a 5-year cooperative agreement to conduct arsenic research in Inner Mongolia between 1999 and 2004. Epidemiological studies and toxicological studies are in progress to assess the neural, developmental and carcinogenic effects of arsenic. Scientist exchanges between both sides have been conducted to carry out the research. These collaborative efforts have lead to the publication of study papers.

U.S.-China Partnership for Industrial Pollution Prevention and Energy Efficiency

Focus: Energy Policy, Environment Protection Policy
Partners: SEPA
Funding: EPA
Schedule: Initiated 2001, Ongoing.

EPA will assist SEPA in developing and launching voluntary pollution prevention (P2) and energy efficiency (E2) "beyond compliance" industry-government partnership programs, and provide training and technical assistance in their implementation. The activities included in the pollution prevention and energy-efficiency cooperative agreement will strengthen the ability of SEPA to establish and implement a more economically efficient environmental management policy for China's industrial sector, focusing on preventing pollution (source reduction) as a preferred approach to environmental management. Objectives of the project are: (1) to conduct pilot voluntary pollution prevention partnership projects at the provincial EPB level, including China's new National Model Industries program modeled on EPA's National Environmental Performance Track (NEPT) program; (2) to evaluate the success of the pilot programs in reducing emissions in a cost-effective manner; (3) to design Chinese national-level programs based on lessons learned from the pilot projects; and (4) to recruit industry partners and launch the national-level Chinese programs. If additional resources become available the longer-range objectives are to design and launch a second, higher tier NEPT program and create a Web site to publicize the voluntary P2 partnership programs and link to P2/E2 technical information online.

Voluntary Equipment Labeling

Focus: Energy Policy
Partners: China Center for Energy Conservation Product (CECP)
Schedule: Initiated October 2000, Ongoing

This project, initiated by a request from CECP, works to develop the capacity of CECP to implement and manage a comprehensive voluntary energy-efficiency product labeling program similar to the *U.S. Energy Star* program. CECP receives training and other assistance in selecting new product classes for labeling, establishing criteria for labeled products, and promoting labeled products.

In establishing the criteria for labeled products the project will use U.S. analytic approaches and the plan will prioritize those products for which new labeling would yield the greatest environmental benefits. Assistance draws on U.S. experience in working effectively with manufacturers, retailers, and consumers in the context of a voluntary program. Technical assistance also is provided in strategic planning, development of staffing plans, and creation of critical program implementation tools such as databases.

LAWRENCE BERKELEY NATIONAL LABORATORY

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Appliance Standards, Labeling, and Market Transformation Programs

Focus: Energy Management, Energy Policy

Partners: State Economic and Trade Commission, State Administration of Quality, Supervision, Inspection and Quarantine (AQSIQ); SEPA; China Certification Center for Energy Conservation Products (CECP); Global Environment Facility (GEF); Alliance to Save Energy; International Institute for Energy Conservation; U.S. EPA; ICF Kaiser Consulting

Schedule: Initiated 1995, Ongoing

Energy-efficiency standards and labeling programs for household appliances have proven to be extremely effective in reducing household electricity consumption in the United States and other developed countries. Several past and current Lawrence Berkeley National Laboratory (LBNL) projects have assisted China to transform markets to promote greater energy efficiency in appliances, particularly in setting minimum energy-efficiency standards and establishing energy labeling programs. Past projects have included: (1) refrigerator standards training; (2) development of a $10 million GEF refrigerator market transformation project; (3) air conditioning standards training and preparation of market transformation project, sector survey, consumer survey, monitoring in 250 households; (4) training in electronic ballast standards; (5) preparation of a Green Lights GEF proposal; (6) training in fluorescent lamp standards; (7) training in color TV energy-efficiency labeling criteria; and 8) inclusion of standby power management policies in national efficiency labeling. Current LBNL standard setting projects include: (1) training in washing machine standards; (2) training in commercial packaged air conditioner standards; (3) training in the establishment of energy-efficiency criteria for China's energy-efficiency label (similar to U.S. Energy Star); and (4) and a cooperative study on the development of a mandatory informational energy label.

Building Energy Efficiency

Focus: Energy Policy

Partners: Energy Efficiency Office and Codes Development Institute, Ministry of Construction, China Building Energy Efficiency Association, Natural Resources Defense Council

Schedule: Initiated 1999, Targeted Completion 2003

The energy usage of buildings in China is rising quickly, both in absolute terms and as a share of total energy use. Building energy codes can be a powerful tool for achieving energy-efficiency policy goals. This project is intended to improve the energy efficiency of building design, construction, and operations in China through activities in three areas. The first phase of this project was the development of building energy standards and implementation procedures for the "Hot Summer, Cold Winter" Zone (the region encompassing the Yangtze River basin, home to over 500 million people, also known as the Transition Zone). These energy standards were completed in 2001. The second phase will be the development of building energy standards and implementation for the "Hot Summer, Warm Winter" Zone. Lastly, this project will focus on the development of tighter commercial building efficiency standards for Shanghai. (*Editor's Note: See commentary by Watson and Finamore in this issue of the China Environment Series for more information on building standards work in China*)

China Energy and Carbon Scenarios

Focus: Energy Policy, Environmental Policy

Partners: Beijing Energy Efficiency Center, Stockholm Environment Institute-Boston, Oak Ridge National Laboratory, National Renewable Energy Laboratory, Shell International

Schedule: Initiated 1999, Targeted Completion 2002

This project is a collaborative effort between teams of Chinese, and international, primarily U.S.-based, researchers. This study is a scenario-based analysis of energy-efficiency and renewable-energy policies on energy use and pollutant emissions, with the intent of providing input to the Tenth Five-Year Plan and ongoing energy planning activities in China. The project involves construction of computer models on which to run scenarios to analyze the potential impact of specific energy policy measures. The project objectives are: (1) to strengthen and train a leading group of energy policy analysts in China; (2) to develop

alternative energy scenarios in far greater depth than done before; (3) to provide analysis of how to implement energy-efficiency and renewable-energy initiatives; (4) to inform the State Development Planning Commission and other government agencies of new analysis technologies; and (5) to better inform and educate citizens of China and other countries of analysis results.

China's Refinery Options and Product Specifications

Focus: Energy Management

Partners: Trans-Energy Research, China Petrochemical Corporation, SEPA

Schedule: Initiated 2000, Targeted Completion 2002

China's moves to reduce vehicle emissions and improve air quality necessitate the strengthening of petroleum product quality standards, reducing the allowable amounts of sulfur, benzene, aromatics, and olefins in oil, and raising performance indicators such as octane and cetane. These improvements are being proposed as China is becoming increasingly dependent on higher-sulfur crude oil imports from the Middle East. Using a national linear programming model of the Chinese refining system, this project assesses the additional investment costs to the refining sector of meeting increasingly stringent product standards by 2010 (including new city standards to be introduced by the 2008 Olympics in Beijing) and the impact of greater fuel efficiency and the promotion of alternative fuels on China's production and import mix.

Evaluating the Outcomes of China's Programs to Promote Improved Stoves

Focus: Energy Policy

Partners: University of California (San Francisco), Tsinghua University, Renmin University, China Centers for Disease Control

Schedule: Initiated 2001, Targeted Completion December 2002

LBNL and the partners in this project—led by the Institute for Global Health (IGH) at the University of California, San Francisco—will conduct an independent review of the Chinese National Improved Stove Program (NISP) (which was implemented from the early 1980s to the early 1990s) and subsequent market-based efforts to disseminate improved stoves. Initiated in response to rural fuel shortages, NISP was the largest program of its kind in the world, and is credited with providing 180 million households with more efficient and cleaner stoves using coal and biomass fuels. This project will address key questions at the national, regional, and local policy levels through surveys of government units and households. Analysis of survey data will provide evidence upon which to base future household energy policy decisions in China and in other low and middle income countries. Surveys performed in this project will provide a quantitative picture of the NISP and subsequent programs, in terms of extent, management, and utilization, as well as impact on the health of rural populations. Data will be collected simultaneously in two ways: (1) a survey of about 100 government agencies and enterprises will gather data on policies and management practices from the national to the village levels, and on rural stove manufacturers and service providers; (2) a household survey will gather data on health status, household fuel, stove use and efficiency, and indoor air quality from about 3,300 households in three provinces (Zhejiang, Hubei, and Shaanxi) representing different socioeconomic levels.

Industrial Energy Efficiency Policy

Focus: Energy Policy

Partners: State Economic and Trade Commission, China Energy Conservation Association

Schedule: Initiated 1999, Targeted Completion 2002

The State Economic and Trade Commission now faces the task of developing regulations and programs to implement China's Energy Conservation Law, which has been in effect since 1998. Industry always has been a particular focus of energy-efficiency work in China since it consumes about two-thirds of China's commercial energy. This project will demonstrate the implementation of a voluntary agreement framework at two steel mills in Shandong, including the development of supporting regulations and reporting structures.

Residential Energy Consumption Survey/China RECS

Focus: Energy Research

Partners: National Bureau of Statistics

Schedule: Initiated 1999, Target Completion 2002

Detailed surveys of household energy use, appliance ownership, and energy expenditures are crucial basic data for developing energy standards and assessing the impact of other energy-efficiency measures. Such a survey has not been conducted before in China. This pilot survey of household energy consumption covers 250 households in five cities, and will provide an important snapshot of current energy-consumption conditions and trends. Initial results of the study will be released in a report in early 2002.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (DEPARTMENT OF COMMERCE)

http://www.noaa.gov

Chesapeake Bay National Estuarine Research Reserve-Tianjin Paleocoastal and Wetland Reserve Exchange

Focus: Coastal Conservation Research, Conservation Management
Partners: Chinese State Oceanic Administration (SOA), Tianjin Oceanic Administration
Schedule: Initiated 1998, Ongoing

In May 2001, SOA and the Tianjin Oceanic Administration hosted three U.S. experts for meetings and discussions on the partner reserve relationship established in 1998. Delegates and representatives discussed the U.S. national reserve network system and administration, current habitat restoration efforts, monitoring, ecotourism, geographical information systems (GIS) applications, the new Tianijn reserve education plan, recent biodiversity studies of Qilihai Wetland, and water quality monitoring efforts. Specific interests to be pursued following this exchange will focus on the conservation and enhancement of existing ecological integrity of Qilihai Wetlands in terms of vegetation, water quality, and habitat restoration, as well as the establishment of GIS capability and enhanced data management practices for the Tianjin reserve.

Coral Ecology Monitoring—Partner Reserve Exchanges

Focus: Coastal Research, Ocean Conservation
Partners: IUCN-The World Conservation Union, UN Environmental Programme, Florida Keys National Marine Sanctuary-Sanya National Coral Reserve, SOA, Hainan Province and Guangxi Zhuang Autonomous Region Reserve Managers, Reef Check
Schedule: Initiated 1999, Completed 2001

In November 2000 and May 2001, the National Ocean Service provided funding support to Reef Check (an international network of regional, national, and local volunteer coordinators who collect scientifically valid data on reef health in their area) and the Chinese State Oceanic Administration for two coral surveying training programs in Hainan Province and Guangxi Zhuang Autonomous Region. After receiving certification in scuba diving, Chinese participants received training in coral monitoring and assessment methodology based on Reef Check protocols. As a result of this project, the Sanya National Coral Reef Reserve and the Weizhou Island reserve managers and staff now have enhanced abilities to document and assess status and trends in coral habitat and associated biodiversity. Both sites are now contributing coral information to the global reef monitoring efforts through Reef Check network and in support of the Global Coral Reef Monitoring Network.

Coupled Air-Sea Modeling

Focus: Ocean Research
Partners: Chinese State Oceanic Administration (SOA)
Schedule: Initiated 2002, Targeted Completion 2004

NOAA and SOA will continue to promote international partnership to improve climate modeling and forecasting by utilizing the U.S.-China Marine and Fishery Science and Technology Protocol to develop more research activities and exchanges that focus on modeling the interactions between oceanic and atmospheric aspects. NOAA's Geophysical Fluid Dynamics Laboratory (GFDL) has proposed hosting one research scientist from China at GFDL's Princeton facility for one year. The primary research area will be in ocean modeling/ocean data assimilation and investigating the application of ARGO data for global and regional ocean state estimation.

Marine and Coastal Management Program

Focus: Marine Policy, Marine Research
Partner: Chinese State Oceanic Administration (SOA)

NOAA's Marine and Coastal Management Program has the following three priorities regarding the management of coastal and near-shore environments in the cooperative program with China:

1) *Legislation and Policy.* NOAA is assisting in the development of China's national coastal resource management regime. Since this cooperative program was established in 1998, China has updated its Marine Environmental Protection Law (2000) for the first time since 1982 to strengthen attention on ecology and other areas. In January 2002, China's first Sea Area Use Law was promulgated, shaped in part by research and policy exchanges with NOAA that had taken place 14 months earlier. In October 2000, SOA Administrator Wang Shuguang led a seven-person delegation to the United States for meetings with U.S. agencies involved in sea area use management at the national and local levels. Through this exchange, the Chinese delegation received briefings on U.S. marine strategy and marine policy, structure and operational issues in marine management in the United States,

and marine enforcement practices. Presentations on sea area and coastal zone policy and legislation, licensing/leasing and permitting regulations and practices, interagency coordination and jurisdictional division of authorities, and intergovernmental coordination were provided to the delegation. Resource management and use issues concerning marine protected areas, living marine resources and fisheries, offshore minerals, shipping and navigation, and coastal and marine ecology were also discussed. China is currently looking at various models for national legislation for integrated coastal management that may be passed between 2005 and 2007.

2) Marine Environmental Quality and Coastal Monitoring. NOAA is promoting exchanges between the three partner reserves, which are addressing management and monitoring issues. In addition, NOAA's Marine and Coastal Management Program and SOA are currently producing a report examining China's marine monitoring experiences since 1972. This report should provide insight into data collection, management, gaps, and general environmental conditions in China at a level of detail currently unavailable.

3) *Integrated Coastal Management and Marine Protected Area Management.* NOAA transfers information and exchanges experiences to operationalize integrated management processes involving multi-stakeholder groups and various sectoral interests. NOAA's Marine and Coastal Management Program seeks to increase interdisciplinary and nongovernmental input into resource management practices, priorities and decision-making. NOAA and China have established three U.S.-China sister marine reserve partnerships and are helping the emergence of a national program and designation of additional key sites as reserves.

Marine Pollution Assessment and Management

Focus: Water Management, Ocean Research
Partners: EPA, Chinese State Oceanic Administration (SOA), SEPA, Chinese Ministry of Agriculture
Schedule: Initiated July 2000, Targeted Completion 2002

In July 2000, a delegation of U.S. and Chinese partners met to discuss a forthcoming joint report on marine monitoring experiences in China since 1972. The report summarizes the national marine environmental monitoring infrastructure and operational mechanisms and data collected from 1979 to 1999 in China. The report also distills "lessons learned" from China's experiences that may be applicable to other countries. The first draft, tentatively entitled *Marine Environmental Monitoring in China: Lessons learned from Successes and Failures* is currently being peer-reviewed. The report will be distributed in hard and electronic copy in 2002.

Mooring Buoy Training and Demonstration Projects—Partner Reserve Exchanges

Focus: Coastal Conservation, Conservation Training
Partners: National Coral Reef Reserve and Weizhou Island Coastal Managers and Agencies
Schedule: Initiated 2000, Completed 2001

In June 2000 and August 2001, two mooring buoy demonstration projects were completed at the Sanya National Coral Reef Reserve (Hainan Province) and Weizhou Island (Guangxi Zhuang A.R.). These areas are sites for emerging numbers of recreational tourist divers. In order to prevent small tour boats from dropping anchor and causing permanent damage to the coral reef, mooring buoys will be provided for tying up the vessels. In addition, mooring buoys also can be used for zoning certain restricted areas to protect particularly fragile reef areas from boat traffic, fishing, and tourism. These projects were coupled with discussions on local education strategies for these sites. In Sanya, six mooring buoys were installed in the reserve during a weeklong training and installation session. In Weizhou, two buoys were installed and six anchor eyes deployed.

Ocean Observations

Focus: Ocean Research
Partners: Chinese State Oceanic Administration (SOA)
Schedule: Initiated March 2002, Ongoing

At the 15 March 2002 meeting of the U.S.-China Joint Working Group on Cooperation in the Field of Marine and Fishery Science and Technology (attended by officials and scientists from NOAA, SOA, National Center for Atmospheric Research in Boulder Colorado, Chinese Academy of Fishery Sciences, and the Embassy of China) held in Maryland, NOAA and SOA agreed to continue cooperation by participating in the implementation of the global ARGO Program. ARGO is a global array of 3,000 free-drifting profiling floats that measure the temperature and salinity of the upper 2,000 meters of the ocean. The data collected will allow continuous monitoring of the climate state of the ocean (ARGO homepage: http://www.argo.ucsd.edu). NOAA will provide scientific and technical training in the development of capacity so its Chinese counterparts will be able to manage their own national ARGO program. China plans to launch an initial deployment of three ARGO floats in the summer of 2002 and intends to deploy more floats in the coming years if additional funding is secured. Specific examples of collaborative activities include: (1) technical assistance in the deployment of ARGO floats; and (2) training on the utilization and assimilation of resulting data to produce improved climate forecasts. NOAA will support the training of two engineers from the Second Institute

of Oceanography (Hangzhou) at University of Washington (Seattle) and at the NOAA Atlantic Oceanographic and Meteorological Laboratory (Miami, Florida).

Offshore Aquaculture and Coastal Modeling

Focus: Ocean Research, Conservation Research
Partners: Chinese Academy of Fishery Sciences
Schedule: Ongoing

The United States and China are continuing their exchange of knowledge and experience to promote the ongoing cooperation to optimize integrated aquaculture and fisheries, and adopt eco-friendly practices to help sustain and increase production in both countries. Continued mutual interests between the two countries are: (1) the commercialization of cold-water shrimp; (2) mitigation of shellfish disease; (3) transfer of seaweed (nori) biomediation technology; (4) technology transfer for ornamental fish; and (5) coastal modeling techniques to coastal ecosystem management in the areas where heavy aquaculture and fisheries activities and multi-user activities are taking place. At the next Living Marine Resources joint coordination panel meeting both the United States and China will hold dialogues among aquaculture scientists who are interested in offshore ecosystem-based aquaculture and coastal modeling topics to determine the present status of development and capabilities in both countries.

Polar Sciences

Focus: Polar Research
Partners: SOA, Chinese Artic and Antarctic Administration, The Second Institute of Oceanography, Chinese Meteorological Administration, Institute of Atmospheric Physics, Chinese Academy of Sciences, Chinese National Science Foundation
Schedule: Initiated October 2001, Ongoing

At meetings in Beijing and Hangzhou between officials from NOAA and several Chinese agencies (See partner list above) there was general agreement that a Panel on Polar Sciences should be established under the U.S.-China Marine and Fishery Science and Technology Protocol. Both countries finalized the establishment of this new panel at the 15th Joint Working Group meeting on 5 March 2002. The long-range goal of the panel will be to develop mutual interest in the following five scientific themes: (1) role of the arctic in global climate change; (2) long-range transport of contaminants to the Arctic; (3) polar ocean exploration; (4) Antarctic environment monitoring and research; and (5) atmosphere-ice-ocean interaction in the Southern Ocean.

Regional Case Study: Integrated Marine Ecological Management for the Beibu Gulf

Focus: Ocean Research, Ocean Conservation
Partners: IUCN-The World Conservation Union
Schedule: Initiated 2000, Ongoing

In June 2000, NOAA and SOA delegations met in Beihai (Guangxi Zhuang A.R.) to select a geographical focus for a proposed regional, long-term cooperative program for integrated coastal management. The selected region is centered on the Beibu Gulf and three special coastal areas at Shankou, Sanya, and Weizhou Island. Key elements of this multiyear program include: (1) fostering integrated coastal management at three sites with technical cooperation in ecological monitoring; (2) local and regional GIS applications; (3) habitat research; and (4) education and outreach.

Rookery Bay National Estuarine Research Reserve-Shankou National Mangrove Reserve

Focus: Coastal Conservation
Partners: IUCN-The World Conservation Union, Chinese Nature Reserves
Schedule: Initiated 2000, Ongoing

In December 2000, representatives of NOAA and IUCN-The World Conservation Union traveled to Guangxi Zhuang Autonomous Region to visit the Shankou National Mangrove Ecosystem Nature Reserve as well as to Weizhou and Xieyang islands. The main objective of this visit was to continue personnel exchange and collaboration between the U.S. and Chinese sister reserves focusing on ecotourism, education, outreach and research.

Surface, Land, and Ocean Data Exchange

Focus: Ocean Research
Partners: Chinese State Oceanic Administration (SOA)
Schedule: Ongoing

At a March 2002 meeting, the United States and China agreed to continue exchanges of oceanographic/climate data and information, as well as to improve communication among scientists specializing in these areas. This strengthened data exchange will take place under the existing bilateral science and technology frameworks (both at the policy and working levels).

Yellow Sea Large Marine Ecosystem Project

Focus: Ocean Conservation, Ocean Research
Partners: NOAA's National Marine Fisheries Service, SOA, Global Environment Facility (GEF)
Funding: $25 million (Global Environment Facility, GEF)
Schedule: Ongoing

Among the 50 largest large marine ecosystems (LME) in the world's oceans, the Yellow Sea LME has been one of the most significantly affected by human development. NOAA's National Marine Fisheries Service has worked with SOA for the past several years to develop the Yellow Sea Large Marine Ecosystem Project. The long-term development and environmental objective of this project is to promote ecosystem based, environmentally sustainable management and use of the Yellow Sea LME and its watershed. This project will include joint international efforts by China, the United States, and the Republic of Korea to develop and implement: (1) regional strategies and actions for sustainable management of fisheries and marine culture, including conducting joint productivity and fish population surveys and assessments; (2) ecosystem-wide initiatives and actions for biodiversity protection; (3) actions to reduce human and environmental stress on the ecosystem; and (4) regional capacity building for carrying forward the long-term project objectives. NOAA's contributions will be scientific and technical including: (1) assistance and training in methodologies for advanced measurements of ecosystem-wide productivity and carrying capacity for fish and fisheries; and (2) applications of satellite remote sensing, fishery demographics, environmental indexing, and improved socioeconomic and governance profiling and assessments.

National Renewable Energy Laboratory

http://www.nrel.gov/china

Technology Cooperation Agreements Pilot Project (TCAPP)

Focus: Energy Research, Energy Policy
Partners: Chinese State Development Planning Commission (SDPC), EPA
Schedule: Initiated 1997, Ongoing

The Technology Cooperation Agreements Pilot Project (www.nrel.gov/tcapp) is an initiative of the U.S. government that is assisting developing countries in attracting clean energy investments to meet development needs and reduce greenhouse gas emissions. In late 1997, TCAPP was initiated in China and the Chinese government developed a technology cooperation framework that detailed technology priorities important for development as well as mitigation of greenhouse gas emissions. The National Renewable Energy Laboratory (NREL) leads implementation of TCAPP for the U.S. government and has established a team of technical experts to assist them in their China TCAPP work. SDPC is the lead organization for this project in China. Under TCAPP teams were formed in: (1) efficient motors; (2) grid-connected wind power; (3) industrial boilers; and (4) clean coal technology, with broad representation from the government, utility, industry and research communities. During an interagency meeting in January 2000, six actions in the wind and motors sectors were selected for implementation and are outlined below. In 2002, work in motors, industrial boilers, wind and clean coal technology will continue. In 2003, as the next phase of the TCAPP program develops, activities will focus on grid-connected wind power.

1) Wind resource assessment. The team has translated NREL's resource assessment and monitoring handbook into Chinese for training. The team identified high-priority regions for assessment and prepared part of a proposal that has been packaged into a larger UNEP/GEF Solar and Wind Energy Resource Assessment Project to secure funding to expand earlier assessment activities. The team already has been instrumental in securing endorsement from the Chinese Ministry of Finance for this project proposal. Work should begin on this project in 2002. A proposal for wind measurement equipment has been prepared for a UN Development Programme (UNDP) renewable energy program. A CD-ROM of wind maps and data for southeast China is being prepared.

2) Wind turbine testing for certification. NREL provided IEA Recommended Practices and international standards information to the wind team and met with the team to explain testing and certification processes in the United States. The China Classification Society (CCS) is preparing the Chinese certification scheme for wind turbines and a Chinese testing organization is being identified. NREL and the Ministry of Science and Technology cosponsored a wind turbine-testing workshop in July 2000 in Beijing to build local capacity in types of testing and certification, testing protocols, and equipment. Six CCS staff attended a training at NREL on design evaluation certification in June 2001. This training was followed by a hands-on training on turbine testing at in February 2002.

3) Wind business partnerships. Wind business partnerships are being developed in five activity areas:

a) Wind workshop—The wind team helped host a wind concessions workshop in Guangzhou in late 2001 to strategize large-scale wind farm development that would attract private sector developers and investors. SDPC met with potential developers to

outline the bidding process for 80-100 MW wind concessions in Guangdong and Jiangsu provinces and to promote dialogue between stakeholders.

b) Wind industry roundtable—Members of the wind team, Chinese wind companies, and U.S. wind industry met in April 2002 in DC to discuss how: 1) to further develop business partnerships between international and Chinese companies; 2) to help the Chinese to develop wind in a way that will attract more private investment; and 3) to help the Chinese develop wind more competitively.

c) Motors Training—The goals of this action are: (1) to identify training needs and potential host institutions; (2) to secure funding for a training center; (3) to provide motors selection and motors systems design software and training; and (4) to initiate training. To fund the establishment of an Efficient Motors Exhibition and Training Center to house training activities, the motors team has prepared a proposal that can be used to solicit additional donor support. The motors team cosponsored and attended conferences in which they presented this proposal.

d) Motors Testing, Labeling, Standards and Certification—The goals of this action are: (1) to provide information on test protocols, certification, and standards; (2) to assist in selection of appropriate protocols, certification, and standards; (3) to find potential hosts for testing; (4) to help secure funding for testing facility and equipment; and (5) to initiate training in testing, standards, and certification.

e) Motors financing and business partnerships—The motors team and the International Institute for Energy Conservation (IIEC—*Editor's Note: see CES 4 inventory for previous NREL-IIEC cooperation*) are providing technical assistance to three high-efficiency motors pilot projects with Shengli Oil Company, the second largest oil company in China. In 2001, 100 units of permanent magnet motors and 10 A/C motors were installed. Assistance includes monitoring of the energy savings and analysis of the results. An expanded pilot project will begin in 2002.

4) Boiler Technology Transfer. Potential sites for industrial boiler pilot projects are being identified and evaluated. A coal mine in northern China and a briquette-making operation are under consideration. An underlying goal of this first action is to help facilitate business development activities. Thus, information exchange will be facilitated between small- and medium-sized companies, trade organization, manufacturers, and project developers. Work also will include an assessment of appropriate technologies for industrial boilers in China.

5) Industrial Boiler Business Partnerships. A study tour in fall 2002 will educate Chinese experts on advanced boiler and boiler-related technologies available in the U.S. and internationally, and provide the opportunity to form partnerships with the private sector. The study tour will consist of presentations on various technologies as well as visits to numerous industrial boiler plants. During the study tour the Chinese experts will participate in a private sector debriefing with U.S. industry to introduce this industrial boilers project and to discuss technical needs and interests in China, potential commercial project ideas, and recent successes. The U.S. participants will likely include representatives of organizations already working in China, members of the Council of Industrial Boiler Owners (CIBO), American Boiler Manufacturers Association (ABMA), the Business Council for Sustainable Energy, and other industry leaders.

6) CCT Evaluation Models. Two models (Total Life Cycle Cost Model and Integrated Environmental Control Model) will be supplied to China to assist in evaluating and screening various power technologies, including advanced technologies that operate at higher efficiency and thus, emit less carbon dioxide. Both of these models and software will be provided to China (CCT information Center) to conduct analyses. Training will be provided to a small group of Chinese experts experienced in the use of techno-economic models.

7) U.S. CCT Study Tour. A study tour to the United States for a small group of senior Chinese CCT experts and government officials will be organized to visit various CCT demonstration sites, technology vendors, engineering firms, and finance organizations. This study tour will focus on specific issues, including technology transfer issues that China needs to address to move its proposed CCT projects into the demonstration stage.

U.S.-China Protocol for Cooperation in the Fields of Energy Efficiency and Renewable Energy Technology Development and Utilization

Focus: Energy Policy

Schedule: Initiated 1995, Ongoing

This protocol (signed in February 1995 by DoE and MOST) focuses on three sustainable energy goals: (1) to advance world energy security interests by helping China develop more diversified energy resources and thereby reduce its future demand for oil; (2) to mitigate environmental damage associated with rapid growth in energy demand through deployment of renewable energy and energy-efficiency measures; and (3) to enhance U.S. industry competitiveness in China's energy market. In this protocol there are six annexes, five of which pertain to renewable energy. Of these, NREL implements annexes on rural energy development, wind energy development, business development, policy and planning, and geothermal production and use. A progress report for this bilateral protocol (also available on CD-ROM) was published in April 2000. It is also available on the Web site at www.nrel.gov/china/re_forum.html. Activities under the five annexes implemented by NREL are outlined below.

Rural Energy Development Annex I

This annex focuses on the use of village scale renewable energy technologies to provide energy or electricity to rural areas in China.

Ongoing Projects Under Rural Energy Annex I (See CES 4): *Great Wall PV Demonstration Site; Inner Mongolia Hybrid Household Project; Rural Biomass Collaboration; Rural Renewable Energy Development Training Activities*

Asia Pacific Economic Cooperation (APEC) Tibet Solar Electrification Project

Two companies have installed 200 solar home systems (30-36 W systems) in rural areas of Damschung and Phendrop counties within Lhasa prefecture. They identified business development strategies for photo voltaic (PV) installations in Tibet. Lotus Energy and Wisdom Light Group have implemented this project with assistance from the Boulder-Lhasa Sister Cities Program. In 2002, this project, in collaboration with Greenstar, will install a 2 kW PV village power system with Internet communications to help villagers increase local incomes through export of digital art and music. Other APEC activities in China include work in four areas—financing, renewable energy standards, distributed resources, and micro-business development—in which the United States is pursuing activities jointly with other APEC members.

Gansu Solar Home System Project

Focus: Renewable Energy Development
Partners: Chinese Ministry of Agriculture (MoA), Solar Electric Light Fund, Gansu Solar Electric Light Fund
Schedule: Initiated 1998, Ongoing

Photo voltaic (PV) solar systems were installed in 320 homes and ten schools by 1998 as the first phase of this project. Under this project the Gansu Solar Electric Light Fund installed additional 460 PV systems and a revolving credit fund also was set up. The MoA now has expanded its solar home system project to 10,000 households in six provinces. The Solar Electric Light Fund is now pursuing follow-up activities with PV school systems.

Wind Energy Development Annex II

Activities under the wind energy development annex focus on accelerating sustainable large-scale development of wind power in both grid-connected and off-grid village power applications in China.

Ongoing Projects Under the Wind Energy Annex II (See CES 4): *Wind Energy Training*

Hybrids Industry Working Group

Focus: Energy Training
Partners: UNDP, UN Department of Economic and Social Affairs (UNDESA)
Schedule: Initiated 2002, Ongoing

DoE/NREL is working with the UNDP: (1) to convene regular meetings of China's hybrid systems integrators; and (2) to design and implement training programs for the working group. The next training is planned for 2002 in conjunction with UNDP/UNDESA.

Wind Resource Assessment and Mapping

Focus: Renewable Energy Research
Partners: U.S. Environmental Protection Agency, DoE, General Hydropower Planning Institute
Schedule: Initiated 1998, Completed 1998

DoE/NREL and EPA completed a southeast China wind resource assessment and mapping in 1998 of Jiangxi, Fujian, and the eastern half of Guangdong. The most attractive wind resources are found along these coastal areas and on the offshore islands. A CD-ROM of these wind maps plus additional recent measurement data will be published in 2002.

Xiao Qing Dao Village Power Project

Focus: Renewable Energy
Partners: State Power Corporation of China
Schedule: Initiated 2001, Ongoing

DoE/NREL and the State Power Corporation of China are currently developing a pilot project using a wind/diesel/battery system to electrify 120 households on an island called Xiao Qing Dao located in the Yellow Sea off Shandong Province. The project was commissioned in February 2001. Currently, NREL and its partners are collecting performance and operational data.

Renewable Energy Business Development Annex IV

Under this annex, DoE/NREL has undertaken workshops and outreach activities that have been successful in helping U.S. companies facilitate business partnerships and develop markets for renewable energy technologies in China. Recent workshops are outlined below (previous workshops are listed in *China Environment Series Issue 4*).

1) Business Development Workshops and study tours

a) NREL/CRED led the third U.S.-China Renewable Energy Business Workshop and study tour in September 2001 with seven U.S. companies and organizations in southwest China. The workshop included one-on-one business meetings, factory and site visits, as well as networking with provincial officials and financial institutions. As a result, at least three U.S. companies are pursuing partnerships with Chinese solar companies.

b) NREL/CRED presented renewable energy technologies and lessons learned at the August 2001 *U.S.-China Clean Energy Technology Forum* in Beijing.

c) DoE/NREL/APEC and MoA held a *U.S.-China Rural Electrification Workshop* in 1998 to provide information to U.S. companies on rural electrification opportunities and plans and facilitate networking between U.S. and Chinese companies. As a result, six U.S. companies are developing business activities with Chinese companies.

d) DoE/NREL conducted a follow-up *U.S.-China Renewable Energy Business Workshop* and study tour with 13 U.S. companies in China in November 1999. This workshop and study tour assisted in introducing U.S. companies with potential new customers, distributorships, and partnerships.

e) A three-day *Wind Energy Business Development and Policy Analysis Workshop* was held in April 1999 to train Chinese officials and companies in business development for grid-connected wind power.

2) Outreach. In December 1999, NREL completed a Web site (www.nrel.gov/china) that provides information on the U.S.-China Bilateral Protocol on the Utilization of Energy Efficiency and Renewable Energy Technologies, as well as business and policy information for companies that are interested in the Chinese markets.

Policy and Planning Annex VII

This annex, which focuses on renewable energy policy and support of the Brightness Rural Electrification Program, was signed between DoE and SDPC in May 2000.

Brightness Program Training Certification

Focus: Renewable Energy Training
Partners: Institute for Sustainable Power (ISP), Jikedian Renewable Energy Center
Schedule: Initiated 2001, Ongoing

NREL and ISP are working with Jikedian Renewable Energy Center to establish a training certification program for the Brightness Program. An initial evaluation of the Brightness Program and training levels was conducted by NREL and ISP in September 2001, and was followed by certification of Master Trainers in the United States in early 2002.

Energy Policy

Focus: Renewable Energy Policy
Partners: Center for Renewable Energy Development (CRED)
Schedule: Initiated 1998, Ongoing

In 1998, staff from the Center for Renewable Energy Development (CRED) participated in a policy study of the United States with DoE/NREL and presented a report comparing U.S. and Chinese renewable energy policies. This led SDPC to advocate renewable energy policy incentives to the State Council, including the creation of a Renewables Portfolio Standard, which became part of the Tenth Five Year Plan (2001-2005).

Geothermal Energy Production and Use Annex VI

This effort has focused on development of the geothermal heat pump markets and identification and implementation of investment projects.

Geothermal Market Development

Focus: Energy Research, Energy Development
Partners: U.S. Geothermal Heat Pump Consortium, Beijing Jike Energy New Technology Development Company

DoE, U.S. Geothermal Heat Pump Consortium, and Beijing Jike Energy New Technology Development Company (Jike)

identified eight geothermal heat pump (GHP) projects, three of which—totaling $5.3 million—have been completed by Trane and Florida Heat Pump Environmental Equipment Company. The Beijing Concordia International Apartment Building, which features 501 GHP units, was commissioned in August 2001. Under this project a GHP training course took place in Beijing in 2000 and Jike is monitoring GHP sites in Beijing and Inner Mongolia for one year to demonstrate energy and cost savings. This work has contributed to a rapidly growing Chinese market for GHP. In 2002 activities will include a market study and the development of a market development strategy.

Office of Science and Technology Policy and Los Alamos National Laboratory

http://www.lanl.gov/chinawater

U.S.-China Water Resources Management Program

Focus: Water Management

Partners: Ministry of Water Resources (MWR), MOST, MoA, SEPA, SPDC

Funding: Office of Science and Technology Policy, National Science Foundation, USDA, U.S. Geological Survey, Army Corps of Engineers, EPA

Schedule: Initiated1999, Ongoing

The U.S. China Water Resources Management Working Group has been formally established as a working group of the U.S.-China Joint Commission Meeting (JCM) on Science and Technology. The Working Group has agreed on objectives and basic principles to guide the cooperative activities, as well as determine priority interest areas and potential activities. Key technical interest areas continue to be: (1) agriculture and forestry; (2) ecosystem dynamics; (3) domestic and industrial water supply and use; and (4) flood and drought planning and mitigation. A critical driver for the Chinese ministries is the implementation of the Tenth Five-Year Plan, which focuses on development of the western regions of the country. Development in this region will be critically dependent on water resources. China also expects a population increase of 400 million people in the next 25 years, which will result in the country running 100 million cubic meters short in water supply. Both sides agreed on the need to develop government and private sector support and funding for bilateral water activities. Program activities have included: (1) kickoff conference in Tucson (April 1999); (2) major U.S. and Chinese investment in GIS and water infrastructure information management (Compaq); (3) an industry workshop in Seattle/Tacoma in April 2001 to address wastewater options; and (4) focus on Green Chemistry to avoid pollution. For more information on this program contact Dr. Dennis L. Hjeresen, Senior Program Manager, Environmental Management Programs, Los Alamos National Laboratory, Los Alamos, NM 87545, dennish@lanl.gov, Phone: 505-665-7251, Fax: 505-665-8118.

Peace Corps

http://www.peacecorps.gov

Environmental Education Project

Focus: Environment Education

Partners: Chinese Education Association for International Exchange, Sichuan Educational Association for International Exchange

Funding: $37,000 per year per volunteer in the field from the Peace Corps. Additionally, the post will receive field support throughout the year.

Schedule: Initiated 2000, Ongoing

Peace Corps/China (in China, Peace Corps is known as the U.S.-China Friendship Volunteers), responding to requests from its partners in the Chinese government, opened an environmental education program in 2000. Twenty-six volunteers are currently assigned to universities and high schools in Sichuan Province where they teach, develop curriculum, and conduct community environmental education activities. Two of the volunteers also are helping the Environment Volunteers Association at Sichuan University. (*Editor's Note: See feature box for two Peace Corps volunteer vignettes in this issue of the China Environment Series*)

United States Geological Survey

http://www.usgs.gov

Biological Resources Discipline Activities

Ongoing Projects (See CES 4): *Biological Studies of Shortnose and Other Sturgeons, Comparative Studies of Polecats and Ferrets, Wildlife Resources Education, Training, and Technical Assistance.*

Below are four projects within the USGS Biological Resources Discipline Activities

Conservation of Ecological and Cultural Diversity in Sichuan Province

Focus: Conservation Management, Biodiversity Research
Partners: Chengdu Institute of Biology, Chinese Academy of Sciences, U.S.-China Environmental Fund
Schedule: Ongoing

The project is to conserve ecological and cultural resources as national parks are being developed at two World Heritage Sites in Sichuan Province. USGS is helping Chinese partners develop Gap Analysis Program (GAP)/Geographic Information Systems (GIS) capacities in order to inventory and conserve biological resources in the Wolong Nature Reserve Region. Other objectives in this project include: (1) conserving ethnic cultures and biological diversity while developing new economic opportunities in western Sichuan; (2) protecting declining amphibian species; and (3) studying and controlling invasive alien species. Training of Chinese scientists has been conducted in the United States.

Economic Development and Conservation of Biological Diversity in Yunnan Province

Focus: Conservation Training
Partners: Biological Resources Innovative Development Office in Yunnan Provincial Government

The Yunnan provincial government has initiated a program to improve economic conditions for their people by increasing development of biological resources. The Yunnan Biological Resources Innovative Development Office has requested assistance from the USGS in developing this program. The USGS will assist in: (1) describing the biological resources; (2) developing a GIS-based technology (GAP) to facilitate conservation planning; (3) identifying innovative economic opportunities; and (4) designing education, training, and outreach opportunities. Achieving increased economic opportunities while maintaining ecosystem sustainability is the goal of USGS participation in this project. Accomplishments to date include reciprocal exchanges of key personnel and a short course for Chinese scientists and administrators on biodiversity, economics, GIS, and grant writing. A Research Agreement between USGS and Yunnan's Biological Resources Innovative Development Office was signed in May 2001 to continue the project.

Freshwater Mussel Propagation Studies

Focus: Conservation Research
Partners: Chinese Academy of Fisheries

The USGS is cooperating with the Chinese Academy of Fisheries on a study of freshwater mussels. The objective is to compare methods used to breed and rear juvenile mussels outdoors and indoors and to evaluate methods used to sustain brood stock in captivity. The project also will test the sustainability of a medium developed in the U.S. for the transformation of the mussel larvae of U.S. and Chinese species. The results will provide information for freshwater mussel propagation studies in the United States.

Information Exchange on Invasive Species

Focus: Conservation Research
Partners: Institute of Zoology in Beijing

Information on invasive species of concern in China and the United States has been exchanged between the two parties and has resulted in publication of a preliminary summary of some significant biological invasions in China. (Xie Yan, Li Zhenyu, William P. Gregg, and Li Dianmo. 2001. Invasive Species in China: An Overview. *Biodiversity and Conservation.* (10):1317-1341).

Geologic Discipline Activities

The three projects below are USGS Geologic Discipline Earth Science activities under the USGS and the Chinese Ministry of Geology Scientific and Technical Cooperation in Earth Science Protocol (originally signed 1985 and recently extended to 2006).

Health Impacts of Residential Coal Use in China

Focus: Health Research, Energy Research
Partners: Institute of Geochemistry, Guiyang, Armed Forces Institute of Pathology
Funding: Chinese National Natural Science Foundation
Schedule: Ongoing

The Energy Resources Team of USGS is collaborating with researchers at the Institute of Geochemistry in Guiyang, the Armed Forces Institute of Pathology, and other organizations to evaluate the health impacts of residential coal use in China. Initial activities have focused on Guizhou Province where residential coal combustion has exposed about 10,000 people to toxic levels of arsenic and about 10,000,000 people to excess fluorine. The USGS has: (1) conducted detailed characterization of the coal to determine the concentrations and forms of the toxic elements; (2) conducted preliminary mapping of the distribution of the

toxic elements; (3) developed electronic maps to help relate coal occurrences in China to the incidence of fluorosis and arsenism; and (4) helped develop a field test kit to allow villagers to easily and rapidly determine the arsenic contents of coal samples. Funding has been obtained from the Chinese Natural National Science Foundation, which will allow for the expansion of the project to assess the relation of residential coal use to high incidences of cancer in Yunnan Province and coal-related health problems in other parts of China.

Cooperation in Earthquake Studies

Focus: Earthquake Research
Partners: U.S. National Science Foundation, China Seismological Bureau, Chinese National Natural Science Foundation
Schedule: Initiated 1980, Targeted Completion (under current extension) 2005

Under the *Scientific and Technical Cooperation in Earth Science Protocol*, U.S. and Chinese partners have been cooperating in the fields of earthquake prediction, earthquake hazards evaluation, earthquake engineering, and other basic and applied studies of earthquake phenomena for 22 years. USGS has conducted workshops and provided training information in the areas of earthquake hazards, seismo-tectonics, and earthquake prediction.

World Coal Quality Inventory

Focus: Energy Research
Partners: Institute of Geochemistry, Guiyang
Status: Ongoing

The Energy Resources Team of USGS is collaborating with researchers at the Institute of Geochemistry in Guiyang to acquire and characterize coal samples from a wide range of active coal mines throughout China. The detailed analysis of the coal, which includes determination of the concentration of all potentially toxic trace elements, will provide insights into the potential environmental and human health impacts of coal use in China. To date samples have been provided to USGS from about 500 coal mines in China. Ultimately, more than 1,000 samples will be analyzed.

Water Resources Discipline

In 1981, USGS and the Chinese Ministry of Water Resources signed the Surface-Water Hydrology Protocol. Extension of this protocol from 2001-2006 is currently pending. Below are descriptions current activities under this protocol

Study of Surface Water Hydrology

Focus: Water Research
Partners: Hai He River Commission, Ministry of Water Resources
Schedule: Initiated 2001, Targeted Completion 2005

In October 2001, two USGS scientists visited China to conduct further discussions and initiate work on a reservoir eutrophication project. They discussed the study design for reservoir eutrophication and visited the field site where water quality and biological samples were collected for nitrogen isotope and algae species identification. The USGS scientists subsequently wrote a work plan, which was submitted to the Hai He River Commission. The current plan is for a Chinese delegation to visit the United States in 2002 to finalize the plan for the reservoir study. The Chinese delegation has agreed to pay for their travel expenses because of the current lack of USGS funding. The reservoir project will have two years of field data collection, followed by an interpretative report. It is anticipated that the final reports will be the published as journal articles. The Administration of Foreign Experts Affairs will continue to provide out-of-country travel expenses for USGS scientists for this project.

U.S. Trade and Development Agency

http://www.tda.gov

Feasibility Studies in China

Focus: Energy and Environment Trade Studies
Schedule: Initiated 2001, Ongoing

The U.S. Trade and Development Agency (TDA) is an independent federal agency that promotes American private sector participation by helping U.S. companies pursue business opportunities in developing and middle-income countries. Through the funding of feasibility studies, orientation visits, specialized training grants, business workshops, and various forms of technical assistance, TDA helps American businesses compete for infrastructure projects in emerging markets. In addition, the agency promotes capacity-building initiatives and supports U.S. government trade, economic policy, and development objectives

around the world. Energy and environment are two of the areas in which TDA concentrates in China. The following are some of the activities undertaken since reopening in China in January 2001:

- **Air and Water Pollution Control Definitional Mission (DM):** The April 2001 DM identified three projects in air and/or water pollution for potential TDA grant assistance. Millennium Science & Engineering (MSE) was the contractor for this project. MSE also prepared air pollution project summaries for TDA's 4-6 June 2001 Asia Regional Air Pollution Conference. A final report has been submitted to TDA.
- **Water Projects Definitional Mission:** The July 2001 DM to Beijing, Shanghai, and Guangzhou identified water treatment and management projects suitable for TDA funding consideration in the Pearl River Delta region in southeastern China. The World Bank recently completed a sector report identifying this region as a high priority and has plans to finance projects within the area. A final report has been submitted to TDA.
- **Environmental Projects Definitional Mission:** TDA approved funding for a DM to Beijing, Shanghai, and Shenyang to evaluate six environmental projects. The potential projects cover environmental monitoring, vehicle emissions, and medical waste disposal. The DM took place in February 2002 and was performed by Brisea International Development, Inc.
- **Changzhou Wastewater Treatment Project:** TDA approved a feasibility study grant to the city of Changzhou for the construction of two wastewater treatment plants. The wastewater treatment plants will enhance the city's ability to mitigate severe water pollution problems and will improve downstream water quality by reducing the discharge of untreated water. The grant was signed in late September 2001. The engineering opportunity was competitively bid in the *Commerce Business Daily*.
- **Shandong Environmental Monitoring Project:** TDA approved a feasibility study grant to assist the Shandong Environmental Protection Bureau with an air and water pollution-monitoring plan for Shandong Province. The project will upgrade the city's environmental monitoring systems and laboratories to better monitor and address growing environmental problems in the province. The grant was signed in late July 2001. The opportunity was competitively bid in the *Commerce Business Daily*.
- **Shanghai Environmental Monitoring Project:** TDA approved a feasibility study grant for the Shanghai Environmental Protection Bureau to monitor air and water quality and to expand laboratory capabilities. Upgrading the city's monitoring systems yields more efficient ways of screening air and water quality. The grant was signed in late July 2001. The opportunity was competitively bid in the *Commerce Business Daily*.
- **PetroChina On-line Automatic Monitoring System Project:** TDA approved a feasibility study grant to partially fund a project that will allow PetroChina to improve its environmental standards by utilizing online automatic monitoring technology. The grant was signed in late July 2001.
- **Chongqing Wastewater Treatment Plant:** TDA has approved funding for a feasibility study of a 300,000-m^3/day wastewater treatment plant along the Yangtze River in Chongqing. The grant was signed in March 2002.
- **Automatic Water Monitoring Technologies Business Briefing/Orientation Visit:** TDA funded a visit to familiarize key Chinese central and local government officials in charge of water quality monitoring projects with U.S. technology and expertise in real-time, automatic water quality monitoring technology. The event took place in January 2002.
- **Asia Regional Air Pollution Control Technology Conference**: On 4-6 June 2001 this conference was held in Hong Kong with the goal of matching U.S. technology and capabilities with Asian project sponsors interested in using air pollution control technology to meet economic and environmental protection goals. Chinese delegates participated in the conference and were presented with potential air pollution projects in China.
- **Power Sector Definitional Mission:** This DM to China identified three projects in clean coal power generation or alternate fuel utilization. Brooks Howell, Inc. was selected to conduct this DM. The final report has been submitted to TDA.
- **Oil and Natural Gas Definitional Mission:** International Development Planners conducted a DM to China in May 2001, in which three potential oil and gas development and refining (upstream and downstream) projects were identified for TDA grant assistance. The final report has been submitted to TDA.
- **Electric Power Definitional Mission:** The January 2002 DM worked with the Shanghai Municipal Electric Power Company as it restructures its generation, transmission, and distribution systems. The contractor also visited with the State Power Corporation in Beijing to identify projects in the electric power sector. The DM was performed by Commonwealth Power Corp.
- **Shenhua Direct Coal Liquefaction Project:** TDA is supporting Hydrocarbon Technologies, Inc. in developing the conversion of coal into clean transportation fuels and chemical feedstock. Shenhua Group (LTD) is the Chinese project sponsor for this activity. The grant was signed in late July 2001.
- **West-East Gas Pipeline Project:** TDA supported Houston based Universal Ensco's project management bid with a *de minimus* training grant offer to PetroChina. The grant agreement was signed in mid-September 2001. Construction of this 4,000-kilometer pipeline is planned to begin in 2001, with completion expected by June 2004.

ALLIANCE TO SAVE ENERGY

http://www.ase.org

Ongoing Projects (See CES 4): Energy Efficiency Seminars. See current entry under Export Council for Energy Efficiency for International Energy Efficiency Technology Assistance Program

ASIA FOUNDATION

http://www.asiafoundation.org

Hong Kong Cleaner Vehicles and Fuels Project

Focus: Air Quality Policy
Partners: Civic Exchange (Hong Kong NGO)
Funding: $90,000 (Lee Hysan Foundation, Hong Kong)
Schedule: Initiated October 2000, Completed August 2001, New Phase Currently in Development

This project aims to develop a practical and effective cleaner fuel and vehicle strategy for Hong Kong by focusing on vehicular emissions. Instead of the traditional model of creating dialogue only involving governmental authorities and business elites, this project will engage a much broader range of stakeholders in order to identify solutions and build confidence within public policy circles. The overall objective of this program is to enlist and encourage Hong Kong and U.S. experts and stakeholders to develop a strategy that would assess the technical, financial, and political feasibility of introducing cleaner fuels and vehicles to Hong Kong, and plan an appropriate course of action. If successful, the project will lead to important expanded opportunities for cleaner vehicles in Hong Kong. The specific objectives include: (1) a review of technological developments of clean fuels and vehicles worldwide; (2) discussions with local and overseas officials and experts, local vehicle manufacturer representatives, oil and power companies, and transport operators; (3) circulation of a range of options for comments; (4) designing, facilitating, and conducting the follow-up of a multi-stakeholder workshop; and eventually, (5) finalizing, publishing, and distributing the cleaner fuels and vehicles strategy.

ASIA SOCIETY

http://www.asiasociety.org

China Meetings

Focus: Environmental Research
Schedule: Ongoing

Asia Society has sponsored numerous meetings and discussions focusing on various aspects of China's environment. Notably, Asia Society hosted: (1) "Urbanization and the Future of China's Environment," featuring Kebin He, professor in the Air Pollution Division in the Department of Environmental Science and Engineering and the principal investigator and organizer of a series of research projects for urban transportation-related air pollution that resulted in national technical policy on vehicular air pollution control, new emissions standards, and regulations issued by SEPA and Beijing EPB; (2) Judith Shapiro presented a lecture based on her book, *Mao's Against Nature: Politics and the Environment in Revolutionary China*, examining how the legacy of the Mao period continues to cloud China's efforts to resolve its severe environmental problems; (3) "The Future of Asia's Nature and Culture" was a panel discussion of the significant development issues facing Asia and their impact on natural and cultural preservation in the region; (4) while "The WTO and China's Agriculture" looked into the implications and impact of China's WTO entry on the countryside, (which is home to 90 percent of the country's population) and how WTO membership will help or hinder the commercial and environmental challenges facing China's agricultural sector.

THE ATLANTIC COUNCIL OF THE UNITED STATES

http://www.acus.org

Clean Air for China and India

Focus: Air Quality Policy, Energy Policy
Partners: Committee for Energy Policy Promotion of Japan, Confederation of Indian Industry, and South-

North Institute for Sustainable Development (Chinese NGO)
Funding: ($100,000) U.S. Department of Energy, National Energy Technology Laboratory
Schedule: Initiated 2000, Targeted Completion 2003

The objective of this project is to develop consensus recommendations on a quadripartite basis (China, India, Japan, and the United States) for economic and energy policies that will contribute to reducing air pollution associated with energy use in China and India. The audience for the recommendations will be government policymakers and decision-makers in the private sector in the four countries noted. During year one, the project activities focused on developing Chinese and Indian views on energy and air pollution, as well as possible policies and actions. In the coming year and a half, seminars to discuss policy options will be held in Beijing and New Delhi. A policy paper then will be developed on a consensus basis by a group of 20 to 30 experts (an equal number from each country). The final recommendations will be disseminated to the public and private sectors in the four countries.

CARNEGIE COUNCIL ON ETHICS AND INTERNATIONAL AFFAIRS

http://www.carnegiecouncil.org/themes/environment.html

Ongoing Projects (See CES 4): Understanding Values: A Comparative Study of Values in Environmental Policymaking in China, India, Japan, and the United States

CENTER FOR CLEAN AIR POLICY

http://www.ccap.org

Energy Conservation and Greenhouse Gas Emissions Reduction Opportunities in Township and Village Enterprises

Focus: Environmental Management, Air Quality Policy
Funding: United Nation Development Programme, United National Industrial Development Organization
Schedule: Initiated 1999, Phase I Completed, Phase II Ongoing

While China's rural township and village enterprises (TVEs) contribute considerably to economic growth and social welfare benefits, they also create a significant amount of local environmental problems. This project aims to reduce greenhouse gas emissions from the TVE sector by increasing the utilization of energy-efficient technologies and products in the brick, cement, metal casting, and coking industries. The project removes key market, policy, technological, and financial barriers to clean technologies to reach these goals. The Center for Clean Air Policy (CCAP) served as the chief technical advisor during Phase I, which aimed to: (1) create institutional mechanisms for barrier removal at the national, county, and enterprise level; (2) establish incentive and monitoring systems to strengthen existing energy-efficiency regulatory programs at the county level; (3) build technical capacity for energy efficiency and product quality improvement in TVEs; (4) create access to commercial financing for TVEs in the four industries; (5) commercialize the financing of TVE energy conservation projects; and (6) expand the application of best practices for local regulatory reform to the national level. Based on the foundational work completed in Phase I, Phase II is currently being implemented in China.

Human Health Benefits of Air Pollution Strategies in Shanghai

Focus: Health Research, Energy Policy
Partners: Argonne National Laboratory, University of Iowa
Funding: Argonne National Laboratory
Schedule: Initiated 2000, Completed 2001

In collaboration with Argonne National Laboratory of U.S. DOE and the University of Iowa, CCAP examined and performed a cost-benefit analysis of pollution control in the city of Shanghai. The study took an integrated approach that links the emission sources, the ambient distributions, and the human exposures of key pollutants—PM_{10}, $PM_{2.5}$, and SO_2—from fossil combustion sources in the city. CCAP and its partners: (1) developed an emissions inventory; (2) created an air dispersion model; and (3) undertook a health analysis of Shanghai. Utilizing these three components, CCAP suggested three scenarios to control emissions from the power, industry, and transportation sectors. CCAP also evaluated the human health implications of implementing these air pollution control measures. A risk assessment method then was applied to evaluate the human exposure risks as well as the potential health improvements of pollution control expressed with various health endpoints (e.g., acute mortality, chronic pulmonary disease, and hospital and emergency room visits). The health benefits of the control scenarios were estimated in economic terms using economic valuation methods (e.g., willingness-to-pay and cost-of-illness) to compare with the cost-effectiveness of the alternative control measures. The study showed large benefit-to-cost ratios for these new strategies and

therefore provided economic grounds for supporting investments in pollution control in cities like Shanghai in the developing world. A paper based on the study has been published in the journal *Environment Management*.

Center for Resource Solutions

http://www.resource-solutions.org

Assistance for Renewable Energy Policymaking

Focus: Energy Policy
Partners: State Development Planning Commission (SDPC)
Funding: Energy Foundation
Schedule: Initiated 1999, Ongoing

For the past two years, the Center for Resource Solutions (CRS) has provided assistance to SDPC's Center for Renewable Energy Development (CRED) with research and analysis on renewable energy policies. This work ranged from drafting potential legislation for a renewable portfolio standard (RPS) to assessing the international experience of systems benefit charges that may prove valuable and applicable to China. Much of the CRS analysis was used by CRED to create an RPS policy statement in the Tenth Five-Year Plan. During 2002, CRS will continue this effort to develop a long-term and effective national renewable energy program. The next steps include providing assistance by analyzing relevant international experiences in other policy areas, and by assessing the political and economic impacts of various policies on China's renewable energy development.

Green Market Development

Focus: Energy Research
Partners: South-North Institute for Sustainable Development (SNISD)
Funding: Energy Foundation
Schedule: Ongoing (Project implementation stage in Beijing; feasibility investigation stage for Shanghai)

To reach the goal of presenting the world "a capital city with blue skies, clear water and green landscapes" during the Beijing Olympics in 2008, the Chinese government already has spent $3.6 billion to clean up Beijing and has committed another $8.6 billion to be spent over the next five years. To capitalize on the momentum of the greening Beijing movement, CRS proposed several tasks to integrate renewable policies and markets into the 2008 Olympics programs. In 2001, SNISD surveyed large businesses in Beijing on attitudes toward and preferences for renewable electricity. The results were overwhelmingly positive—businesses showed a strong preference for renewable electricity and expressed a willingness to pay a slight premium for renewable power. CRS will assist SNISD to take this market research to the next level by conducting additional surveys in other cities and developing a pilot green power marketing initiative to market renewable power among Chinese businesses in Beijing and possibly Shanghai.

Off-Grid Renewable Energy Development

Focus: Energy Policy
Partners: China Energy Research Society (CERS), China Association of Rural Energy Industry
Funding: Energy Foundation
Schedule: Ongoing

By the end of 1995, 850 million people lived in the rural areas of China, which occupy 7 percent of the total cultivated lands of the world. Rural energy demand for electricity continues to grow as farmers' incomes increase and township and village enterprises rapidly develop. CRS will work with the China Energy Research Society (CERS) and the China Association of Rural Energy Industry to examine current policies promoting renewable energy in rural communities, as well as to provide recommendations for revisions and new policies. CRS also will review and edit the draft CERS reports for publication, and assist in implementing recommended policies and programs.

Public Benefits Fund and Other Renewable Energy Policy Support

Focus: Energy Policy
Partners: Center for Renewable Energy Development (CRED), SDPC, ERI, Guangdong Energy Techno Economic Research Center
Funding: Energy Foundation
Schedule: Initiated 2001, Ongoing

Over the past year, CRS has provided expert assistance to CRED and SDPC on the use of public policy to reach renewable

energy goals by focusing on the use of systems benefits charges (also called public benefits fund) and renewable portfolio standards. CRS will continue to provide information on these and other policies and will promote analysis to better understand the disadvantages and benefits of a wide range of renewable energy and energy efficiency policies used in Europe and the United States.

Wind Concession Project

Focus: Energy Research
Partners: National Renewable Energy Laboratory (NREL), Tsinghua University, Guangdong Energy Techno Economic Research Center
Funding: Energy Foundation
Schedule: Initiated 2001, Ongoing

CRS and NREL organized their first Wind Concession Workshop in China in 2001. The wind concession project, which is partially headed by experts from Tsinghua University, aims to establish wind concession rights for bidding by private companies. CRS will provide expert assistance on: (1) power purchase agreements; (2) the relationship between specific contract terms and conditions; and (3) the ability to finance wind projects.

Wind Policy

Focus: Energy Policy
Partners: SETC, SDPC, Ministry of Science and Technology (MOST)
Funding: Energy Foundation
Schedule: Initiated 2001, Ongoing

In 2001, CRS assisted a joint working group on a draft document outlining a draft framework for wind policy in China. CRS reviewed and commented on the SETC/SDPC/MOST draft wind policy framework report, which will be published in English in 2002. CRS also will identify areas of follow-up activity for wind policies in 2002. Follow-up activities include provincial implementation of pilot policies and programs, such as: (1) a new wind pricing policy for existing wind contracts; and (2) alternative tax treatment of wind equipment and facilities that can improve the incentives for wind energy investments.

CONSERVATION INTERNATIONAL

http://www.conservation.org

Hengduan Mountains Hotspot

Focus: Biodiversity Research, Conservation Management
Partners: Sichuan Provincial Planning Committee, Chengdu Institute of Biology (CIB), Sichuan Department of Forestry, Institute of Human Ecology (IHE)
Funding: Critical Ecosystem Partnership Fund (CEPF), Center for Environmental Leadership in Business (CELB), Center for Applied Biodiversity Science (CABS)
Schedule: Initiated 2000, Targeted Completion 2005

The overall goal of Conservation International's (CI) Hengduan Mountain project is to strengthen the management of selected nature reserves in the region. There are six major components of CI's conservation work in this mountainous region of Sichuan Province: (1) ecosystem profiling; (2) networking and coordinating with transnational organizations; (3) regional planning; (4) nature reserve management; (5) monitoring and assessment; and (6) green business. In order to build on CI's foundational work with the Sichuan provincial government, in March 2002, CI, World Wide Fund for Nature (WWF), and The Nature Conservancy (TNC) organized a conservation priority-setting workshop in Chengdu, attended by over 60 Chinese and foreign scientists. The goal of this meeting was to identify biological priorities and discuss conservation strategies across a region of interest covering CI's Hengduan Mountains Hotspot and WWF's Forest of the Upper Yangtze Eco-region. The workshop followed a meeting hosted by the Chengdu Institute of Biology (CIB)—which was sponsored by IUCN and CI—to review maps and data for the China portion of IUCN's Global Amphibian Project. CI will set up a representative office in Chengdu to manage and implement the projects in Hengduan Mountains.

ECOLOGIA (ECOLOGISTS LINKED FOR ORGANIZING GRASSROOTS INITIATIVES AND ACTION)

http://www.ecologia.org

China Environmental Management Systems Project

Focus: Environmental Management
Partners: China Accreditation Committee for EMS Certification, local institutes, companies and environmental groups in China
Funding: Rockefeller Brothers Fund, Goldman Fund
Schedule: Initiated 2001, Ongoing

ECOLOGIA's China environmental management systems (EMS) project seeks to work with members of China's business, government, and nonprofit sectors to promote the use of environmental management principles as a tool for sustainable development. Together with its Chinese partners, ECOLOGIA is initiating EMS workshops and exchanges that reach out to Chinese businesses. ECOLOGIA has successfully undertaken similar work in Russia and Eastern Europe, and has participated in the development of international environmental management and communications standards in these areas.

Virtual Foundation and Small Grants Program

Focus: Environmental Capacity Building
Partners: Environmental Volunteers Association of Sichuan University (Chengdu), Green Earth Volunteers (Beijing)
Funding: Ford Foundation, Trace Foundation, individual donors
Schedule: Initiated 1997, Ongoing

ECOLOGIA provides direct small grants (under $3,000) to NGOs and community groups initiating environmental, sustainable development, and human health projects in China. Projects that assist in the development of NGO capacity while solving concrete local problems are given priority. ECOLOGIA's Virtual Foundation Web site (www.virtualfoundation.org) is used to match grant applicants with foreign organizations and individuals interested in supporting community projects in China.

Ecology and Culture Organization

Wang Xiaogang, startrekking@hotmail.com

Educational Development Project

Focus: Education Development
Partners: Gongshan Local Government, *Ming Pao Weekly*
Funding: Private donations, *Ming Pao Weekly*
Schedule: Initiated 2000, Targeted Completion 2010

The Ecology and Culture Organization (ECO) has made a special agreement with *Ming Pao Weekly* in Hong Kong to cosponsor a development project in the Gongshan area (Northwest Yunnan, Nujiang Prefecture). Projects are proposed and managed by ECO while *Ming Pao Weekly* provides the funds. After initial projects for the benefit of the poorest students in Gongshan during 2001, the project was extended in 2002 to include: (1) help for the poorest students and orphans to attend school in favorable conditions; (2) maintenance and repairs of school buildings for a suitable educational environment; and (3) improved education methods through training for local teachers by experienced teachers from outside the valley, and workshops to exchange thoughts and experiences on teaching techniques. This project is part of larger sustainable development projects in Gongshan (see Rural and Economic Development Project below).

Environmental and Rural Development Project in North Gaoligong Mountain: Phase I Mountain Trail Clean Up

Focus: Conservation Capacity Building, Environmental Education
Partners: Gongshan Environmental Protection Bureau, local schools
Funding: ECOLOGIA, internal finance
Schedule: Initiated 2001, Targeted Completion 2002

The project aims to raise local people's conservation awareness and call attention to the global pollution problem through restoring a mountain trail in the Dulong Valley. Local government representatives, as well as teachers and students from different schools in the area are invited to attend a workshop on environmental education principles and to participate actively in this "Clean Up Week in the Nature." This experience will provide local people opportunities to appreciate their homeland together with a focus of environmental preservation.

Rural and Economic Development

Focus: Biodiversity
Partners: Yunnan University, Life Science and Chemistry Department; Southwest School of Forestry; Gongshan Environmental Protection Bureau
Funding: Internal funding
Schedule: Initiated 2002, Targeted Completion 2007

This project aims to protect the endangered botanical species found in mountains and to experiment cultivating such species in the Gongshan area. The scientific research and supervision of this botanical species cultivation also will include the involvement and training of the local people. The selling of these botanical resources will directly profit villagers where the species will be grown. The primary focus of this project will be using the special botanical resources of the area to produce Chinese medicine. A secondary focus will be to promote access to the North Gaoligong Mountain natural resources by developing trails in the area, and training local people to lead eco-tours. In order to become tour guides local citizens will need to acquire deeper knowledge of their natural environment, history, and geography. This project will both help local communities improve their living conditions and allow them to remain in their native villages instead of leaving for better living conditions in outside townships.

ENVIRONMENTAL DEFENSE

http://www.environmentaldefense.org

Total Emissions Control and Emission Trading in China

Focus: Air Quality Policy
Partners: Chinese Association for NGO Cooperation; Beijing Environment and Development Institute; State Environmental Protection Administration (SEPA); Regional Environmental Protection Bureaus (EPBs) of Shandong, Shanxi, Jiangsu, and Henan Provinces; EPBs of Shanghai, Tianjin, and Liuzhou Municipalities; State Power Corporation and its subsidiaries; Peking University
Funding: CV Starr Foundation Grant, Environmental Defense general support
Schedule: Initiated 1997, Targeted Completion 2005

Environmental Defense is currently undertaking a project to develop strategies for implementing China's total emissions control (TEC) policy. It is the goal of SEPA to control total SO_2 emissions by 2005 at 80 to 90 percent of their 2000 levels. Environmental Defense has been working closely with different related departments of SEPA to examine implementation policy alternatives to help SEPA achieve this goal, with emphasis on the application of market-based instruments (MBIs). Phase I of the project focused on understanding the present state and evolving process of TEC, and identifying the main obstacles in policymaking and implementation of the TEC policy. The work of this phase is completed and summarized in a book titled *Total Emission Control and Emission Trading* (Ma Zhong and Dan Dudek, 1999), which is the first such book in China. Phase II was focused on the exploration of solutions to key obstacles identified in Phase I and experimentation with MBIs at the local level. Two pilot cities were selected for the study: Benxi, a highly industrialized northern city dominated by state-owned enterprises; and Nantong, a fast growing southern coastal city trying to balance its economic growth and environmental quality. In Benxi, Environmental Defense partnered with Benxi EPB to develop local cap and trade legislation to control sulfur dioxide emissions. In Nantong, Environmental Defense and its local partner the Nantong EPB developed a genuine emission trade between a power plant and a light manufacturing facility. The trade was labeled in the Chinese news media as the "first real SO_2 emission trade."

During ongoing Phase III work, in cooperation with SEPA, Environmental Defense is partnering with leading universities and research institutes to: (1) develop long-term SO_2 control targets for the power sector and demonstrate emission trades between power plants; (2) develop consistent allocation, permit management, and emission trading mechanisms in four provinces and three cities; and (3) review new project approval procedures and their integration with MBIs. It is the expectation of Environmental Defense that the outputs of these projects will help SEPA develop integrated and consistent SO_2 management policies to achieve the national SO_2 control target during the Tenth Five-Year Plan period (2001-2005). Environmental Defense also is assisting in the formation of a nationwide emission trading network that specializes in the training, information dissemination, and promotion of MBIs through: (1) news media outreach; (2) the internet; (3) working with other government agencies; and (4) joint training programs with universities and other organizations.

EXPORT COUNCIL FOR ENERGY EFFICIENCY

http://www.ecee.org

International Energy Efficiency Technology Assistance Program

Focus: Energy Efficiency Education

Partners: Alliance to Save Energy (ASE), International Institute for Energy Conservation (IIEC), U.S. National Association of Energy Service Companies, U.S. National Association of State Energy Officials (NASEO), Solar Energy Research and Education Foundation, China Energy Conservation Association, Shanghai Energy Conservation Center (SECC), China State Power Corporation-Demand Side Management Center, Shandong Province Economic and Trade Commission, Beijing Energy Conservation Center

Funding: U.S. Department of Energy

Schedule: Initiated 1994, Targeted Completion 2002 (extension pending additional funding)

Since 1997, the Export Council for Energy Efficiency (ECEE), together with its partner organizations, has organized a series of seminars and peer exchanges to promote awareness of energy efficiency in both the public and private sectors in China. Some of the past and ongoing programming is reviewed below. Copies of quarterly reports with details about these meetings can be requested from Ginny Leikam (ginny@ecee.org) or Laura Gubisch (laura@ecee.org).

- Building upon the success of the policy and program seminar in October 2000, NASEO worked with DoE, APEC's Energy Efficiency Working Group, and the SECC for a second policy forum focused on public buildings programs.
- In January 2002, NASEO also held a 3-day meeting for 30+ mayors on community sustainable energy planning in Wuhan.
- In September 2001, NASEO organized a seminar in partnership with the SECC on energy service company (ESCO) project development, with energy management companies in China. Immediately following—in collaboration with the World Bank—NASEO organized a workshop to lay the groundwork for forming an ESCO association in China.
- Upcoming EEEC activities include the Alliance to Save Energy's twelfth energy efficiency seminar in China. The seminar, planned for June 2002, will be organized in cooperation with the State Economic and Trade Commission's Energy Conservation Information Dissemination Center and the Sichuan Energy Conservation Supervision Center. The seminar will focus on energy managers in Chengdu (Sichuan Province). Some of the main topics will include: (1) lighting, (2) HVAC systems, (3) steam and hot water generation and distribution, (4) motors, drives, and controls.

Institute for Transportation and Development Policy

http://www.itdp.org

Supporting Pilot Bus Prioritization and Pedestrian Facilities

Focus: Transportation Policy, Transportation Research

Partners: Guangzhou Transportation Planning Research Institute, South China University, Guangdong Consumers Council, The World Bank

Funding: Rockefeller Brothers Fund

Schedule: Initiated 2000, Ongoing

The Institute for Transportation and Development Policy (ITDP) has been working closely with the Guangzhou Transportation Planning Research Institute. Together they have organized several workshops to train municipal officials how better to integrate the needs of pedestrians into the transportation system. ITDP also has conducted an independent review of the effectiveness of the World Bank's City Center Transport Project. Led by Enrique Penalosa, the former Mayor of Bogota, ITDP and the World Bank hosted a workshop on bus rapid transit in China. ITDP now is working with Guangzhou municipality to help identify a pilot bus way corridor and methods how to permanently pedestrianize two areas in order to improve tourism in the city.

International Crane Foundation, China Program

http://www.icf.org

Ongoing Projects (See CES 4): Conservation of Globally Significant Wetlands Used by Siberian Cranes; Environmental Summer Camp Exchange Between Russia and China; Integrating Conservation with Rural Development at Cao Hai Nature Reserve; Protection of Black-Necked Cranes in Agricultural Areas of South-Central Tibet; and Publication of China Crane News; Studies of Waterbirds, Water Levels, and Aquatic Food Plants as a Basis for the Conservation of Threatened Wetlands at Poyang Lake

Coordinated Crane County in Yunnan/Guizhou Plateau

Focus: Conservation Research

Partners: Forestry Bureau of Yunnan Province
Funding: ICF Member Donations
Schedule: Initiated 2001, Targeted Completion 2003

The Yunnan/Guizhou Plateau consists of two wintering regions for the black-necked crane: western and northeastern Yunnan, and northwestern Guizhou. These two regions support 1400 to 1700 black-necked cranes. The counts for the black-necked cranes, however, have not been accurate due to the remoteness of the region and lack of efficient communication among the sites. ICF is planning to conduct coordinated crane counts for three consecutive years (2001-2003), and this project will help to determine the number of black-necked cranes wintering in this region. Three other major water birds, the common cranes, the bar-headed geese, and the ruddy shelducks wintering in this region also will be counted through this project.

INTERNATIONAL FUND FOR ANIMAL WELFARE

http://www.ifaw.org

(Editor's Note: For information on an IFAW presentation at the Wilson Center, see 5 September 2001 Meeting Summary in this volume of the China Environment Series)

Asian Elephant Habitat Conservation and Community Development Project

Focus: Conservation Management
Partners: Wildlife Division of Simao Prefecture Forestry Bureau, Forestry Department of Yunnan Province, Institute of Ecology at Beijing Normal University, U.S. Fish and Wildlife Service
Funding: International Fund for Animal Welfare (IFAW), U.S. Fish and Wildlife Service
Schedule: Initiated 1999, Targeted Completion 2003

To address the human-elephant conflict in the Simao area of Yunnan, in July 2000 IFAW initiated the Asian Elephant Project. Instead of the conventional compensation mechanism, which passively addresses the demand of local villagers, IFAW provides funding to local governments to develop community economic programs in order to ease the pressure on farmers caused by elephant activities. By providing micro-credit loan assistance to the rural communities in Simao, the project encourages local farmers to actively seek alternative farming methods and to reduce agricultural activities in the forest. The education component of the project includes training of farming techniques, human safety awareness, wildlife protection and habitat conservation. Research has revealed that the construction of salt licks in the forest can attract elephants away from crops. This research is being used to initiate a new protection area and ecological corridors for elephants in Simao.

Beijing Raptor Rescue Center

Focus: Conservation Management, Environmental Law
Partners: Beijing Normal University, Beijing Forestry Bureau, International Bird Rescue and Research Center (California), California Raptor Center (UC Davis), Kadorie Farm and Botanic Garden (Hong Kong), Beijing Zoo
Funding: International Fund for Animal Welfare
Schedule: Initiated 2000, Ongoing

Realizing the urgent need to establish good models of wildlife rescue and rehabilitation practices in China, IFAW provided initial funding to build the first raptor rescue and rehabilitation center on the campus of Beijing Normal University. The Beijing Raptor Rescue Center officially opened in December 2001 with permits granted by the Beijing Forestry Bureau. The center is designed as a nonprofit wildlife rehabilitation center, aiming to promote the highest standards of animal welfare by incorporating the most current technology and best animal husbandry techniques to rescue, care, rehabilitate, and release wild raptors injured or those that had come into contact with humans in and around the Beijing municipal area. A central mission of the center is to acquaint rescue and rehabilitation personnel with the most up-to-date animal care technology and animal welfare understanding.

China Bear Campaign

Focus: Conservation Management, Environmental Education
Partners: State Forestry Administration of China, China Wildlife Conservation Association, CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) China, Beijing University of Traditional Chinese Medicine, Animals Asia Foundation (Hong Kong)
Funding: International Fund for Animal Welfare (IFAW)

Schedule: Initiated 1996, Ongoing

IFAW initiated this project by investigating Chinese bear farms and publicizing the terrible conditions in which over 10,000 Asiatic black bears were caged. These bears lived in cages with medal catheters inserted into their stomach for the production of bile, used as an ingredient in Chinese traditional medicine. This project kicked off a worldwide campaign that brought mounting pressure from outside and within China to solve the problem. In 1996, IFAW established the first bear sanctuary in China in which 7 former "farmed" bears will peacefully live out the rest of their lives. IFAW funded a public opinion poll and survey on bear bile market in 1998 and 1999, respectively. The results of these surveys showed that the demand for bear bile in China is limited and that more education of consumers is needed to raise the awareness of the mistreatment of bears. IFAW is therefore utilizing continued bear bile alternative research and is increasing education efforts to target consumers, traditional Chinese medicine practitioners, and international travelers about CITES regulations and consumer responsibilities.

CITES Education and Awareness

Focus: Environmental Capacity Building, Environmental Education
Partners: CITES China, provincial CITES offices
Funding: International Fund for Animal Welfare
Schedule: Initiated 1999, Targeted Completion in 2002

To educate travelers about the threat illegal animal trade poses for China's biodiversity, IFAW initially collaborated with CITES Yunnan branch to install the first education billboard in the departure lounge of the Kunming International Airport in 1999. Similar billboards are now installed in Shanghai and Beijing airports. Brochures in Chinese titled "Love Nature, Respect Life," educating travelers about CITES regulations were distributed to all fourteen CITES offices around China. Another component of this project was to adapt and translate the wildlife crime enforcement guide that had been published by Indian wildlife experts. The book will be printed in 2002 for CITES and customs enforcement personnel training. Currently, education efforts are targeting Duty Free shops in China's international airports, many of which sell products made from endangered species, which is a direct violation of CITES.

Humane Education

Focus: Environmental Education
Partners: Beijing Man and Animal Environment Education Center, Friends of Nature, numerous schools and children's activity centers around China
Funding: International Fund for Animal Welfare (IFAW)
Schedule: Initiated 1997, Ongoing

As the only international animal welfare organization in China, IFAW has initiated a series of educational activities to foster a humane environment for animals. IFAW organized and facilitated animal welfare conferences in China, bringing relevant groups, individuals, and government officials together to share the latest animal care techniques, animal welfare knowledge and information about anti-cruelty legislation. One education initiative—the Animal Action Week—successfully motivated 120,000 children to do kind acts for animals in 2001. Several books were published in Chinese to educate children about proper care for companion animals, compassion towards all living things, kind and ethical behavior toward animals in zoos and wildlife parks and the capacity of individuals to stop cruelty to animals. IFAW also funds local university student groups in carrying out conservation and animal welfare activities, sponsoring Green Camps and establishing Green Libraries, which are two projects operated by the Green Student Forum. With the help of Friends of Nature (FON), animal welfare education is brought to remote areas and communities using FON's mobile classrooms.

Pet Rescue (Companion Animal Welfare)

Focus: Environmental Education
Partners: Beijing Agriculture University, College of Law at China Technology University
Funding: IFAW, Royal Society for the Prevention of Cruelty to Animals (United Kingdom)
Schedule: Initiated 1993, Ongoing

IFAW's Pet Rescue project funds organizations that: (1) shelter companion animals; (2) provide veterinary care and spay/neuter programs; (3) conduct responsible pet ownership education; and (4) advocate for more humane policies for companion animals. In China, pet rescue grants have supported numerous groups and shelters since 1993. IFAW provides both technical and animal welfare training to Chinese veterinarians, and encourages them to work closely and ethically with shelters and pet owners. IFAW supported the establishment of Beijing Man and Animal Environment Education Center, a companion animal shelter, and helped refine its management protocols. Writing directly to local governments and protesting practices and regulations cruel to

companion animals, IFAW was able to stop several "dog eradication campaigns" held throughout China and IFAW continues to lobby the Beijing municipal government for a more humane and workable dog management policy that will protect the welfare of animals as well as promote the image of Beijing in preparation for the 2008 Olympic Games.

Tibetan Antelope Campaign

Focus: Conservation Management
Partners: CITES China, State Forestry Police of China, SEPA, Nature Reserves in Qiang Tang, Kekexili, and Arjin Shan, Green River, IFAW-UK, Wildlife Trust of India, London Metropolitan Police
Funding: International Fund for Animal Welfare (IFAW)
Schedule: Initiated 1998, Targeted Completion 2003

In light of the increasing slaughter of Tibetan antelopes in China, IFAW created a strategy to conserve this endemic species in the remote Qinghai-Tibet Plateau by funding anti-poaching patrols inside China. As part of this Tibetan antelope campaign, IFAW also is: (1) initiating trade investigations; (2) organizing consumer awareness campaigns; and (3) supporting CITES enforcement in ranging, transporting, and consuming countries. In China, IFAW provided patrol equipment, supplies, and funding to various anti-poaching agencies and nature reserves within the Tibetan antelope range. With the help of local agencies, various conservation education materials in the local language are distributed in the region. In May 2001, IFAW and the State Forestry Police jointly held the first intelligence sharing at a CITES training workshop at the Police Academy in Nanjing, which brought together 30 officers from Tibet, Qinghai, and Xinjiang. Outside China, a major consumer awareness and CITES enforcement campaign is picking up speed in India and Europe, with more consumers aware of the deadly "shahtoosh trade" and more confiscation of wool and shahtoosh products by local enforcement agencies. IFAW believes this consumer campaign component is crucial, for if the buying stops so will the killing.

INTERNATIONAL FUND FOR CHINA'S ENVIRONMENT

http://www.ifce.org

Demonstration Project on Family-based Ecological Yards in Western China

Focus: Energy Training
Partner: Yan An Municipal Government, Shaanxi Province
Schedule: Targeted Initiation September 2002

The project will provide technical training to 30 farmer families on the construction of family-based ecological yards. The centerpiece of this technology is the use of biogas. Through utilization of animal wastes to generate biogas, the surrounding environment of farmer houses will be much cleaner. The use of biogas also will reduce pressure on surrounding woods and vegetation. The residues in the biogas pond can be used to fertilize vegetables in greenhouses, which can be sold to generate cash for the families. Implementation of such practical technologies will be key to ecological restoration in western China.

Development of Watershed Management Planning Report in Cao Hai, Guizhou Province

Focus: Watershed Management

This project aims to help the Guizhou EPB to develop a management plan for Cao Hai Lake, a national reserve for rare black-necked cranes in China. IFCE will organize a multidisciplinary team consisting of U.S. experts to conduct a 5-day survey to Cao Hai and develop a recommendation report for watershed planning and management. The expert team includes professors, research scientists, and field professionals from the private and research sectors. The team also will visit Wuhan after the Guizhou visit to discuss general water resources management problems in central China.

Environmental Technological Delgation to Chongqing and Wuhan

Focus: Environmental Management
Partners: The Center for East Asian & Pacific Studies at the University of Illinois Urban/Champaign
Schedule: Targeted Initiation May 2002

(1) introduce the latest environmental technologies and management methods in the United States; (2) discuss and understand the practical environmental problems and projects in Chongqing and Wuhan cities; and (3) explore and discuss possible cooperative consulting or research projects.

Pilot Project to Recycle Obsolete Computers and Support Science Education in Western China

Partners: Hewlett Packard, Chinese Ministry of Education
Focus: Environmental Education

Funding: Hewlett Packard (pending)
Schedule: Targeted Initiation October 2002

The project will recycle obsolete computers and provide them to needy schools in western China. IFCE will collect and recycle 2,000 computers from governmental agencies and large firms in China. Technical staff identified by each individual school will be trained to use these computers. Training for future trainers will be provided in order to make more efficient use of the equipment.

U.S. Environmental Trade Delegation to China

(Environmental Export Council, The Center for Sustainable Environment, Energy and Economics in Shanghai, China)
Focus: Environmental Policy
Funding: Individual environmental firms
Schedule: Targeted Initiation July 2002

This trade mission is designed to promote U.S. environmental companies possessing the technologies, goods, and services that can meet the needs of government and private sector investors in two major cities: Shanghai and Chongqing. In addition to planning government contacts, participating companies will have an opportunity to meet executives of Chinese environmental companies to discuss new business opportunities. The delegation will meet with senior officials, environmental administrators, economic development officers, technical and management staff of environmental enterprises, as well as potential investors to understand the needs and discuss possible cooperative projects and joint ventures. The delegation will also meet U.S. commercial officials at the U.S. consulate in Shanghai during the visit.

International Rivers Network

http://www.irn.org http://www.chinarivers.org (Chinese)

Campaign for Living Rivers in China

Focus: Environmental Education
Funding: Foundation for Deep Ecology
Schedule: Initiated 1997, Ongoing

International Rivers Network (IRN) works to increase public awareness of the environmental, social, economic impacts of large dams and to advance more sustainable options to large hydro projects. IRN supports grassroots initiatives to revive ecological and cultural awareness of rivers. Internationally, IRN works to impede public- and private-sector capital flows to dam projects, such as the Three Gorges Project, that fail to meet the guidelines of the World Commission on Dams. To register for a free information list serve on dams, water, and energy issues in China, email irn@irn.org.

International Snow Leopard Trust

http://www.snowleopard.org

Ongoing Projects (See CES 4): Conservation of the Snow Leopard and its Mountain Habitat

IUCN—The World Conservation Union

http://www.iucn.org

China Programs

Focus: Environmental Research, Environmental Management
Partners: Center for Biodiversity and Indigenous Knowledge, Yunnan Academia Sinica; China Wildlife Conservation Association; Hong Kong Zoological and Botanical Gardens; Institute of Botany, Academia Sinica; Chinese Ministry of Foreign Affairs; Nanjing Institute for Environmental Sciences; The Agriculture, Fisheries and Conservation Department of the Hong Kong SAR; The Institute of Zoology, Academia Sinica; SEPA; State Forestry Administration; World Wide Fund for Nature-Hong Kong; Wuhan University
Schedule: Ongoing

- In 2001 and 2002 the IUCN's Biodiversity Regional Program assisted the Biodiversity Working Group of The China Council on International Cooperation on Environment and Development in developing a sub-regional biodiversity action plan for Dujiangyan in Sichuan Province.

• The Research Institute for Environmental Law (RIEL), Centre of Excellence under IUCN's Global Environmental Law Programme, has been established at Wuhan University and its Director has completed a research fellowship at the IUCN Environmental Law Centre in Bonn. RIEL has been instrumental in developing a program titled Promoting Environmental Law in China (PELC) and an action plan for implementing it. Initial efforts under PELC will be linked with the Western Development Strategy.
• The Regional Forest Programme has conducted several missions to China and identified a lack of comprehensive institutional framework for sustainable forest management. IUCN has subsequently prepared several concept papers with Chinese partner institutions and a training packet on national area protected systems in southwest China.
• IUCN's Asia Regional Marine Programme is developing a program for the Beibu Gulf in collaboration with the U.S. National Oceanic and Atmospheric Administration and Massey University in New Zealand. The activities focus on sustainable development through ecotourism and biodiversity monitoring.
• In order to help China with the implementation of its National Biodiversity Conservation Plan, IUCN will be cooperating in the following areas: (1) alien invasive species; (2) biosafety; (3) implementation of local biodiversity action plans; (4) national implementation of the Convention on Biodiversity; and, (5) restoration of forests and grasslands under the Western Development Strategy.
• Currently, China has seven natural and mixed World Heritage sites and IUCN may be assisting China in a study to nominate more World Heritage sites.

MISSOURI BOTANICAL GARDEN

http://www.mobot.org

Flora of China

Focus: Biodiversity Research
Partners: Chinese Academy of Sciences (Beijing, Kunming, South Guangzhou and Jiangsu Institute of Botany); California Academy of Sciences; Harvard University Herbaria; Royal Botanic Garden Edinburgh (U.K.); Royal Botanic Gardens at Kew (U.K.); Smithsonian Institution; Muséum National d'Histoire Naturelle (Paris)
Funding: U.S. National Science Foundation, Starr Foundation, Stanley Smith Horticultural Trust, Chinese Academy of Sciences
Schedule: Initiated 1987, Ongoing

This long-running project was initiated because Chinese plant taxonomists had not been able to obtain access to many herbarium specimens and pertinent literature that was important in the preparation of the first edition of *Flora Reipublicae Popularis Sinicae* (*FRPS*—Latin for: *Flora of China*), which was completed over a 30-year period (from 1961 to 1991). A joint editorial committee was formed to publish a second edition of *FRPS*, which soon will be available in English as hard copy and on the Web in Chinese. The new *FRPS* contains 25 volumes covering over 1,000 plant species each. Seventy percent of the species in each volume will be included in a corresponding *Flora of China Illustrations* volume. The plants of China amount to some 30,000 species, about 10 percent of the world total. China's vast plant species are important sources for horticultural development, as crops, as medicines, and as living testimony to the rich fossil floras that existed around the whole Northern Hemisphere up until about 15 million years ago. It is evident that the trust and cooperation to train Chinese plant taxonomists and better introduce the world to Chinese plants highlight how this is an ideal cooperative project for scientific work among all the nations involved.

NATIONAL COMMITTEE ON UNITED STATES-CHINA RELATIONS

http://www.ncuscr.org

Developing Municipal Finance for Local Infrastructure in China

Focus: Environmental Management
Funding: U.S. Department of State Bureau of Education and Cultural Affairs
Schedule: Initiated Spring 2002, Targeted Completion Fall 2002

The limitations of centralized planning, the demise of many state-owned enterprises, fiscal crises at the central and local government levels, and increasing pressures from localities to participate in decision-making have altered the relationship between China's central government and local authorities, as well as between the public and private sectors. These changing fiscal and political dynamics are particularly relevant to China's plans to improve its infrastructure. This project aims to build a greater understanding among American policymakers and practitioners of the demand in China for more and better water supply and wastewater treatment, district heating, solid waste collection and disposal, energy supply, local and regional transportation, and

education and social facilities. This workshop/study tour of several Chinese cities will introduce American finance experts to China's municipal infrastructure system and the current state of fiscal decentralization in China and, at the same time, help to build the capacity of local government agencies and policymakers to plan for infrastructure development. American participants will include urban planners, municipal finance experts and lawyers on the legal, financial, and political dimensions of municipal bond financing.

Economic Development and Environmental Management

Focus: Environmental Management

Partners: Hazardous waste NGOs and government institutions in cities in Mainland China, Hong Kong, and Taiwan

Funding: U.S. Department of State Bureau of Education and Cultural Affairs

Schedule: Initiated Spring 2002, Targeted Completion Summer 2002

This two-week study tour for a Chinese delegation to four American cities will include a series of workshops and discussions on regulatory frameworks and best practices, such as: (1) America's Superfund legislation; (2) the financing of hazardous waste treatment; (3) the transnational transfer of hazardous waste; (4) corporate environmental standards and practices of U.S. companies; (5) Chinese enterprises and Sino-American joint ventures; (6) brown fields; and (7) concerns about public health and environmental justice. The Chinese delegation will include hazardous waste specialists from Mainland China, Hong Kong, and Taiwan who work within private and governmental institutions responsible for hazardous waste regulation and management. The group also will include one environmental journalist or editor.

Grassroots Environmentalism and Environmental Education Workshop and Study Tour

Focus: Environmental Education

Partners: Center for Environmental Education and Communication of the Chinese State Environmental Protection Administration (SEPA), Qingdao City and Helongjiang Province Environmental Protection Bureaus

Funding: U.S. Department of State Bureau of Education and Cultural Affairs, United Technologies Corporation

Schedule: Initiated May 2001, Completed June 2001

The goal of this study tour and workshop was to foster a dialogue between teachers, administrators, NGO leaders, and students in the field of environmental education. It was designed in response to strong interest from American and Chinese environmentalists and as a follow-up to the National Committee's 1998 study tour for Mainland, Hong Kong, and Taiwan environmental NGO leaders. This project, which included five American environmental education specialists and dozens of Chinese colleagues, promoted cooperation between and among institutions with environmental NGO ties and aimed to strengthen public-private partnerships. The exchange achieved several objectives. American participants learned a great deal about environmental conditions in China and Chinese government, business, and NGO efforts to educate its public about the environment. The workshops introduced Chinese colleagues to American environmental awareness programs addressing such issues as urban environmentalism, biodiversity, pollution, conservation, energy efficiency, and species preservation. Hands on teaching experience was gained via the Americans running demonstration programs and Chinese and Americans educators collaborating on running demonstrations programs. Lastly, linkages were made between environmental leaders, information and resource materials were exchanged, and friendships were formed. Geographic diversity was achieved by including destinations in the interior, including Harbin City and Zhalong Nature Reserve in Heilongjiang Province. The study tour also included Qingdao City and Laoshan Mountain in Shandong Province.

Natural Disaster Prevention and Cooperation

Focus: Environmental Management

Partners: Hong Kong Red Cross, China Charities Federation, Amity Foundation, Chinese Ministry of Civil Affairs, Nantou County Fire Department

Funding: U.S. Department of State Bureau of Education and Cultural Affairs

Schedule: Initiated January 2001, Completed April 2001

This natural disaster study tour encouraged collaboration, brought together colleagues from Mainland China, Taiwan, and Hong Kong with American counterparts, and attempted to de-politicize the disaster response process and develop effective inter-regional policies. It was conceptualized in the aftermath of the major earthquake in Taiwan (September 1999), during which the National Committee was hosting a delegation from Taiwan in the field of transportation and energy planning. The study tour members exchanged ideas with American counterparts and among themselves, and observed the American disaster response system, particularly how the public and private sectors work together to address the effects of floods, earthquakes, fires, and hurricanes. The project gave Chinese participants the opportunity to meet with their American counterparts at federal, state and

local government agencies, relief organizations, and volunteer groups. Amity Foundation, China Charities Federation, and the Hong Kong Red Cross among others were represented in the delegation. Several ongoing partnerships resulted from the project.

WTO Accession and Agriculture

Focus: Agriculture Policy
Potential Partners: U.S. Trade Representative, the U.S. Department of Agriculture, economic research institutions and corporations, Chinese Ministry of Foreign Trade and Economic Cooperation (MOFTEC), Chinese Ministry of Agriculture
Funding: U.S. Department of State Bureau of Education and Cultural Affairs
Schedule: Initiated 2002, Ongoing

This project will support a series of workshops in China to consider the effects of WTO accession on the agriculture sector. Chinese participants would include farmers, local officials, economists, and the news media. American discussants will include specialists in international trade, agribusiness representatives, commodity traders, and policy analysts, who will examine the likely practical consequence of WTO accession for grain and cotton markets, as well as for meat, fruit, vegetables, and further value-added food products. By drawing a practical, real-world picture of the potential positive and negative repercussions of WTO accession, farmers, business people, and policymakers would be better prepared to make the necessary adjustments and would be less apprehensive about the impact of China's WTO entry. In addition to Beijing, where the delegates will meet with national policy leaders, the itinerary might include workshops in the cities of Changchun, Zhengzhou, and Guangzhou.

NATURAL RESOURCES DEFENSE COUNCIL (NRDC)

http://www.nrdc.org

Ongoing Projects (See CES 4): ACCORD21 Building Demonstration Project; Controlling Power Plant Emissions; Energy Efficient Building Codes

(*Editor's Note: See commentary by Robert Watson and Barbara Finamore in this issue of the China Environment Series for an update of NRDC's Building Demonstration Project*)

Fuel Cell Vehicle Development and Commercialization

Focus: Air Policy, Transportation Research
Partners: Shanghai Municipal Economic Commission, Shanghai Tongji University, China Ministry of Science and Technology, South-North Institute for Sustainable Development, Taiwan Institute for Economic Research
Funding: W. Alton Jones Foundation, China Sustainable Energy Program of the Energy and Packard Foundations
Schedule: Initiated 2001, Targeted Completion 2002

This project will support the development and commercialization of fuel cell vehicles in China, a key research and development (R&D) objective of the Tenth Five-Year Plan. The Natural Resources Defense Council (NRDC) and its partners will facilitate international technical exchanges and assist with a national fuel cell development strategy that will: (1) spell out cost-effective approaches China should take to promote the use of fuel cell technology in urban transportation, based on an in-depth techno-economic analysis of various options; (2) identify the needed adjustments in existing policies and incentives to encourage fuel cell commercialization in China; and (3) encourage public-private partnerships in fuel cell commercialization by proposing a framework of collaboration between Chinese and foreign partners, as well as among Chinese partners themselves, in such areas as R&D, demonstration, testing, manufacturing, infrastructure construction and operation, and marketing, with a view to accelerating the introduction of fuel cell vehicles into the Chinese market.

PESTICIDE ACTION NETWORK NORTH AMERICA

http://www.panna.org

Promoting Ecological Agriculture in China

Focus: Agriculture Management, Environmental Capacity Building
Partners: Center for Community Development Studies, Yunnan Entomological Society
Funding: Rockefeller Brothers Fund
Schedule: Initiated 2000, Ongoing

Pesticide Action Network North America (PANNA) is one of five independent regional centers of Pesticide Action Network, an

international coalition of organizations and individuals working to eliminate the use of hazardous pesticides and promote ecologically sound and socially just alternatives. PANNA's main work in China involves collaborating with the Kunming-based NGO Center for Community Development Studies (CDS) to promote compliance with the World Bank's pest management policy. PANNA and CDS have conducted participatory monitoring and evaluation of the World Bank-financed Anning Valley Agricultural Development Project in Sichuan Province and discovered extremely high levels of pesticide use. The World Bank and its Chinese counterpart offices have agreed to address the concerns of PANNA and local farmers by developing a plan for training in ecological integrated pest management as required by World Bank policy. The joint monitoring project is designed to serve as a model for promoting local empowerment and sustainable farming practices throughout the World Bank's agricultural development projects in China. Documentation of work in China also will contribute to PANNA's growing collection of case studies that provide the basis for recommendations for reform of World Bank agricultural lending practices throughout the developing world. In addition, PANNA provides strategic and technical support to Chinese organizations engaged in promoting ecological agriculture, such as the Yunnan Entomological Society (YES), and fosters links between Chinese groups and similar organizations in other parts of the world. In the coming years, PANNA will support YES in their efforts to develop a new organization called Pesticide Eco-Alternatives Center that will engage in policy advocacy and conduct collaborative projects to educate consumers about choosing pesticide-free food.

Renewables for Development

http://www.inshp.org

Large Scale Rural Electrification through Renewable Energy

Focus: Energy Policy

Partners: International Network on Small Hydro Power (IN-SHP), Hangzhou, China (Chinese GONGO)

Funding: The China Western Provinces Development Program, Emissions Trading Credits, Foreign Investment

Schedule: Initiated Spring 2002, Targeted Completion 2005

This project represents China's first large-scale renewable energy-based rural electrification program to be conducted primarily at the county level. Two complementary programs (initiated by the Chinese central government and UNDP) will be implemented in 400 counties throughout the poorer regions of China: 1) *Rural Electrification Construction Plan 2001-2005* will be a nationwide program on rural electrification by renewable energy, coupled with grid-connection and extension; 2) *Green Villages Program 2001-2010*, a nationwide program aimed at the replacement of wood fuel by small hydropower in off-grid areas coupled with resource protection, including reforestation, flood control, agriculture, and soil erosion. Both of these programs are designed to make the benefits of clean renewable energy available to rural villages of China where energy needs are currently met with wood fuel. By managing initial electrification with renewable energy, the two programs help rural China leapfrog its dependence on fossil fuels and allow for sustainable development. Renewables for Development and its Chinese partner IN-SHP were jointly selected to conclude cooperation contracts leading to local-based establishments with provincial and county governments for the development of low-risk and best-practice strategies. The most crucial issues will be generating and coordinating foreign investment and international cooperation for self-construction, self-management and self-consumption of renewable energy in each county's distribution zone.

Resources for the Future

http://www.rff.org

Air Quality Improvement in Shanxi

Focus: Air Quality Policy

Partners: Norwegian Institute for Air Research, RCA Associates, Chinese Research Academy of Environmental Science, Shanxi Provincial Government, Taiyuan Municipal Government, U.S. EPA

Funding: Asian Development Bank

Schedule: Initiated March 2001, Targeted Completion December 2002

The project team (led by Resources for the Future—RFF) will provide technical assistance to the Shanxi provincial government to develop a workable SO_2 emission trading system. The initial focus of the project is on the capital city of Taiyuan. The RFF team, in cooperation with both international and domestic consultants, is designing an emission trading system suitable to the local situation. Facility-specific targets, consistent with the China's Tenth Five-Year Plan, are being established, along with appropriate monitoring and tracking systems. The U.S. EPA is providing Taiyuan with extensive training on the operation of SO_2 emission trading.

SAVE CHINA'S TIGERS

http://www.savechinastigers.org

Saving the South China Tiger

Focus: Conservation Education
Partners: China State Forestry Administration (SFA), Provincial Forestry Departments (particularly Hunan Province)
Funding: Internal funding
Schedule: Initiated 2000, Ongoing

Due to its environmental flagship status, cultural symbolism, and endangered status, the South China Tiger is currently the conservation focus of the UK-based Save China's Tigers (SCT). In 2001, SCT funded the second stage of the South China Tiger survey in cooperation with national and Hunan provincial forestry administrations. SCT also donated 20 infrared cameras to the State Forestry Administration to continue their infrared camera monitoring surveys. Through the act of saving the South China Tiger, SCT intends to promote public awareness of the importance of wildlife to the human society as a whole, and the critical role of large carnivores, such as tigers, within their natural ecosystems. Planning is also underway to introduce advanced conservation models from South Africa to China in the near future.

THE NATURE CONSERVANCY (TNC)

http://www.nature.org

Yunnan Great Rivers Project (Phase II)

Focus: Biodiversity Research, Conservation Management
Partners: Over forty partners including: China's State Environmental Protection Administration; State Development Planning Commission; Yunnan Provincial Government (Provincial Planning Commission, Department of Forestry, and other Provincial Bureaus, Departments, and related prefecture offices); Institute of Forest Planning and Design; South North Institute for Sustainable Development (Chinese NGO); Southwest Forestry College; Chinese Academy of Science; Kunming Institute of Botany and Kunming Institute of Zoology
Funding: Alcoa, International Community Foundation, Starr Foundation, Yunnan Provincial Government, UN Foundation, and W. Alton Jones Foundation
Schedule: Initiated 1998, Phase I Completed 2000, Phase II Ongoing

The Yunnan Great Rivers Project (YGRP) is a joint conservation and sustainable development project between the Yunnan provincial government and The Nature Conservancy (TNC). The recently completed Conservation and Development Action Plan for Northwest Yunnan will guide the work of Phase II (see CES 4 for an overview of Phase I). TNC is collaborating with government and academic partners, as well as local village leaders to create conservation site plans to: (1) protect the area's unique biodiversity; (2) reduce and/or eliminate threats to the area's biodiversity; and (3) promote sustainable development. In addition, major initiatives have been launched to develop alternative energy sources for northwest Yunnan as well as to promote ecotourism as sustainable economic alternatives to the threats posed by the over-collection of fuel wood and mass tourism. The Yunnan provincial government has provided funding and other resources to this project and other funding support is provided by a variety of individual, corporate, and foundation donors. (*Editor's Note: See Commentary by Ou Xiaokun on TNC's work in China in this issue of the China Environment Series*)

U.S.-CHINA ENERGY AND ENVIRONMENT TECHNOLOGY CENTER, TULANE UNIVERSITY

http://www.tulane.edu/~uschina

Ongoing Projects (see CES 4): U.S.-China Clean Coal Technology Center, the Integrated Resource Planning for Major Developing Cities in China Project has been postponed

Joint Projects for the 2008 Beijing Green Olympics

Focus: Energy Efficiency Policy
Partners: Beijing Municipal Government
Schedule: Initiated 2001, Ongoing

The 2008 Beijing Olympic Games pose an excellent opportunity for showcasing clean energy technology and equipment. The

U.S-China Energy and Environmental Technology Center (EETC) therefore has initiated a series of projects including technology transfer and energy-efficiency policy recommendations. In 2001, EETC initiated meetings of the Yanzhou Coal Mine Group with DoE and U.S. Trade Development Agency experts on the pre-feasibility study for using high-sulfur coal to produce high-value added chemicals (such as methanol and dimethyl ether plus integrated gasification combined cycle) for power generation. EETC also has helped to initiate a pre-feasibility study for polygeneration in Shandong Province. Additionally, EETC worked with the Beijing municipal government to sponsor and co-host the Workshop on Improving Industrial Boilers in January 2002. This was followed by EETC participation in the Beijing Energy and Environment International Symposium and the Research on Demonstration of High-Efficiency Clean Energy Technology and Relevant Policy and Infrastructure for Beijing City. After the different mechanisms for the implementation for this project are determined, funding sources will be finalized.

U.S.-China Natural Gas Training Program

Focus: Energy Capacity Building
Partners: Tulane University, Gas Technology Institute
Funding: Estimated Cost $50,000 per year, National Petroleum Technology Office under the Annex III of the U.S.-China Fossil Energy Protocol
Schedule: Initiated 2001, Ongoing

This project aims to create a pilot one-week training program and develop training materials for building up a Chinese natural gas professional team to manage large-scale natural gas projects. This training program is focusing on producing: (1) a set of training materials for future courses; (2) an initial one-week training in Beijing; (3) a follow-up information tour to the United States in 2002; and (4) development of other related follow-up training activities. A separate training program on coal bed methane also has been initiated.

U.S.-China Environmental Fund

http://www.uscef.org

Biodiversity Conservation and Protected Area Management

Focus: Conservation Management
Partners: Global Environment Facility (GEF), UNDP, University of Wisconsin-Madison, Yunnan Provincial Government, Sichuan National Park Office, Qinghai Environmental Protection Bureau (EPB)
Funding: Total budget $2.5 million ($750,000 from GEF; over $1 million co-financing from Yunnan Provincial Government; over $400,000 co-financing from University of Wisconsin and U.S.-China Environmental Fund—USCEF)
Schedule: Initiated 2001, Targeted Completion 2004

Under this project a range of capacity building programs is being developed in western China (Yunnan, Sichuan, Qinghai provinces, and Tibet Autonomous Region) with local agencies to conserve biodiversity and sustainably manage protected areas. USCEF programs tend to either work with local and provincial administrative units to develop master plans or involve local stakeholders in project design and implementation, including adoption of alternative agricultural practices and livelihoods to reduce development pressures on sensitive ecosystems. The first major conservation program is a multi-agency, multi-level (involving village leaders to provincial level bureaus) GEF project in the upper Mekong River watershed in the Wuliang Mountains of Yunnan. The Yunnan GEF project focuses on developing local watershed co-management councils that will make decisions on biodiversity protection, resource conservation, and alternative practices. These decisions will be based on data from ongoing biodiversity monitoring systems, supported by observations of local villagers.

The Great Wall at Badaling

Focus: Conservation Management
Partners: Beijing Municipal Government, Badaling Special Zone Administration
Funding: Total Budget 10 million RMB (Phillips Petroleum Company 5 million RMB, USCEF 2 million RMB, Badaling Special Zone Administration 3 million RMB)
Schedule: Initiated 1999, Ongoing

This project integrates environmental planning with economic development by balancing conservation and tourism at Badaling the most popular Great Wall site. Key in the design of the master plan has been how to accommodate increased tourism from the newly completed Beijing-Badaling expressway. In partnership with the Beijing municipal government and the Badaling special zone administration, USCEF is working to preserve the cultural integrity of this section of the Great Wall though the design and development of the International Friendship Forest (IFF)—a 100-acre natural park along the western edge of the Great Wall at

Badaling. The IFF will open to the public in late 2002.

Interpreting China

Focus: Environmental Education, Conservation Management
Partners: National Association for Interpretation, China National Park Administration, Sichuan National Parks Office, China National Park Association, Beijing Parks Bureau, Beijing University, Sichuan University
Funding: $100,000-$250,000 per year
Schedule: Ongoing

Due to dramatic economic and socio-demographic changes in China, Chinese visitors flood cultural and natural sites as never before. Surprisingly, there are virtually no educational or "interpretative" programs for China's premier cultural and natural sites. To address this need, USCEF developed a multi-year memorandum of understanding with the U.S. National Association for Interpretation (NAI), the world's premier professional association of more than 4,500 cultural and natural resource educators. Based on similar programs in the United States, NAI's research indicates that interpretive programs can forge emotional and intellectual connections of tourists to China's cultural and natural heritage that will foster a stewardship ethic to help protect China's threatened resources. Together USCEF and NAI are establishing a long-term capacity building program titled "Interpret China" that has two major components: (1) site specific interpretive programs at model sites (e.g., Great Wall at Badaling, Wolong Nature Reserve, and Beijing Parks); and (2) training workshops to build the capacity of Chinese professionals to improve onsite informal education programs at parks, nature reserves, historic sites, and zoos throughout China.

Lead Poisoning Prevention in China

Focus: Health Policy
Partners: Alliance to End Childhood Lead Poisoning, Institute for Preventive Medicine, Shanghai Children's Medical Center, SEPA, Beijing University
Funding: $50,000-$100,000
Schedule: Planning Stage

Presently in the planning phase, this project will assist key Chinese institutions to develop and implement education and prevention programs to control and eliminate environmental sources of childhood lead poisoning. USCEF, working with the Alliance to End Childhood Lead Poisoning and Chinese partners, will help build coalitions of government agencies, environmental organizations, industry associations, universities, and medical centers to provide technical and policy assistance at the national and local levels and help conduct community-based pilot projects. Currently, a coalition is being built in Beijing with hopes of launching specific activities by late 2002. Partnerships are being sought within Chinese, U.S., and international organizations.

National Parks, World Heritage Sites

Focus: Conservation Policy
Partners: China National Park Administration within the Ministry of Construction; China National Park Association; Beijing University, EarthVoice (U.S. NGO); Wisconsin State Parks; University of Wisconsin-Madison
Funding: $100,000-250,000 per year
Schedule: Initiated 1999, Ongoing

In cooperation with the Ministry of Construction's National Park Administration, USCEF is helping to build the institutional capacity of China's national park system. This technical assistance program will: (1) publish interpretive literature; (2) strengthen policies and laws for park administration and concessions; (3) create design standards for construction within parks; (4) address economic development needs of communities surrounding parks; and (5) conserve threatened cultural and natural resources. Specific activities include policy research and development, training, strategic planning utilizing GIS, interpretive signage, visitor programs and publication of educational materials, as well as ongoing exchanges with U.S. park professionals.

"Search for Solutions" Environmental Education Program

Focus: Environmental Education
Partners: SEPA, Municipal EPB environmental education centers, Municipal Education Commissions in Beijing, Shanghai, Tianjin, and Shenzhen
Funding: Phillips Petroleum Company
Schedule: Initiated 1998, Ongoing

After initiating an environmental education exchange between 18 U.S. and Chinese sister cities in 1996, USCEF is now

working with municipal Environmental Protection Bureaus (EPBs) on an experiential environmental education program, titled "Search for Solutions" for primary and secondary students. The program's goal is to help Chinese elementary and secondary students become better environmental citizens by providing environmental education materials and experiential, hands-on learning opportunities. The two major elements of "Search for Solutions" are: (1) publication of new or adaptation of existing environmental materials that are informative and directly relevant to local environmental conditions; and (2) coordination of experiential environmental field studies that build ties between students and their local environment. Main publications include: (1) municipal environmental handbooks—hands-on, practical guides on local environmental conditions that turns a city's environmental management systems into a laboratory for study; (2) municipal field trip guidebooks that inventory suitable sites for experiential learning; and (3) environmental posters and maps. As part of this education program, USCEF also founded "TEA" (Theater for Environmental Awareness, see below) an innovative activity to enable students to express their environmental concerns.

Theater for Environmental Awareness

Focus: Environmental Education
Partners: International Awareness Community Theater (I ACT)
Funding: $100,000-$250,000 per year
Schedule: Initiated 1998, Ongoing

Theater for Environmental Awareness (TEA) is an innovative and interactive educational program that enables Chinese students to communicate their environmental concerns through role-playing and the performance arts. Utilizing techniques developed by I ACT, international trainers work with Chinese teachers, drama instructors, and professional actors to organize performances in schools and cultural community centers. In 2002, USCEF and I ACT will launch an expanded TEA program that will include a reference and training manual, teacher training workshops, a "Summer Break TEA" program at a Beijing community center, and series of school and community performances.

Wolong Nature Reserve (Giant Panda) Breeding Center

Focus: Conservation Management
Partners: Wolong Nature Reserve, The Humane Society of the U.S. National Association for Interpretation, Jones & Jones (a U.S. design firm)
Funding: $2 million
Schedule: Targeted Completion of Final Designs Fall 2002, Targeted Initiation of Construction 2003

The China Research and Conservation Center for the giant panda (Wolong Breeding Center) is situated within the Wolong Nature Reserve, home to approximately 100 wild giant pandas, the largest concentration of giant pandas in the world. The reserve encompasses 100 peaks over 5,000 meters high and covers more than 200,000 square hectares in Sichuan Province. The Wolong Breeding Center has loaned giant pandas to both the National Zoo in Washington, D.C. and the San Diego Zoo. Within the reserve, the Breeding Center has become a major domestic and international tourist destination—projections anticipate there will over 500,000 visitors per year at the Breeding Center in the immediate future. USCEF is currently preparing a redevelopment plan and interpretation program to significantly improve Wolong's aging facilities with the following goals: (1) to enable the Breeding Center's research and scientific staff to focus on the care and breeding of pandas instead of serving as tourist guides; (2) to provide an enriching educational experience for Wolong visitors; and (3) to support the incremental development of a giant panda reintroduction program. USCEF also is serving as advisors to Wolong on a master plan for the entire reserve, which is facing increasing tourism development pressures.

Wildlife Conservation Society

http://www.wcs.org http://www.wildlifewarden.net/wcs.htm

China Program

Partners: China Ministry of Education, China State Forestry Administration, China Wildlife Conservation Association, Heilongjiang Forestry Bureau, Jilin Forestry Bureau, Tibet Forestry Department, Shanghai Agriculture and Forestry Bureau, Gansu Endangered Wildlife Breeding Center, China Endangered Species Import and Export Administration, Shanghai CITES Office, Shanghai Center for Youth Wildlife Conservation Education, Jilin Hunchun Nature Reserve, East China Normal University, Peking University, Anhui Medical University, Anhui University of Science & Technology, Guilin Medical University, Second Military Medicine University, Shanghai University of TCM, Northeast Forestry University, Jilin University,

ExxonMobil China, Ogily & Mather, Shanghai Zoo, Shanghai Wild Animal Park.
Focus: Conservation Research, Environmental Education
Funding: NFWF/Save the Tiger Fund, MacArthur Foundation, U.S. Fish and Wildlife Service, Cline Family Foundation
Schedule: Initiated 1996, Ongoing

The strategy of the Wildlife Conservation Society (WCS) in China has been to undertake conservation and education activities, as well as offer technical and financial support to wildlife research, especially on tigers and other endangered species. WCS collaborates with the State Forest Administration, China CITES Administration, local government agencies, institutions, traditional Chinese medicine practitioners, and NGOs. A summary of the major areas of WCS work is below.

- *Conservation workshops*. The first program conducted by WCS in China was an Asian Conservation and Communication Program. Since 1996, WCS has organized a total of 12 workshops on the theme of "Conservation of Endangered Wild Species Used in Traditional Chinese Medicine," reaching top traditional Chinese medicine practitioners and students in Jiangsu, Anhui, Jilin, Shanghai, Guangxi, provinces.
- *Education programs*. To educate school children, WCS has initiated a series of successful activities, including "Model school on wildlife conservation," "Saving the tigers," "Big hands in small hands to save wildlife," and publishing a series of booklets on the wildlife conservation. WCS China Program also works to raise public awareness of conservation. Some public education activities have included: (1) a television commercial on tiger conservation was produced with Ogilvy & Mather Shanghai Advertising; (2) a prominent billboard was placed outside the Shanghai International Airport, and (3) since 2002, WCS has focused its efforts on the tiger population in northeast China and therefore WCS and the Ministry of Education have been conducting a conservation education project on wildlife conservation among elementary and middle schools in four Chinese provinces—Sichuan, Yunnan, Jiangxi, and Hubei.
- *Wildlife conservation and nature reserve projects.* WCS has initiated several successful projects in China on wildlife conservation. Based on several field surveys, WCS and the Heilongjiang Forestry Department convened a workshop to develop a recovery plan for the wild Amur Tiger population in northeast China. In 2001, Jilin Province, with assistance from WCS, established the Hunchun Nature Reserve, the first reserve to prioritize the conservation of the Amur Tiger and Far Eastern Leopard in China. Since 1998, WCS Director for Science Dr. George B. Schaller and his colleagues in China have been working together with the Tibetan Forest Department in conducting a series of surveys and training courses on conservation and biodiversity in southeast Tibet. In addition, concern for the current status of the Chinese alligator in the wild led WCS to conduct field surveys in 1999. These surveys revealed that the alligator population is critically low in wild and WCS therefore is now assisting China's Forestry Administration in initiating a reintroduction program of the alligator into its former habitat.

WINROCK INTERNATIONAL

http://www.winrock.org

Asia Alternative Energy Program Support

Focus: Energy Policy, Energy Efficiency Education
Funding: World Bank
Schedule: Initiated 1999, Ongoing

The purpose of this activity is to provide support for a World Bank initiative to identify opportunities for mainstreaming renewable energy and energy efficiency technologies into the World Bank's cross-sector lending program and to promote the World Bank's Asia Alternative Energy Program (ASTAE). Tasks under this project are: (1) alternative energy education; and (2) outreach in non-energy sectors, which involves oversight and preparation of background and promotional materials on alternative energy, particularly a briefing package, and organizing mechanisms for information dissemination. Jeremy Levin of Winrock's Clean Energy Group, who is assigned fulltime to the World Bank., provides technical support and advisory services (especially on donor support, strategic planning, and analysis) to ASTAE.

Building Capacity in Agriculture Business Operations in China

Focus: Agriculture Policy
Partners: Chinese Academy of Agricultural Sciences
Funding: Starr Foundation
Schedule: Initiated 2000, Targeted Completion 2003

Implemented by Winrock's Planning and Strategic Initiatives Unit and China Office, this project offers an education program to strengthen the foundation and management of modern farming enterprises in China, which has a direct effect on the environment. The Agribusiness MBA program builds on the successful implementation (from 1996 to 1999) of the Leading

Economic and Agricultural Development into the 21st Century (LEAD21) model for advanced education, pioneered by Winrock with support of the Starr Foundation. Twenty-nine top students recruited from eight leading national agriculture universities in China studied and completed Ph.D. degrees in agricultural economics. All of these graduates remained to teach and/or conduct research in national universities and research institutes throughout China. The project successfully pioneered an approach to counteract the serious, ongoing drain of talent from China. The key feature is that participants receive Western-style training in China and remain to contribute their expertise to the country, in contrast to the conventional model in which Chinese graduates of advanced education programs overseas opt not to return to China. To demonstrate this new model for Agribusiness MBAs, Winrock brought to China a complete curriculum adapted from leading Western universities and provided qualified teaching staff to lead instruction from within China. This approach provides convenient, cost-effective, and world-class training in advanced international practices for leading Chinese scholars.

Fostering Leadership of Women in China

Focus: Capacity Building, Forestry Management
Funding: Ford Foundation
Schedule: Initiated 2000, Targeted Completion 2003

This program opens the door for Winrock in China to establish a long-term women's leadership program, based on the ten-year successful model of Winrock's women's leadership program in Africa. The program contributes to Winrock's goals of increasing gender equity in development, improving productivity of rural farmers, protecting the environment, and building the capacity of local organizations. The purpose of this program is to train and mobilize a group of pioneering women leaders and male supporters in key institutions to improve the policies, programs, and practices that affect rural women in China, especially in the agriculture and forestry sectors.

Short Term Consultant Support for Capacity Building for the Rapid Commercialization of Renewable Energy

Focus: Energy Policy
Partners: Chinese Renewable Industries Association
Funding: United Nations Development Programme
Schedule: Completed Fall 2001

Judith Siegel, Managing Director of Winrock's Clean Energy Group, recently completed a consultancy to assist the Chinese Renewable Energy Industries Association (CREIA) in developing an Annual Operating Plan for the calendar year 2002 and assist CREIA in the development of a Five Year Business Plan. CREIA provides assistance to the Chinese domestic renewable energy industries to promote the adoption and expansion of renewable energy markets in China. Since its creation in January 2000, CREIA has proactively (1) facilitated business development between domestic and international companies; (2) served as a spokesman on industry's behalf with lead government agencies responsible for renewable energy programs and policy development in China; and (3) functioned as an information conduit to the general public promoting the benefits of renewable energy for energy development and environmental protection in China. (*Editor's Note: See 19 July 2001 Renewable Energy in China Meeting Summary in this issue of the China Environment Series for more information on CREIA*)

Southwest China Participatory Upland Resource Development

Focus: Agriculture Training, Environmental Education
Funding: Ford Foundation
Schedule: Initiated 2000, Targeted Completion 2003

For more than a decade, Winrock has been continuously involved with upland development in Yunnan Province. This project aims to build capacity and promote participatory upland development in poor areas beyond Yunnan provincial borders. Specific activities within this project have included: (1) supporting degree and non-degree training in management of natural resources in the uplands; and (2) assisting fellows in developing research agendas for their degree requirements. These degree and non-degree training programs have been constructed for participants in the fields of environmental studies and natural resource management, agrarian studies, land use planning, community forestry, agro-forestry and forest management, as well as social and development studies. Over the life of the project, more than 30 professionals have been trained.

Technical Assistance for Renewable Energy Development Project

Focus: Renewable Energy
Partners: Center for Renewable Energy Development (under U.S. Department of Energy/NREL)
Funding: Asian Development Bank

Schedule: Initiated 1999, Completed 2000

This project set out to address barriers to commercial development of renewable energy through: (1) focused assistance to enhance the policy and institutional framework to further commercialization of selected renewable energy resources; (2) development and evaluation of prioritized investment programs for commercialization of selected technologies (biogas, bagasse cogeneration, and solar thermal); and (3) identification of specific investment requirements for external financing for a project that could supply energy to remote areas. A team fielded by Winrock's Renewable Energy Division (now the Clean Energy Group) recommended that the Asian Development Bank: (1) proceed with the design of a loan component to accelerate expanded use of solar thermal technology, especially solar water heating; (2) continue with the design of a loan component to introduce advance cogeneration technology into large well-managed sugar factories; and (3) establish a new Secretariat in China led by a senior government official and reporting to the State Council to coordinate and set national objectives for expanded use of renewable energy.

WORLD RESOURCES INSTITUTE

http://www.wri.org/

China BELL (Business Environment Learning Leadership)

Focus: Environmental Education

Partners: Center for Environmental Education and Communications of SEPA, Renmin University, Tsinghua University, Peking University, Fudan University, Hong Kong Polytechnic University, Dalian University

Funding: GE Fund, Alcoa Foundation, Netherlands Ministry of Foreign Affairs, Boeing, The Kearny Alliance

Schedule: Initiated 2000, Ongoing

Today, there are 62 nationally accredited institutions that grant graduate management degrees in China, a number that is steadily increasing. The number of top students enrolling in these schools is also growing, making them a critical point of intervention in the development of China's future business leaders. The infusion of environmental and sustainable management into the curricula of these business schools is the goal of this World Resources Institute (WRI) BELL project. The China BELL project: (1) trains and promotes networking among business school faculty; (2) publishes curricula; (3) supports course development; and (4) helps business schools understand changes in industry practice and skill needs that are relevant to curriculum development and research. In North and Latin America, WRI's BELL projects have produced over 40 case studies covering the intersection between profitability and sustainability in such areas as accounting, finance, marketing, organizational behavior, and production. BELL held its second China BELL Conference in April 2002. The conference enabled WRI's partner schools to use the curriculum modules they had developed to train a large number of Chinese professors on how to use the new material in marketing, management, accounting, finance, strategy, and operations courses. The curriculum modules presented at the conference were given to the attending business school representatives in order to help them infuse their own curricula with environmental content. For more information, please see http://www.wri.org/sep/chinabell.html.

New Ventures Asia

Focus: Environmental Capacity Building

Funding: Citigroup Foundation

Schedule: Initiated 2002, Ongoing

Since 1997, WRI's New Ventures Latin America program has supported sustainable enterprise creation by accelerating the transfer of venture capital to outstanding investment opportunities that incorporate social and environmental benefits. By providing sound business opportunities for investors and the growing Latin American economy, New Ventures has been demonstrating that investing in sustainable enterprises makes good business sense. WRI has been working on New Ventures in Latin America to connect investors with sustainable business leaders, and WRI is moving this successful program to Asia, beginning with China. Additional information can be found at http://www.new-ventures.org.

Resources Policy Support Initiative

Focus: Conservation Management, Conservation Policy

Partners: Center for Biodiversity and Indigenous Knowledge, Research Center for Ecological and Environmental Economics, Yunnan Academy of Social Sciences, Yunnan Institute of Geography

Funding: Sida, Royal Dutch Foreign Ministry, Rockefeller Foundation, Ford Foundation-Beijing

Schedule: Initiated 1997, Targeted Completion 2002

The Resources Policy Support Initiative (REPSI) is a project to improve the basis for decision-making about development and natural resource use in the uplands of mainland Southeast Asia. REPSI aims to provide policymakers with timely options for sustainable upland management and to strengthen the capacity of local organizations to analyze such management issues,

through independent research, outreach, and regional exchange. REPSI is a collaborative effort by WRI and many local and international institutions. In China, REPSI focuses on Yunnan Province where WRI currently is: (1) analyzing the effects of decentralized natural resource management on local ecosystems and people's welfare; and (2) facilitating a regional dialogue on needed innovations in regional governance for transboundary natural resources. Further information on the initiative can be found at http://www.wri.org/repsi.

Worldwide Fund for Nature, China Program Office (WWF China)

http://www.wwfchina.org

Ongoing Projects (See CES 4): Environmental Educators' Initiative for China, Integrated Conservation and Development in Pingwu County, Living Yangtze Program, Pilot Projects in Wetland Restoration and Use, Tibetan Antelope Protection

Capacity Building in Nature Conservation in Tibet

Focus: Environmental Capacity Building, Conservation Management
Partners: Tibet Forestry Department
Funding: WWF US
Schedule: Initiated May 2000, Ongoing

Building capacity is essential to the long-term health and effectiveness of a project. In Tibet, the lack of well-trained staff in nature reserves and the necessary framework to support them is a pressing issue. WWF is laying a foundation by building a systematic training program targeting decision-makers and conservation managers, nature reserve staff, researchers, and community workers. The main goals of this project are: (1) to improve the capacity of nature reserve managers so that they can effectively implement nature reserve policies, laws, and conservation awareness activities; (2) to provide nature reserve managers with basic knowledge so they can conduct wildlife surveys and monitoring; (3) to improve the capacity of Changtang Nature Reserve managers in community management to more effectively handle poaching in nature reserves; and (4) to improve the capacity of the Tibet Forestry Department staff in various fields such as English language, management skills, and information analysis. Currently, WWF-China is preparing training for community management and wildlife monitoring, and Geographic Information System (GIS).

China Air Conditioner Energy Efficiency Standard

Focus: Environment Policy
Partners: Beijing Energy Efficiency Center
Funding: WWF Netherlands, WWF China
Schedule: Ongoing

The objective of this project is to reduce greenhouse gas emissions by promoting more sustainable energy consumption and supporting policy measures. In 2001, the Chinese government adopted new, stricter energy standards for air conditioners, which had been developed jointly by government, industry, and scientists through a program sponsored by WWF. The new national standard (GB 12021.3-2000) regulates the energy performance of air conditioners, with the aim of stimulating the industry to adopt new technologies and innovations for saving energy.

Community Education in Baimaxueshan Nature Reserve

Focus: Biodiversity Management, Conservation Capacity Building
Partners: Baimaxueshan Nature Reserve Management Bureau
Funding: WWF UK, WWF Switzerland, British Petroleum (BP)
Schedule: Initiated 1996, Ongoing

Located between the Jingsha, a major branch of the Yangtze and the Mekong Rivers in northwestern Yunnan Province, Baimaxueshan Nature Reserve is one of China's richest reserves in terms of biodiversity, but one of its poorest areas in terms of the economy. This project is designed to empower local communities to actively participate in making decisions and taking action to manage their natural resources sustainably. This goal will be achieved by: (1) facilitating a learning process through community-initiated activities to foster knowledge, skill, and attitudes of the participants in sustainable management of their local natural resources; (2) increasing the capacity and potential of people and communities in the selected sites to shape and initiate change towards a sustainable future by connecting them to structure and processes of economic, political, and cultural decision-making; and (3) starting a community-led dissemination process and using the lessons learned from the project to build such capacities among communities and partners in other project sites in China.

Conservation Awareness in Tibet

Focus: Environmental Education, Conservation Capacity Building
Partners: Tibet Forestry Bureau, Wildlife Conservation Society
Funding: WWF US
Schedule: Ongoing

This project was initiated to raise awareness of conservation issues and to increase people's capability and potential to affect change in and outside of Tibet. Within this project the Tibet Forestry Bureau has been issuing a quarterly newsletter on progress and emerging issues in conservation in Tibet. This newsletter serves as a tool to communicate conservation messages and needs to the public, governmental agencies, and donors. The first issue was distributed in December 2001. WWF also published and distributed posters promoting conservation awareness in Tibet.

Database for New and Renewable Energy Industries and Products

Focus: Energy Policy
Partners: China Renewable Energy Industry Association (CREIA), Norwegian Computing Center
Funding: UNDP/GEF, WWF
Schedule: Initiated 2002, Ongoing

To help develop renewable energy industries, this project aims to strengthen information exchange and international contacts by developing a database of China's renewable energy industries and products. Information about renewable energy industries in Scandinavian countries also will be included in the database. WWF hopes to help promote international technology transfer, investment, and trade through the exchange of information and e-commerce. This exchange will improve the operational capacity of the Chinese Renewable Energy Industries Association (CREIA) and help stimulate the growth of renewable energy industries in China. The database will be jointly developed through the participation of renewable energy industries in Scandinavian countries (Sweden, Denmark, Norway, Finland and Iceland). While UNDP/GEF and WWF Netherlands are supporting the initial stages of the project, further funding is needed to help support this project.

Forest Certification

Focus: Forest Management
Partners: State Forestry Administration, Sustainable Forestry Research Center, Chinese Academy of Sciences, Chinese Academy of Forestry
Funding: WWF-World Bank Alliance
Schedule: Initiated 2001, Ongoing

Forest certification offers China a means to move beyond the 1998 logging ban in natural forests in much of the country and toward the establishment of a sustainable domestic forest industry. This project aims to: (1) promote the development of certification standards appropriate to the Chinese context and compatible with The Forest Stewardship Council ; (2) encourage the development of models and markets for forest-certified products in China; and (3) minimize the negative impacts of the logging ban outside of China, with the aim of at least 50 percent of all imported timber coming from certified forests in China. In May 2001, the first meeting of the 'Working Group on Forest Certification in China' was held in Beijing, with the State Forest Administration (as supervisor), the Sustainable Forestry Research Center, the Chinese Academy of Forestry, and WWF (which is responsible for the coordinating logistics for this working group). The group discussed developing forest certification policies and raising awareness of sustainable forestry. In December 2001, the Working Group on Forest Certification held a series of workshops aimed at forest managers. Currently, WWF is raising awareness of these issues in China through the publication of a newsletter and brochure on forest certification. An East Asia Pacific Forest Certification Web site that will include China specific guidelines in both Chinese and English. For more information on forest certification, see Forest World http://www.forestworld.com and WWF International http://www.panda.org/forests4life/certify.cfm, which contain detailed information on China's Chain of Custody companies.

Green Electricity Market Development

Focus: Renewable Energy Technology
Partners: South-North Institute for Sustainable Development, China Central TV Station (CCTV)
Funding: Energy Foundation, WWF Netherlands, WWF China
Schedule: Initiated 2002, Ongoing

Green electricity, produced from new and renewable energy sources, has considerable growth potential in China. However, knowledge and experience of how to establish a green electricity market are currently underdeveloped in China, as is awareness

of this issue amongst the general public. To promote the public support of renewable energy is an important step for green electricity market development. Beijing and Shanghai have currently been selected as cities for market research, surveys, and future demonstration sites. WWF's role in this project focuses on communication, capacity building, and media campaigns. Experiences from Europe and the United States on green electricity market development are to be introduced to China with the involvement of international experts and major news agencies. News media involvement is underway. WWF and its partners also will conduct investigation and market research for green electricity.

A Landscape Approach to Forest Conservation in the Minshan Mountains

Focus: Conservation

Partners: Sichuan and Gansu Forestry Departments; Sichuan Academy of Social Sciences; Sichuan Academy of Forestry; Chinese Academy of Forestry; State Forestry Administration; Chinese Academy of Sciences; Pingwu, Qingchuan, Beichuan, Songpan. Maoxian, and Jiuzaiguo Counties in Sichuan Province; Wenxian County in Gansu Province

Funding: WWF US, WWF Sweden, WWF International Forest TDP

Schedule: Initiated in 2001, Ongoing

This project contributes to the larger-scale conservation of the forests of the upper Yangtze eco-region and aims to increase the extent and quality of the forests in the Minshan Mountains. These conservation projects are being undertaken to benefit key species, in particular the giant panda, while enhancing the livelihood security of local communities. The current plan involves working with stakeholders to prioritize and assess sites and draw up broad conservation targets. Once the sites have been established, WWF—in collaboration with local communities and other stakeholders—will look at the potential of these forests in terms of non-timber forest products, forest certification, agriculture, and tourism, in order to develop a series of different scenarios on how the area might develop in the future. The various scenarios will form the basis of negotiations between local government, communities, conservationists, and other affected groups, which will help to shape a conservation development approach for the whole Minshan Mountain area.

Nature Reserve Management in Tibet

Focus: Conservation Management

Partners: Tibet Forestry Department

Funding: WWF US

Schedule: Initiated 2001, Ongoing

WWF has identified two priority eco-regions within Tibet—the Tibetan Steppe (Chang Tang) and the East Himalayas (Yarlung Tsangpo Great Canyon Nature Reserve or YCR)—and WWF is currently concentrating its efforts in the Chang Tang eco-region. Enhancing the management of these reserves within Chang Tang is key to WWF's overall goal of conserving Tibet's biodiversity while integrating the needs of local development into conservation. Key objectives in these nature reserve priority areas are: (1) protection of Tibetan antelopes and other wildlife from poaching and illegal trade; and (2) addressing the conflict between wildlife conservation and livestock raising by developing management strategies for species such as the wild ass (Kiang), wild yak, Bengal tiger, red deer, and Tibetan brown bear.

Promotion of Energy Efficient Buildings

Focus: Energy Management, Forest Conservation

Partners: International Network for Bamboo and Rattan

Funding: WWF Netherlands, WWF China

Schedule: Initiated 2002, Ongoing

In southeast and southwest China, bamboo is an abundant resource available in 18 provinces. Bamboo is also cheap, locally available, and can be used as a substitute for wood and forest products. WWF aims to introduce bamboo building design, while also integrating renewable energy and energy saving measures into the designs. The building designs include schools, hotels, and residential houses for rural people of different income levels. Several potential project sites have been selected in Yunnan Province, with the first pilot project beginning March 2002 and ending August 2002.

Promotion of Investment Opportunities for Energy Conservation and Renewable Energy Development

Focus: Energy Conservation

Partners: DVA Investment Management Ltd. (pending)

Funding: W. Alton Jones Foundation, WWF Netherlands, WWF China

Schedule: In Planning Stage

Lack of investment is a major barrier to energy conservation and renewable energy development in China. Funding shortages are particularly acute in projects for clean power plants, village-based biogas power plants, and household-based wind/solar generators. In this project, WWF aims: (1) to encourage the involvement of domestic and international investors in such energy conservation projects; and (2) to establish new finance mechanisms, such as investment funds for these projects. A micro-credit project for household biogas technology dissemination will be started in mid-2002 in Yunnan and Hunan provinces. This is WWF's first initiative in promoting new mechanisms for energy projects. Discussion is underway with international investors interested in new fund development.

Qinghua University/WWF Graduate Program on the Human Dimension of Climate Change

Focus: Environmental Education
Partners: Qinghua University
Funding: WWF Netherlands, WWF China
Schedule: Initiated 2001, Targeted Completion 2003

WWF is working with Qinghua University to train students on the human dimension of climate change. The central focus of this project is to provide training for the next generation of scientists, leaders, policymakers, and experts to work in multi-disciplinary areas of climate diplomacy, research, and policy. The first group of eight students currently is enrolled in this program and training is underway. WWF also is setting up international exchanges as another component of this training project.

Qinling Giant Panda Focal Project

Focus: Conservation Policy
Partners: Shaanxi Forestry Department
Funding: WWF Netherlands
Schedule: Initiated 2001, Ongoing

The Qinling Mountains in Shaanxi Province contain the highest panda population density in China and are home to approximately 10 percent of China's total wild panda population (about 120 individuals). To provide effective protection and ensure the long-term survival of this species, the Shaanxi Forestry Department and WWF are working together to create new panda reserves and establish ecological corridors to enlarge the protected habitat for the panda population in Qinling. WWF also supports the priority panda reserves to conduct monitoring and patrolling for panda population and its habitat. This project is relatively new for WWF China. WWF and its partners are currently undertaking surveys and feasibility studies for the creation of new panda nature reserves and corridors.

Renewable Energy Business Development Training

Focus: Energy Management
Partners: Center for Renewable Energy Development, Energy Research Institute, State Development Planning Commission
Funding: WWF Netherlands, W. Alton Jones Foundation
Schedule: Completed 2001

This project aimed to strengthen the management and marketing capacities of managers whose enterprises are involved in renewable energy technology development, production, and trade. WWF sponsored two training workshops on finance and project management for these industrial managers. The workshops included presentations by international experts on their experiences in renewable energy market development. In 2001, WWF also organized a business trip to Europe for Chinese managers of renewable energy enterprises. This exposure led to improved international contact and trade, and particularly promoted the export of Chinese renewable energy products to the European market.

Sustainable Road Transport and Greening of the Auto Industry

Focus: Environmental Policy
Partners: Qinghua University
Funding: WWF Netherlands, Center for International Climate and Environment Research (Oslo, Norway)
Schedule: Initiated March 2000, Targeted Completion June 2002

This project aims to encourage government policy changes in favor of sustainable transportation management and planning, as well as promote China's motor industry to move toward cleaner combustion and energy use. WWF and its partners at Qinghua University are conducting research to investigate different technology and policy options and major barriers to sustainable urban

road transportation management in China. WWF also is exploring alternative and innovative technologies that can increase energy efficiency and reduce automobile emissions. The research already has produced a number of reports that may be used for governmental policymaking in the transportation sector as well as news media campaigns. WWF will be involved in an international workshop in June 2002 on this topic.

Systematic Conservation Planning of the Forests in the Upper Yangtze

Focus: Conservation Management
Partners: Chinese Academy of Forestry
Funding: WWF International Forest for Life Campaign
Schedule: Initiated 2001, Ongoing

The upper Yangtze forest eco-region is one of 25 global priority eco-regions chosen by WWF and is an important center for giant pandas as well as rare species such as the golden monkey, red panda, and clouded leopard. The area encompasses approximately 1 million square kilometers, covering all of Sichuan and Shaanxi provinces, and parts of Yunnan, Gansu, Qinghai, Hubei, and Tibet. The logging ban on natural forests in 1998 has provided a good opportunity for promoting conservation of China's forest ecosystems. However, the Chinese government is primarily focused on the immediate issue of implementing the ban, rather than making clear future plans for the protection or utilization these natural forests, which are temporarily being restricted. Moreover there is a lack of comprehensive data on the current status and distribution of key forest ecosystems and their associated social and economic conditions in this eco-region. This project is designed to identify gaps and gather the necessary information in order to help ensure the future protection of China's natural forests. Working on an eco-regional scale is important for long-term conservation success. The areas between smaller protected areas need to be linked not only because species do not necessarily live within these lines, but also because a more integrated approach takes into account agriculture, dams, and development in general. By using this eco-region approach, conservationists have greater flexibility and the ability to accept 'trade-offs' (i.e., an eco-region project would not be a complete failure if, for example, the government decided to mine in a certain protected area) when necessary while still being able to ensure the protection of species on a larger scale. Some steps to reach the goals include: (1) identifying broad goals for biodiversity conservation in the forests in the upper Yangtze eco-region; (2) formulating conservation targets for systematic conservation planning in this eco-region; (3) working out a systematic conservation plan in the eco-region; and (4) testing and developing a WWF manual for conservation planning and WWF rapid assessment and prioritization methodology in the upper Yangtze eco-region.

Tibet GIS Biodiversity Database

Focus: Conservation Research
Partners: Tibet Forestry Bureau, Chinese Forestry Academy, Beijing University
Funding: WWF US
Schedule: Ongoing

In terms of biodiversity, Tibet is still an insufficiently researched area. Although many surveys have been conducted on Tibet's biodiversity, most of the information collected has been limited to inventory, and very little data has been collected on the ecology of wildlife, plants, and ecosystems. Similarly, there are statistics on people's livelihoods, land productivity, and resources use, but very little social-economic or anthropological research documenting details of people's lifestyle and recent changes, or—perhaps most importantly—people's interaction with and impact on the natural environment. Filling in this knowledge gap is necessary to make long-term conservation management strategies in Tibet. This project is particularly designed to establish a GIS database on Tibet's main nature reserves and wildlife habitats, with the aim of compiling information for better conservation decision-making. A consultant has conducted an introductory training for staff at the Tibet Forestry Bureau and the Lhasa City Forestry Bureau to explain and demonstrate the function and basic features of a GIS database. WWF China has been conducting discussions with Tibet Forestry Bureau staff on their needs in terms of management, education, and communication, with the aim of designing an effective and useful GIS database. The project design for the GIS database will be completed in spring 2002. The next stage will focus on working with the Tibet Forestry Bureau and relevant organizations to establish a GIS lab and assign specific staff to manage the lab. After the training, Tibet Forestry Bureau staff will implement the collection, compilation, and analysis of data with technical assistance from Beijing University. WWF China also will organize a workshop on Tibet's eco-region.

PART III. U.S. UNIVERSITIES AND PROFESSIONAL ASSOCIATIONS

AMERICAN BAR ASSOCIATION

www.aba.org

Environmental Governance Training Program

Focus: Environmental Law

Partners: Center for Environmental Education and Communication of State Environmental Protection Administration, other multi-stakeholder partners

Funding: U.S. Department of State

Schedule: Initiated February 2002, Targeted Completion February 2003

In February 2002, the Asia Law Initiative Council of the American Bar Association (ABA) placed a liaison attorney in Beijing to implement an environmental governance training project. The project is providing Chinese stakeholders with training and education on environmental governance issues and includes three components. The first component will be a comparative overview of national systems of environmental management, and the different approaches which result; the second training component will be a review of emerging strategies for environmental compliance around the world; and the third will be a comparative review of roles and responsibilities of public, private, and nongovernmental stakeholders in environmental management, analyzing each sector's role in providing for public access to information and environmental justice. Training courses will take place in three regional cities and be based on environmental circumstances in each locale. (*Editor's Note: For a full description of this project see the ABA feature box in this issue of the China Environment Series*)

CARNEGIE MELLON UNIVERSITY

http://www.andrew.cmu.edu/user/kf0f/china.htm

Air Pollution Management in Chinese Cities

Focus: Air Quality Management

Partners: Environmental Protection Bureaus (EPBs) in Hohhot, Benxi, Taiyuan, Binzhou, and Nantong Cities

Funding: U.S. National Science Foundation, Electric Power Research Institute, ExxonMobil Corporation, American Petroleum Institute (through grants to Carnegie Mellon's Center for the Integrated Study of the Human Dimensions of Global Change)

Schedule: Initiated 1997, Targeted Completion 2002

Since the early 1970s, China has launched numerous nationwide programs to reduce airborne particulate matter (PM) in urban areas. This dissertation research project analyzes a select group of these programs in five diverse cities: Hohhot, Benxi, Taiyuan, Binzhou and Nantong. In each city, interviews were conducted with air pollution experts in the local environmental protection and other bureaus to ascertain the history of local PM control programs, their effectiveness and costs, and the relationships among various stakeholders in government and (state) industry. In addition, data were collected on ambient PM concentrations, reported PM emissions from various sources, and local fuel resources. Three PM-control programs were selected for detailed analysis: (1) retrofitting coal boilers with particulate control devices; (2) replacing raw coal with coal briquettes for cooking; and (3) replacing coal with coal gas for cooking. The costs and health benefits of each program were estimated using an integrated model of PM exposure, PM health impacts, and implementation cost. *Publications to date:* G. Sun, *Effectiveness, Efficiency and Governance: An Integrated Study of China's Air Pollution Management*, Ph.D. dissertation, Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA, 2001.

Exposure-Based Regulation of Particulate Air Pollution

Focus: Air Quality Policy

Funding: U.S. National Science Foundation, Electric Power Research Institute, ExxonMobil Corporation, American Petroleum Institute (through grants to Carnegie Mellon's Center for the Integrated Study of the Human Dimensions of Global Change), travel support from the Scientific Group on Methodologies for the Safety Evaluation of Chemicals

Schedule: Initiated 1999, Targeted Completion 2002

This research project reviews the successes and limitations of past and existing policies for particulate controls, as well as the effects of China's economic reforms and energy policies on particulate exposure and pollution management. Researchers are examining the challenge of emissions reporting, required as part of both China's pollution levy system and an emerging system for "total emissions control." In the 1980s, China instituted a nationwide system of self-reporting for industrial air pollution emissions. Within China, these data are used for national and regional planning, setting emissions permit levels, and enforcement of the national pollution levy. Outside of China, development economists frequently use such emissions data as an indicator of the environmental performance of industry. The analysis done by the project partners shows that reported emissions of particulates from hundreds of boilers in one medium-size Chinese city are unbiased for all except large sources equipped with electrostatic precipitators. Because these largest sources comprise a large fraction of total industrial emissions, however, citywide particulate emission figures underestimate emissions by roughly a factor of two.

Nuclear Power and the Social Dimensions of Energy Choice

Focus: Energy Research
Partners: Tsinghua University, Chinese Academy of Science
Funding: W. Alton Jones Foundation, Carnegie Mellon Center for the Integrated Study of the Human Dimensions of Global Change
Schedule: Initiated 1998, Targeted Completion 2002

Both academic analyses and news media reporting on nuclear power in China is quite positive and includes little or no coverage of the social dimensions of nuclear power development in industrialized countries. This research project addresses this void by developing a set of papers in Chinese on nuclear power safety, public acceptance, regulation and economics. A supplemental goal is to understand and describe the forces driving nuclear energy policy in China. *Publications to date:* (for copies of these Chinese language papers, contact K. Florig at florig@cmu.edu): Z.G. Shi, Z.Y. Zhang, L. Xue, and K. Florig. (2000). "Public Acceptance of Nuclear Power." *China Soft Science*, (August); L. Xue, Z.G. Peng, and K. Florig. (2001). "Lessons from the Evolution of the U.S. Nuclear Regulatory System." *Tsinghua University Journal - Social Science Edition*; K. Florig and S. Zhao. "Competing Perspectives on Nuclear Power Safety." *Science and Technology Review*, (March); Y. Wang. (2001). "The Path of Nuclear Power Development with Uncertain Variables." *China National Condition and National Power*,(No.10).

Center for Environmental Science and Policy Forum, Stanford University

http://cesp.stanford.edu

The Program on Energy and Sustainable Development

Focus: Energy Policy, Energy Research
Partners: Electric Power Research Institute (U.S.); India Institute of Management; Guangdong Energy Techno-economic Research Center (China); Tata Energy Research Institute (India); James A. Baker Institute at Rice University; Council on Foreign Relations (New York)
Funding: Electric Power Research Institute
Schedule: Initiated September 2001, Ongoing

This interdisciplinary program focuses on three main research platforms: (1) the transition to commercial energy spurred by industrialization; (2) the current shift within the worldwide energy system to natural gas; and (3) the political economy of power market reform across the globe. The researchers in this program also are interested in notions of corporate sustainability, with an emphasis on firm behaviors in the energy area. This broad research agenda investigates patterns of institutional designs for energy utilization and sustainable development worldwide over long-time horizons. China is one of the major cases explored by this program.

Center for International Earth Science Information Network (CIESIN), Columbia University

http://sedac.ciesin.columbia.edu/china

China Dimensions Data Collection

Focus: Environmental Research
Partners: Global Change Information and Research Center (GCIRC), China in Time and Space Project
Funding: U.S. National Aeronautics and Space Administration
Schedule: Ongoing

The Socioeconomic Data and Applications Center (SEDAC) maintains access to a range of environmental and socioeconomic

data on China, including county-level administrative boundaries and associated attribute data in Geographic Information System format. A Memorandum of Understanding signed with the GCIRC of the Institute of Geographical Sciences and Natural Resources Research of the Chinese Academy of Sciences will permit updating and expansion of these data in 2002.

Environmental Sustainability Index

Focus: Environmental Research
Partners: Global Leaders of Tomorrow Environment Task Force of the World Economic Forum, Yale Center for Environmental Law and Policy
Funding: The Samuel Family Foundation
Schedule: Ongoing

The Environmental Sustainability Index (ESI) provides a measure of overall progress towards environmental sustainability for most countries of the world, including China. The ESI permits cross-national comparisons of environmental progress in a systematic and quantitative fashion. CIESIN provides access to both the ESI data and to detailed documentation on the analytic framework, quantitative methodology, and data sources used to construct ESI. An online interactive mapping tool permits users to compare the overall ESI with its subcomponents and with other indicators such as the Human Development Index and the Ecological Footprint.

Global Population and Land Use Data

Focus: Environmental Research
Partners: International Food Policy Research Institute, World Resources Institute, Oak Ridge National Laboratory (ORNL), Intergovernmental Panel on Climate Change (IPCC), Goddard Institute for Space Studies (GISS), Brown University; Ramsar Bureau, Wetlands International
Funding: U.S. National Aeronautics and Space Administration
Schedule: Ongoing

SEDAC maintains a number of global databases and information resources on population, land use, greenhouse gas emissions, agriculture, wetlands, and international environmental treaties that include detailed data on China and neighboring countries. Data resources include: (1) Gridded Population of the World, Version 2, and the ORNL LandScan 2000 gridded population data sets; (2) future economic and greenhouse gas emission scenarios developed by the IPCC Special Report on Emission Scenarios; (3) data from a major crop-climate modeling study at GISS; (4) spatial data on wetlands of international importance; and (5) the Environmental Treaties and Resource Indicators database. A set of peer-reviewed guides on future population projections is also available.

World Data Center for Human Interactions in the Environment

Focus: Environmental Research
Partners: International Council of Science (ICSU)
Funding: National Aeronautics and Space Administration
Schedule: Ongoing

The CIESIN World Data Center (WDC) for Human Interactions in the Environment is one of nearly 50 WDCs in the ICSU World Data Center System. This WDC focuses on population and administrative boundary data, including selected national, regional, and global datasets and links to sources of data on China and neighboring countries.

HARVARD UNIVERSITY CENTER FOR THE ENVIRONMENT, CHINA PROJECT

http://www.environment.harvard.edu/china/

Dynamic Economy-Energy-Environment Model

Focus: Energy Research
Partners: John F. Kennedy School of Government and Department of Economics at Harvard University, Chinese Academy of Social Sciences, Chinese Institute of Quantitative and Technical Economics
Schedule: Initiated 1995, Ongoing

The team led by researchers at Harvard University has developed and continues to revise and update a dynamic computable general equilibrium model of the Chinese economy, with a special focus on energy use and emissions. Besides taking into account dynamic effects of changes in population, capital, technology and demand, the model also incorporates the dual nature of the Chinese economy—the coexistence of plan and market institutions. The team is applying the model in a number of environmental

and economic policy analyses. In one case, the model was used to simulate the impact on GDP of using of carbon taxes to reduce carbon emissions by five, ten and fifteen percent from a baseline level. Currently the model's projections also are serving as a component of a broader initiative to estimate the total damages of energy-related air pollution to human health and the economy in China (see next two studies below). A newer policy simulation being conducted on the model prepares for results of this broader initiative, seeking to set externality tax rates of PM_{10} and SO_2 at their estimated marginal damages to health.

Economic Value of Reducing Health Risks by Improving Air Quality in China

Focus: Air Quality Policy, Health Policy

Partners: Harvard School of Public Health, local bureaus of public health in China

Schedule: Initiated 1998, Targeted Completion 2002

A group of researchers of the Harvard School of Public Health, collaborating with authorities in local bureaus of public health, have used contingent valuation to estimate the economic value of preventing adverse health effects in China. Field surveys have been conducted in urban Beijing, Anqing (in Anhui Province), and the rural area surrounding Anqing. The study is estimating the population's willingness to pay in three cases: (1) to prevent a minor illness (cold); (2) a statistical case of chronic bronchitis; (3) and premature mortality. Results of this and other research will be applied to health damage estimates of the study described above to estimate total health damage of air pollution in China and its economic cost.

Modeling Air Quality and Policy in China

Focus: Air Quality Policy

Partners: Division of Engineering and Applied Sciences and Department of Earth and Planetary Sciences at Harvard, Institute of Environmental Science and Engineering at Tsinghua University

Schedule: Initiated 2001, Targeted Completion 2005

Researchers at Harvard, with Tsinghua collaborators, are developing a high-resolution window over China within an existing global atmospheric model. This model accounts for transport of chemicals and particulates in the atmosphere by 3-dimensional motions. The regional window will capture and describe the sources of various types of gases and particles, and will allow for chemical transportation of these compounds, including the removal of species by dry and wet deposition. The model will be a powerful tool for scientific understanding of air quality with direct and important linkages to policy choices targeting both global and local pollutants—including their transboundary dimensions. To complement this model, the team is considering the feasibility of a measurement program to provide additional observational data. This could include a mobile laboratory to carry out long-term automated measurements of a range of chemical species. Data obtained would be coupled with information from occasional spatial surveys.

Study on the Popular Understanding and Utilization of Environmental Law in China

Focus: Environmental Law

Partners: Harvard Law School, Zhejiang University

Schedule: Initiated 2001, Targeted Completion 2003

The research team is examining the manner in which environmental law and policies are communicated to, understood, and utilized by the public in China, with particular attention to urban areas. The team will conduct baseline surveys and interview-based qualitative research on the Hangzhou area of Zhejiang Province, and potentially also on Tianjin Municipality. The study will contribute to the understanding of the impact and consequences on the Chinese populace of environmental law development to: (1) create effective environmental policy; and (2) provide avenues of redress by the citizenry over the past decade. The study is an urban compliment to a multidisciplinary rural initiative of the China Project at Harvard University Center for the Environment, completed by team members and others in Anhui Province, with publication pending in 2002. This study also builds on a separate China Project study completed and published by team members in 2001, on the drafting and implementation of the revised Air Pollution Prevention and Control Law.

Systems Analysis of Personal Transportation Demands in Developing Countries

Focus: Transportation Research

Partners: Division of Engineering and Applied Sciences at Harvard University, Harvard School of Public Health, Department of Environmental Science and Engineering at Tsinghua University, multiple institutions in India

Schedule: Initiated 1999, Targeted Completion 2005

Harvard and partner institutions in both China and India are examining the investment, technology, and policy trade-offs in meeting the demand for urban mobility in developing countries. Researchers are conducting a number of urban case studies.

One research stream is developing optimization models that take the predicted demand for person-kilometers traveled as a primary input, and seek the most cost-effective mix of transportation options to meet it, subject to a variety of adjustable policy, technology, and environmental parameters. Critical is that transport options are defined broadly, ranging from "hard" ones (e.g., engine technologies, fuel choices) to "soft" ones (e.g., traffic management, urban planning). Linked to the optimization models are Geographical Information Systems (GIS) that represent the urban plans of target cities geographically and temporally. The GIS serves a number of key purposes: (1) they will model urban growth, densification, and land-use variation; and (2) they will evaluate population proximity to transport corridors and thus human exposures to air pollutants. Such results can be combined with air pollution dose response functions to estimate total health impacts under different policy scenarios. The research initiative began with a pilot study on Beijing and subsequently broadened its focus to Delhi, India. The team is now initiating new case studies in China, including Jinan (Shandong Province), and tentatively Chengdu (Sichuan Province) or Chongqing Municipality.

Total Damages of Energy-Related Air Pollution to Human Health and the Economy in China: From Emissions to Human Exposure

Focus: Air Quality Policy, Health Research
Partners: Department of Economics at Harvard, John F. Kennedy School of Government at Harvard, Harvard School of Public Health, Department of Environmental Science and Engineering at Tsinghua University
Schedule: Initiated 2000, Targeted Completion 2002

In a central link of the initiative to estimate the total health damages of ambient air pollution in China, a joint research team is estimating the intake fraction (IF) or exposure efficiency (EE) of air pollutants in China. This method translates emission rates of key air pollutants from key sectors into population exposures. The team is applying atmospheric dispersion models on source data gathered in five field cities and five sectors—electric power, chemicals, iron and steel, cement, and transportation. Among key source characteristics are stack heights, meteorological conditions, and population in surrounding areas. Derived and validated coefficients will be applied to sources across sectors throughout the country to estimate national average IF of each pollutant, and thus the exposed population. From this, results from earlier epidemiological studies (chiefly those by Harvard team members, including a China Project initiative completed and published in 2001) will be applied to estimate health damages from each economic sector.

HOFFMAN ENVIRONMENTAL RESEARCH INSTITUTE, WESTERN KENTUCKY UNIVERSITY

http://hoffman.wku.edu

Project on Environmental Issues in Guizhou, China

Focus: Environmental Research
Partners: Cave Research Foundation, Institute of Karst Geology, Guilin (Chinese Academy of Geological Sciences, Ministry of Land and Resources), Guizhou Normal University
Funding: Institute of Karst Geology, Cave Research Foundation, Western Kentucky University
Schedule: Initiated 1990, Ongoing

Ten collaborative study groups (seven based in China, three in the United States) have focused on two interrelated issues in Guizhou: (1) water resources and karst-related environmental problems in the areas of Guado and Liupanshui, and (2) a cave and underground river survey in Pingba and Duyun. On a 2002 study trip to western Guizhou, the American project researchers learned of the serious natural arsenic and fluorine problems in that region and the research team subsequently met with scientists at the U.S. Geological Survey working in Guizhou to explore possible collaboration.

Project on Karst Landscape-based Tourism and Environmental/Economic Development in Guangxi and Guizhou Provinces and the State of Kentucky

Focus: Economic Development
Partners: Institute of Karst Geology, Guilin Tourism Development Corporation
Funding: Western Kentucky University, Karst Research Institute, Guilin Tourism Development Corporation
Schedule: Initiated 1998, Ongoing

Southwest China (Guanxi and Guizhou provinces) and south central Kentucky both have globally important karst landscapes where spectacular surface and cave landscapes offer tourism-based economic development opportunities. Seven collaborative study groups visited and met with administrators at numerous surface and cave park areas around Guilin and Lipu (Guangxi) and around Mammoth Cave National Park (Kentucky) to learn about common resource management problems and shared solutions. In 2001 the partners in this project conducted a three-day English language workshop at the Karst Institute in Guilin.

UNESCO Geological Correlation Program (Project #379): Karst Processes and the Global Carbon Cycle

Focus: Air Quality Research

Partners: Institute of Karst Geology, Cave Research Foundation, U.S. National Speleological Society, Karst Waters Institute

Funding: Western Kentucky University; U.S. National Park Service; Institute of Karst Geology (Guilin); American Chemical Society Petroleum Research Fund; U.S. National Speleological Society; Cave Research Foundation; Karst Waters Institute

Schedule: Phase I Initiated 1995, Completed 1999; New Phase Ongoing

Biogeochemical processes within karst areas, which cover some 12 percent of the earth's land surface, consume carbon dioxide gas from the atmosphere, but the rates are not well known. Since 1995 the partners in this project have jointly developed new methodologies for the measurement of the karst-associated carbon sinks through seven collaborative field excursions (five in China, two in the United States). In 1998, an international conference on this project held in Kentucky attracted 110 scientists from 17 countries. In 2002, the project organizations worked in Guangxi Province to: (1) install water-monitoring equipment; (2) conduct training on the equipment and data analysis; and (3) initiate long-term monitoring of the carbon sink near Yaji (Guangxi), which will become the fifth field station of a developing global network.

UNESCO International Geological Correlation Program (IGCP), Project 448: Global Correlation of Karst Geology and Relevant Ecosystems

Focus: Hydrogeology Research, Biogeochemistry Research

Partners: Institute of Karst Geology, Guilin; International Association of Hydrogeologists; International Geographical Union; International Union of Speleology; U.S. National Park Service; Cave Research Foundation; Karst Waters Institute

Funding: IGCP Project 448, Western Kentucky University, Institute of Karst Geology

Schedule: Initiated 2000, Targeted Completion 2004

Karst landscape and aquifer systems are formed on highly soluble rocks such as limestone and are characterized by such features as caves, underground rivers, and large springs. One of the world's greatest karst regions covers a half million square kilometers within eight provinces of southern China. The purpose of this UNESCO International Geological Correlation Program (IGCP) project is to enhance international communication and cooperation among scientists studying both the physical and biological components of karst ecosystems. The project is directed by a team of international scientists from the Institute of Karst Geology (China), the Hoffman Environmental Research Institute (United States), and the Centro di Studio per la Faunistica ed Ecologia Tropicale (Italy). A ten-day field excursion was organized through the karst areas of southwest China in September 2001, and international conferences are planned to take place in Spain in 2002 and Kentucky in June 2003, cooperatively with the other three primary partner international groups investigating karst issues.

Workshop on Geographic Information Systems (GIS) for Karst Water Resources in Southwest China

Focus: Water Research

Partners: Institute of Karst Geology, Cave Research Foundation

Funding: Western Kentucky University, Institute of Karst Geology, Guilin, Cave Research Foundation

Schedule: Initiated 2000, Completed 2002

Geographic Information Systems (GIS) computer technology provides powerful tools for the analysis of spatial data, and is widely used in environmental, economic, and planning investigations. In 2000 this project's research team conducted a three-day workshop at the Institute for Karst Geology in Guilin on the use of GIS for water resource investigations. The workshop focused on analysis and visualization of three-dimensional relationships common in groundwater quality and quantity investigations using Arcview extensions. An outline manual detailing procedures for GIS analysis of karst underground river surveys was translated into Mandarin. A follow-up visit to Guilin in 2002 showed that the group had obtained an impressive level of sophistication with the technology, having used it to complete several significant projects, including an extensive structural karst geology analysis at the proposed site of a large airport near Guangzhou, Guangdong.

Institute for Environmental Studies, University of Wisconsin

http://www.ies.wisc.edu

Ongoing Projects: University of Wisconsin is a key partner with the U.S.-China Environmental Fund in two projects: Biodiversity

Conservation and Protected Area Management Project and National Parks, World Heritage Sites. For full descriptions see the International NGO Inventory in this issue of the China Environment Series.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY—DEPARTMENT OF URBAN STUDIES AND PLANNING

http://web.mit.edu/dusp/www/academics/idrp/MRP/AGSresearch.htm

Alternative Energy-Efficient and Low-Pollution Technologies in China and Industrial Supply Chains

Partners: (principle researchers in parentheses) Swiss Federal Institutes of Technology, Zürich (Hans C. Siegmann, Qian Zhiqiang), Massachusetts Institute of Technology (Karen R. Polenske, János M. Beér), University of Tokyo (Masayoshi Sadakata, Steven B. Kraines), Chinese Academy of Sciences (Chen Xikang, Yang Cuihong), Taiyuan University of Technology (Fang Jinghua)
Focus: Energy Efficiency
Funding: Alliance for Global Sustainability, U.S. National Science Foundation, China National Natural Science Foundation, MIT Center for International Studies
Schedule: Initiated 1999, Targeted Completion July 2003

The project touches a few significant environmental sustainability issues related to the cokemaking sector in Shanxi Province. Researchers are working at the forefront of the environmental field in terms of adapting current and developing new economic, transportation, and pollution-monitoring tools of analysis. During the past four years, the multidisciplinary team, which consists of chemical engineers, economic planners, and physicists, has been making regular field missions to China. Through case studies, plant surveys, and literature reviews, the research team is: (1) examining the alternative cokemaking technologies that are being used in the province; and (2) conducting case studies of three plants. There are more than 20 types of coke ovens in use in China. A very important aspect of this project has been developing a transportation model to examine alternative plant locations and the pollution and economic effects of the transportation of the coal to the plants and of the coke to the domestic and foreign consumer. A critical part of the work has been the plant surveys from which the team has been able to compare and analyze energy use, pollution generated, and employment involved in cokemaking over time (from 1998 to 2001) for state-owned enterprises and township-village enterprises. The team is preparing a book on this research for publication and members of the team already have published individual articles in several different journals.

The Technology-Energy-Environment-Health Chain in China: Monitoring for Particulates in Cokemaking Plants and Worker Households

Partners: (Principle Researchers in parentheses) Swiss Federal Institutes of Technology, Zürich (Hans C. Siegmann, Qian Zhiqiang), Massachusetts Institute of Technology (Karen R. Polenske, János M. Beér), University of Tokyo (Masayoshi Sadakata, Steven B. Kraines), Chinese Academy of Sciences (Chen Xikang, Yang Cuihong), Taiyuan University of Technology (Fang Jinghua)
Focus: Air Quality Management
Funding: Alliance for Global Sustainability, U.S. National Science Foundation, China National Natural Science Foundation, MIT Center for International Studies
Schedule: Initiated 1997, Targeted Completion 2002

The project is monitoring particulate pollution in the cokemaking sector in Shanxi Province. This project utilizes three mobile, battery-operated particulate monitors to run the pollution tests, which will be conducted both in the cokemaking plants and in the homes of cokemaking workers. One of the physicists on the research team developed two of the three mobile air-pollution monitors in use. The team is writing articles discussing the results from this testing. If funding becomes available, the team proposes to extend the project to include the health effects on the cokemaking workers and families of changes in the environmental regulations and adoption of new cleaner technologies.

PACE (PROFESSIONAL ASSOCIATION OF CHINA ENVIRONMENTALISTS)

http://www.chinaenvironment.net

China Environment Seminar Series

Partners: The World Bank, numerous environmental NGOs
Funding: The World Bank, corporate donations, member volunteers
Schedule: Initiated 1998, Ongoing

Since its inception, PACE has organized periodic seminars and workshops on a variety of topics related to China's environment.

These seminars have allowed for increased exchange of information and ideas on issues related to China's environment among PACE members and other interested parties.

Discussion Board

Funding: Supported through member volunteer work
Schedule: Initiated 2001, Ongoing

Since 2001, PACE has sponsored and maintained a discussion board, which is open to the general public through PACE's Web site (www.chinaenvironment.net). This discussion board has promoted increased exchange of information and ideas on issues related to China's environment among PACE members and other interested parties.

PACE Listserve

Funding: Supported through member volunteer work
Schedule: Initiated 1998, Ongoing

Since 1998, PACE has sponsored and maintained an e-mail listserve. The listserve has allowed for increased exchange of information and ideas on issues related to China's environment among PACE members and other interested parties. PACE membership is not required for participation in the listserve. To subscribe, send a blank email to PACELISTSERVER-subscribe@yahoogroups.com. To contribute to the listserve, email PACELISTSERVER@yahoogroups.com.

Sinosphere Online Journal

Funding: Supported through member volunteer work
Schedule: Initiated 1999, Ongoing

Sinosphere Journal is the online journal for PACE and is published at www.chinaenvironment.net/sino. The journal covers a wide range of topics relevant to China's environment, such as transportation, energy, trade, U.S.-China relations, air and water resources, environmental education, and NGOs in China. After a recent reorganization of the editorial board, the new *Sinosphere Journal* will resume publication in summer 2002. The journal will be distributed either electronically or by mail to nearly 1,000 PACE members around the globe.

Part IV. Chinese and Hong Kong Environmental NGO Activities

(*Editor's Note: Several Shanghai NGOs are described in a feature box in this issue of the China Environment Series*)

Agricultural Service and Training Pioneering Team, Nankai University (Tianjin)

ZHANG Huiteng, zht0695@sohu.com

Organization Background: The Agricultural Service and Training Pioneering Team is comprised of approximately 60 graduate students and faculty members primarily from the School of Economics and the School of International Trade at Nankai University. Their research focuses on standards and principles of agricultural production, as well as the development and utilization of natural and human resources. This university organization is carrying out projects particularly designed to strengthen the cooperation between agricultural research experts and local farmers.

Beijing Environment and Development Institute (Beijing)

MA Zhong, mazhong@public.bta.net.cn

Ongoing Projects: BEDI is a key partner with Environmental Defense in the Total Emissions Control and Emission Trading in China project. For a full description see the International NGO Inventory in this issue of the China Environment Series.

Center for Biodiversity and Indigenous Knowledge (Kunming, Yunnan Province)

http://cbik.org

Ongoing Projects (See CES 4): Northwest Yunnan Great Rivers Conservation and Development Project, Rangeland Management Project

Ecotourism and Eco-Cultural Tourism Project

Focus: Conservation Management
Funding: Pending
Schedule: Initiated 2001, Targeted Completion 2006

This projects will have two main components: (1) the Geo-Architecture and Eco-Cultural Tourism Project; and (2) the Action Planning for Geo-Architecture and Bio-Cultural Conservation. The conservation and ecotourism sites will be selected by the Center for Biodiversity and Indigenous Knowledge (CBIK) together with villagers. At each site, CBIK will study the different dimensions of indigenous geo-architectural heritage and experiment with various ways to improve the local living conditions in symbiosis with the environment. Participatory courses, workshops, and textbooks will be provided to promote indigenous housing knowledge. CBIK also will implement effective regulations of developing eco-cultural villages.

Watershed Management Project

Focus: Water Management, Water Research
Funding: The Ford Foundation, Rockefeller Brothers Fund, World Resources Institute (Resources Policy Support Initiative)
Schedule: Initiated 2001, Ongoing

This project includes two components: (1) the watershed dynamics project; and (2) the watershed governance project. The goal of the former is to understand societal and ecological dynamics in the Mekong River Basin and its secondary watersheds. This will be accomplished by establishing a Geographic Information System (GIS) database, which will be used to analyze local ecological strategies for livelihoods reacting to environmental stresses and socioeconomic constraints. GIS also will be used to assess the state of traditional natural resource management and governance systems in the basin. This analysis will help generate recommendations and guidelines for policies and resource management. The watershed governance project will focus on assessing the impacts and effectiveness of institutional and policy changes on upland watershed management in the Mekong River Basin.

CENTER FOR COMMUNITY DEVELOPMENT STUDIES (KUNMING, YUNNAN PROVINCE)

WU Yusong, wuyusong@hotmail.com

Organization Background: Based in the southwestern province of Yunnan, the Center for Community Development Studies (CDS) works on projects that empower local communities to improve their welfare and reduce adverse environmental impacts. Currently, CDS is working with the Rural Development Institute on legal and policy approaches to land tenure on grassland and forestland projects (see CES 4). CDS also is working with government and research centers in Yunnan, Guizhou, and Sichuan provinces to implement a two-year project to identify the primary forest resource conflicts and their associated causes in southwest China. Together with the Pesticide Action Network North America (PANNA) and Pesticide Action Network Asia Pacific, CDS is active in a project to promoting ecological agriculture in China. (*Editor's Note: See PANNA's project entry in the International and U.S. NGO Activities section of this inventory*)

CENTER FOR LEGAL ASSISTANCE TO POLLUTION VICTIMS (BEIJING)

WANG Canfa, clapv@public2.east.net.cn

Organization Background: Approved by the China University of Political Science and Law and registered at the Chinese Judicial Ministry in October 1998, the Center for Legal Assistance to Pollution Victims started operation in November 1999 as an NGO. The center is composed mainly of professors and assistant professors engaged in environmental law research and teaching at the China University of Political Science and Law. Law students and part-time legal experts and scholars from other institutions also volunteer time at the center. Professor Wang Canfa, who teachers environmental law, is presently the director of the Center.

Legal Assistance to Pollution Victims

Focus: Environmental Law
Funding: Ford Foundation, Canadian Embassy in Beijing, UK Embassy in Beijing, Japan Foundation Asia Center
Schedule: Initiated 1999, Ongoing

The Center for Legal Assistance to Pollution Victims (CLAPV) provides legal assistance to the general public and makes substantial efforts to improve the enforcement of environmental laws in China through a variety of means: (1) A legal assistance hotline provides free legal advice to pollution victims. As of March 2002, the center had received 3,291 telephone calls (which

led to the filing of 257 cases) and replied to 163 letters; (2) legal experts at the center have published 77 advisory letters in the *China Environmental News*, *China Youth*, *Post Weekly, Life Weekly* and other national newspapers; published six articles on typical pollution victim cases, and; (3) cooperation with relevant news media organizations to conduct lectures on environmental law and advance the public's awareness of environmental law. For example, in cooperation with *China Environmental News* the center regularly publishes public letters concerning questions of environmental law in an article called the "Lawyer's Mailbox." Representatives from the center have held six lectures at a Beijing radio station on environmental issues and how to protect civilians' environmental rights and interests; (4) cooperation with law firms to undertake environmental cases and pay expense of proceedings and lawyer fees for pollution victims who are unable to pay for their cases; (5) research and critique for strengthening the legislation and enforcement of environmental laws in China; (6) training for the judges and administrative officials to improve their professional knowledge and raise the enforcement level of environmental laws; and (7) participation in international and national seminars of environmental law enforcement to promote international exchanges on the issue. (*Editor's Note: See Kenji Otsuka's commentary for more information on this NGO's work*)

China Green Student Forum

http://www.greenchina.org

Ongoing Projects (See CES 4): Consulting and Training Center for Students Environment Groups, Green Seed

Training Camp for Young Environmentalists

Focus: Environmental Capacity Building
Partners: Student Environmental Societies at Northeast University of Finance and Economy and Dalian Marine University
Funding: Global Greengrants Fund
Schedule: Initiated November 2001, Ongoing

The training camp is designed for young Chinese environmentalists to obtain necessary skills to promote environmental awareness on their university campuses. The camp's ultimate purpose is to encourage these environmentalists to join forces and learn from each other in order to protect the environment in China. Furthermore, this project aims to strengthen the solidarity of the green community and provide new opportunities and platforms for young leaders to engage in communication outside their communities. During the training sessions, students participate in various group discussions to exchange ideas and in on-site training to collect firsthand information on environmental management and conservation work.

China Wild Bird Liberation Front (Dalian, Liaoning Province)

WEN Bo, chinabirding@hotmail.com

Wild Bird Protection Campaigning

Focus: Environmental Education, Conservation Capacity Building
Partners: China Bird Watch, Wild Bird Society of Dalian, Green Stone City (NGO in Nanjing)
Funding: Global Greengrants Fund
Schedule: Initiated November 2001

This grassroots organization is devoted to campaigning against poaching, trading, and consumption of wild birds. They also publish and distribute a biweekly newsletter, which includes educational information on birds and advocates measures to protect wild birds by, for example, creating safeguard flyways of migratory bird species.

Chongqing Green Volunteers Federation (Chongqing, Sichuan Province)

WU Dengming, Wen Housheng, cqbvu@sina.com

Organization Background: The Chongqing Green Volunteers Federation is active in a number of research, environmental education, and public awareness activities, including: (1) providing teacher training classes in schools; (2) investigating and monitoring environmental protection in natural woods along the Yangtze River and around the Three Georges Dam area; (3) establishing green schools; (4) advocating green industry; and (5) promoting public awareness of sustainable consumption and recycling within Chongqing.

CIVIC EXCHANGE (HONG KONG)

http://www.civic-exchange.org

Addressing Cross-Border Air Pollution

Focus: Air Quality Research
Funding: Pro-bono from volunteers and researchers
Schedule: Completed October 2001

Civic Exchange researchers and volunteers carried out a comparative study of the Hong Kong-Guangdong and U.S.-Mexico borders investigating mechanisms that address trans-boundary air pollution. This study, which has been published on the Civic Exchange Web site, involves a critical assessment of some of the air pollution initiatives along the U.S.-Mexico border and evaluates their applicability to the Hong Kong-Guangdong situation.

Air Quality Monitoring for Southern China

Focus: Air Quality Management
Partners: Peking University, Georgia Institute of Technology, Hong Kong University of Science & Technology, Hong Kong Polytechnic University, Environmental Protection Department of Hong Kong SAR Government
Funding: Hong Kong Jockey Club Charities Trust, CLP Power, and Hong Kong Environmental Protection Department
Schedule: Initiated 2002

This two-year pilot project contains the following goals: (1) to study ground level ozone and fine particles in order to fill in knowledge gaps in smog and visibility problems in Hong Kong and the Pearl River Delta region; (2) to provide insight into policy relevant questions that could assist policymakers in managing regional air quality in Hong Kong and south China; (3) to strengthen the ability of public sector agencies, private businesses, and the academic scientific community to develop policies to improve air quality management; and (4) to build long-term air quality management capability in Hong Kong and Mainland China.

Emissions Trading in China

Focus: Air Quality Management
Funding: Pro-bono from volunteers and researchers
Schedule: Completed October 2001

A background paper is available on the Civic Exchange Web site to introduce the concept of emissions trading to Hong Kong readers. The paper outlines emissions trading experiences in numerous countries, including a range of experiments in Mainland China. The paper raises the possibility that Hong Kong could be an emissions trading center for the region in the future.

CLEAR THE AIR (HONG KONG)

http://www.cleartheair.org.hk

Organization Background: Clear the Air is committed to promoting the introduction and implementation of measures to significantly reduce air pollution in Hong Kong by: (1) promoting and publicizing strong, focused community support for air pollution control measures; (2) working with government and stakeholders to find practical solutions; and (3) educating the public on the importance of the issue to their own health and wealth.

THE CONSERVANCY ASSOCIATION (HONG KONG)

http://www.conservancy.org.hk

Organization Background: Founded in 1968, the Conservancy Association is Hong Kong's oldest environmental NGO. Its membership initially was comprised of young professionals who sought to apply pressure on the government to institute stricter pollution control and conservation laws. Today the Conservancy Association focuses on conservation and development policy, waste management, energy, and greenhouse gas problems. In these issue areas, the Conservancy Association advocates appropriate environmental policies, monitors government actions, promotes environmental education, and takes a lead in community participation. This group has 15 full-time staff and a number of unpaid volunteers running approximately 30 different campaigns a year. Since the 1980s, some of the members of this NGO sit on the Hong Kong government's Advisory Committee on Environmental Pollution.

Environmental Volunteer Association of Sichuan University

Website Construction for Promoting Student Environmental Leadership and Action

Focus: Environmental Education
Funding: Elisabeth Luce Moore Leadership Program for Chinese Women Mini-Grant (application stage)
Schedule: Planning stage

This project is constructing a Web site targeted at members and leaders of student environmental groups in China, as well as undergraduate and graduate students, and interested citizens. It is designed to provide these groups with environmental information and leadership training, and allow them to exchange information and advice among themselves. The Web site also will be a vehicle for online consultancy and trouble-shooting.

Friends of the Earth (Hong Kong)

http://www.foe.org.hk

Ongoing Projects (See CES 4): Bless the Yangtze and Yellow Rivers Project, China BELL, Earth Award

Environmental Education Training Delegation

Focus: Environmental Education
Partners: Local environmental protection bureaus and local schools in Guizhou, Hubei, Jiangxi, and Henan Provinces
Funding: Personal donations
Schedule: Initiated November 2000, Completed 2001

This training delegation visit aimed to provide an opportunity for local teachers and students in Guizhou, Hubei, Jiangxi and Henan provinces to acquire environmental knowledge and to enhance their admiration and respect for nature. The training also aimed to inspire the teachers and students to become engaged in the green movement. Participants included people from government education and environmental bureaus, research organizations, and teaching colleges, as well as principals and teachers from kindergartens, primary, and secondary schools.

Friends of the Earth, Guizhou (Guizhou Province)

YANG Jiongli, zlbmu@sina.com

Organization Background: Established in 1997, this NGO had been active in environmental education activities in one of China's poorest provinces, Guizhou. Some of the major activities undertaken by the Friends of Earth, Guizhou include: (1) running a series of lectures on environmental issues in schools and colleges; (2) publishing environmental education textbooks; (3) holding student environmental education camps and bird watching activities in nature reserves; and (4) establishing the Cao Hai Ecological Education Base. Working with local businesses and government bureaus, Friends of the Earth, Guizhou has become one of the shareholders of the Cao Hai Ecological Education Base, which will be the location for future environmental education activities and camps. Friends of the Earth, Guizhou eventually will be able to subsidize their NGO from the funds raised by this educational center.

Friends of Green (Nanjing, Jiangsu Province)

LU Wei and WAN Lina, luwei@discovery.cn.com

Organization Background: This relatively new NGO stresses environmental education and sutainable farming through a variety of activities, including: (1) leading walks along the Yangtze River to promote environmental awareness and protection; (2) writing and editing textbooks on environmental protection for kindergarten education; (3) constructing a protective base for precious birds and rare animals in wetlands in Jiangsu Province; and (4) establishing an organic farm in Nanjing City.

Friends of Green—Green Education Committee of Tianjin Municipal Environmental Science Association (Tianjin)

SUN Yanjun, sunyanjun011@sina.com

Organization Background: Some retired environmental experts and professionals took the initiative to establish the Friends of Green in Tianjin in 2000. The main activities of this NGO include: (1) conducting surveys on public environmental problems; (2) providing environmental advice to governmental agencies; (3) collecting and sharing environmental information with the public; and (4) offering legal aid to pollution victims. Support from Shell Ltd. enabled Friends of Green to organize volunteers to plant trees in the Enbebei Desert in Inner Mongolia on May Day 2001.

Friends of Nature (Beijing)

http://www.fon.org

Organization Background: Friends of Nature (FON) is the first legally registered environmental NGO in China. Central goals of FON are to improve public environment awareness and to enhance environmental education among preliminary and middle school students. Through their Green Hope Action program, FON volunteers go to underdeveloped regions to conduct environmental education in rural schools. Another innovative educational initiative is FON's mobile classrooms—The Antelope and Wild Pony Busses take volunteers to rural schools and communities to lead wildlife conservation games and programming. The Better Environment Scheme program encourages primary and middle school students to design and create environmental protection projects in their communities. In addition to the regular public education activities (e.g., tree planting, bird watching, expert lectures, and summer/winter-camps), in 2001 FON published the book *Environmental Disasters in the 20th Century* and issued a new annual survey on environmental awareness reporting in Chinese newspapers.

Global Village of Beijing

http://gvbchina.org

Ongoing Projects (see CES4): Green Community, China Earth Day, Greem Communities, Environmental Center **(See also Green NGO and Environmental Journalist Forum Report at http://ecsp.si.edu):** Green Olympics.

Green Association for Environmental Action (also known as the "Green Ants")

Yang Yang, juancitoy@yahoo.com

Organization Background: Green Association for Environmental Action (GAEA) is a grassroots organization founded by over 60 nature lovers in Nanjing. This group has been active in conservation projects and public education since 2000. GAEA is currently pursuing official NGO status with the local government. All operational funding comes from private donations and membership fees. In its projects GAEA's main partners include the Friends of Nature and green college student groups in Nanjing.

Butterfly Habitat Restoration

Focus: Biodiversity Management
Schedule: Initiated 2000, Ongoing

The *Luehdorfia chinensis* butterfly is a Class II protected species under China's Wild Animal Protection Law and listed under the "K" category of IUCN's Global Red List. Due to heavy habitat loss, this butterfly's population has dwindled drastically in past years. This project aims to restore the habitat of *Luehdorfia chinensis* at Niushou Mountain in Nanjing and preserve the ecosystem of this mountain.

Green Life Campaign

Focus: Environmental Education
Schedule: Initiated 2000, Ongoing

This project aims to educate and encourage the public to incorporate environmental protection into their daily lives. There are two main components of the project. First, this NGO sets up community-based educational outreach to foster an environmentally friendly lifestyle. Efforts have been made to publicize the three "R" principles (reduce, reuse, recycle) to ensure the sorting and proper disposal of garbage, and to promote composting, organic gardening, growing of indigenous plants, animal welfare, and energy saving. The second component of the project is collaboration with supermarkets and other businesses to promote green consumption. For example, GAEA has been working on informing consumers: (1) to avoid products containing hazardous materials; (2) to buy organically grown foods; and (3) to recycle packaging materials and used batteries.

Zijin Mountain Watch

Focus: Conservation Management
Schedule: Initiated 2000, Ongoing

Located in the eastern suburb of Nanjing, Zijin Mountain is a major tourist site in the city. The aim of this project is to preserve the rich biodiverse ecosystem of Zijin Mountain and to promote its sustainable management through guided eco-walks with tourists, monitoring of the mountain management, and news media publicity. More specifically, GAEA will evaluate new development projects, such as the reconstruction of an altar and the expansion of a guesthouse on the mountain. GAEA also will organize volunteers to collect garbage and lobby the local government to phase-out open dumping on the mountain. In addition, GAEA is developing a proposal to ban gasoline-powered vehicles in this mountain area.

Green Association of Tsinghua University (Beijing)

SUN Hao, MENG Qingyu, Department of Environmental Science and Engineering, Tsinghua University

Organization Background: This university environmental association, founded in the mid-1990s, promotes environmental education exchanges between Beijing and Hong Kong college students, as well as several projects including: (1) the "Protect the Yellow River and Show Love to the Green" environmental awareness project; (2) ecological investigation at Mount Five Fingers in Hainan Province; and (3) activities to protect Tibetan antelopes.

Green Earth Volunteers

http://chinagev.org

Tree Planting and Adoption in Inner Mongolia

Focus: Environmental Education
Funding: Ford Foundation, member donations, volunteer support
Schedule: Initiated March 2001, Completed April 2001

On three weekends in spring 2001, more than 210 members of the Green Earth Volunteers (GEV) from different parts of the country gathered in the Hukou area of the Inner Mongolia Autonomous Region to plant and "adopt" 3,000 trees. Among the volunteers were 50 students, 30 environmental scientists (and their families) from the China Institute of Environmental Science, and many international participants. The adoption of trees is meant to emphasize the long-term relationship between people and nature. GEV has received a two-year grant (2000-2002) of $40,000 from the Ford Foundation for this and other activities.

Bird Watching in Shandong and Making ID Tags for Birds

Focus: Environmental Education
Funding: Ford Foundation, member donations, volunteer support
Schedule: Initiated August 2000, Completed December 2000

During this project's bird watching activities, GEV members not only learned about China's precious indigenous cranes, but also put ID tags onto birds. This activity was a live classroom for both children and adults to become aware of the vulnerability of wild birds in China and the necessity to enforce wildlife protection regulations.

Greener Beijing

http://gbj.grchina.net

Internet Activism and Online Green Community

Focus: Environmental Education
Partners: Various grassroots environmental NGOs
Funding: Volunteer donations
Schedule: Initiated 1998, Ongoing

Greener Beijing was the first Chinese NGO to be primarily internet-based. Two young brothers, Song Gang and Song Xinzhou, established the Greener Beijing Web site in 1998. Through Internet technology, Greener Beijing aims to promote public environmental awareness and to act as a networking service and supplier of environmental protection information for volunteers and grassroots green NGOs. Many of the main environmental activists in Beijing have collected and shared information through this Web site. A central focus on the Web site has been municipal waste problems and the pollution from used batteries. Greener Beijing has helped environmental volunteers in Fujian, Liaoning and other provinces to mobilize the public to collect solid waste

and used batteries. Important online campaigns in the past few years that Greener Beijing has initiated and been actively involved in include: (1) Save the Tibetan Antelope (since January 2000); (2) A Green Beijing for Green Olympics together with graduate students at the Environmental Science Department, Tsinghua University (since April 2000); (3) Greener Beijing Tableware Bag Action (since September 2000); (4) Publicity Tour Music Calls for Environmental-Friendly Living (since November 2000); and (4) Say No to Wild Tortoise Products from Hainan Yangshengtang Pharmaceutics (since 2001). With two prominent Chinese NGOs—the South-North Institute for Sustainable Development and Global Village of Beijing—Greener Beijing also launched the Green Power Campaign to promote the awareness and use of clean and energy-efficient products in China. To better connect with the members of its virtual community, Greener Beijing organized many tree-planting, camping, and social activities in 2001. Invited by the Knowledge Workshop of the *Beijing Evening* (a major daily newspaper in Beijing), Greener Beijing also holds periodic environmental forums, which consist of speeches, and discussions on different topics from sand storms and the Green Olympics to green NGO development.

GREEN FRIENDS ASSOCIATION (SHIJIAZHUANG, HEBEI PROVINCE)

ZHANG Zhongming, GAO Hongwei, ghw@jingying.com.cn

Organization Background: This relatively new NGO is active in a wide range of activities in Shijiazhuang City and the surrounding suburbs, including: (1) tree-planting along dry rivers in suburban areas; (2) fundraising for cleaning the canal in Shijiazhuang; (3) environmental education exhibitions and textbooks; (4) establishing "Green Schools" in the city; and (4) presenting the "the Daughter of the Earth" award to area conservationists.

GREEN HOPE (*SHAN NUO HUI*)—THE SCIENTIFIC EXPLORATION AND OUTDOOR LIFE SOCIETY OF BEIJING FORESTRY UNIVERSITY (BEIJING)

FAN Yingying, senol@263.net

Organization Background: Since 1995, members of the Green Hope have been actively involved in grassroots movements in Beijing protecting the golden monkey and Tibetan antelope. They also organized a scientific investigation of Xiaoluanhe River in 1995 and environmental education programs for children in poor areas of Gansu Province and Inner Mongolia in 2000. In Beijing, they have launched various public campaigns promoting recycling, reducing paper cards to save the forest, and giving up disposable wooden chopsticks.

GREENPEACE—CHINA (HONG KONG)

http://www.greenpeace-china.org.hk

Organization Background: Greenpeace China undertakes non-violent direct actions to protest where environmental damage is taking place. Current projects include campaigns for: (1) building a toxic-free Pearl River Delta; (2) improving water quality in Dongjiang River; (3) stopping genetically modified food; (4) and banning waste incineration in Hong Kong.

GREEN PENG CHAU ASSOCIATION (HONG KONG)

http://www.greenpengchau.org.hk

Organization Background: This group, formed by a group of young people who returned to Peng Chau Island after study abroad, is committed to protecting and promoting the sustainable development of their island home, while simultaneously preserving cultural traditions. A multi-purposes education center is under construction and one active project encourages local families to rent empty wasteland and plant gardens.

GREEN PLATEAU INSTITUTE (YUNNAN PROVINCE)

SHI Lihong, zhinong@public.km.yn.cn

Conservation and Community Development in Zhenxi District

Focus: Conservation Management, Environmental Education
Funding: WWF China Programme, The Nature Conservancy, The Hong Kong Conservancy Association, Institute of International Education, Global Greengrants Fund
Schedule: Initiated 1999, Ongoing

Zhenxi district in northwest Yunnan is an area rich in biodiversity. Through environmental education and other projects, Green Plateau Institute aims to increase local people's environmental awareness and promote sustainable development. Their main ongoing projects include: (1) Diqing Prefecture environmental education teacher training; (2) Diqing Prefecture Elementary School "Love and Protect Diqing's Environment" essay and picture contest; (3) Naren Village villager mountain patrol project; (4) Naren Village redesign of traditional housing project; and (5) Naren Village women's weaving project.

Green Power (Hong Kong)

http://www.greenpower.org.hk

Organization Background: Green Power opened the Chinese White Dolphin Resource Center in 1997, so as to raise public concern about this endangered dolphin. This Hong-Kong based NGO also joined hands with the Guangzhou Environmental Protection Bureau and the Guangzhou Research Institute of Environmental Protection to establish the Green Field Ecological Education Center, which facilitates the exchange of green education and promote sustainable development awareness between Hong Kong and Mainland China.

GreenRiver (Sichuan Province)

http://green-river.org

Conservation of the Source of the Yangtze River

Focus: Conservation Capacity Building
Partners: Various Green NGOs, Chinese school and college student associations
Funding: Friends of the Earth, Hong Kong; International Fund for Animal Welfare; corporate and individual donations
Schedule: Initiated 1994, Ongoing

GreenRiver aims to protect the source of the Yangtze River through a variety of projects, including: (1) construction of an ecological monitoring station in the Tongtian River Basin (1994) and the Suonandajie monitoring station in the northern river basin of the Yangtze headwaters (1996); (2) cooperation with local scientific research organizations and journalists to survey and research the quality of the Yangtze River headwaters in order to accumulate baseline data on the health of the river and to help design an effective environmental protection plan for the basin; (3) establishment of monitoring stations to assist local governments in developing anti-poaching patrols; and (4) recruitment of volunteers to educate local rural communities and tourists about the threats to the Yangtze River ecosystem. In 2001, GreenRiver launched a volunteer system at the Suonandajie station in which every year 30 volunteers from the local community and beyond will be recruited to maintain the operation of the station, train local people, and participate in conservation work. In addition to private donations and foundation support, Yang Xin (the founder of GreenRiver) has used money from sales of two of his photo-essay books on the Yangtze River to improve the Suonandajie Protection Station and support other activities. GreenRiver was formally registered as an NGO in 1999.

Greensos Fund

http://www.greensos.org

Mini Grants for Student Environmental Groups

Focus: Environmental Capacity Building
Funding: $3,000 (ECOLOGIA)
Schedule: Initiated 2002, Targeted Completion 2004

Thirteen former leaders of student environmental groups from western Chinese universities assisted in the establishment of the Greensos Fund Council in March 2002. This council will review grant applications and manage the distribution of funding to ten student environment initiatives in six western provinces and Chongqing Municipality. As of the 15 April 2002 deadline, 23 proposals from 15 universities and individual organizations were received. Evaluations of the Greensos Fund Council will be open to the public. Approved proposals include:

- Guangxi Medical University (Nanning City)—Rejecting Consumption of Guangxi's Wild Life is a project consisting of surveys, newspaper articles, educational shows, lectures, and posters;
- Northwest University of Politics & Law Debate Competitions (Xi'an City)—lectures and posters on environmental education;
- Guizhou University (Guiyang City)—the establishment of the first environment education corner in Guizhou university;
- Xi'an Institute of Science & Technology (Xi'an City)—Behavior Art Show. This show will feature garments made from garbage

and will be performed in universities and the city center in Xi'an; and,
• Lanzhou University (Lanzhou City)—survey and public education on air pollution in Lanzhou City.

Green Stone City (Nanjing, Sichuan Province)

http://www.green-stone.org

Organization Background: Green Stone City, located in Nanjing, grew out of a virtual forum for environmental protection groups and university student volunteers in Jiangsu Province. Since its founding in September 2000, Green Stone City has held regular environmental forums for college students, consultations, and campus mobilizing activities. Green Stone City is now moving toward a united force of grassroots environment protection initiatives in the entire province.

Promoting Public Environmental Awareness
Focus: Environmental Education
Partners: Nanjing Environmental Protecting Communication and Education Center (under Nanjing EPB), various universities and NGOs in Nanjing, Beijing, Shanghai and Xiamen
Funding: Volunteer and business donations, consultation fees, grants from Global Greengrants Fund
Schedule: Initiated 2000, Ongoing

Through a network of college student associations, Green Stone City has managed to organize well-attended educational activities such as: (1) the Green Stone Training School; (2) Saving Baiji Dolphin and Luehdorfia Butterfly programs; (3) Nanjing Bird Conservation Newsletter; (4) Community Environmental Health Assessment program; (5) Nanjing Universities Environmental Education Tour; and (6) training courses with the Chinese staff from Roots and Shoots. This NGO also has led various plastic bag, paper, and battery reduction campaigns, as well as a broader campaign promoting Nanjing citizens to support the sustainable development of the Zijin Mountain and Qinhuai River. Green Stone City also has initiated some investigations into the ecological quality of the Yangtze River near Nanjing and a study into the illegal markets of wild animals in Nanjing.

Green-web (Beijing)

http://www.green-web.org

Online Activism and Environmental Protection Outreach Initiatives
Focus: Environmental Education
Partners: Various grassroots environmental NGOs and corporations
Funding: Private and corporate donations

The Green-web is a nonprofit independent Web site dedicated to environmental issues, initiated by several (now graduated) Chinese university students. Green-web aims to promote environmental education and hands-on environmental protection projects, and most importantly to bridge the gaps between grassroots environmental groups and organizations in China. Currently, there are two fulltime staff at Green-web and several volunteers that carry out the following outreach programs: (1) waste battery collection—in cooperation with a Beijing garbage recycling center, they have launched battery collecting campaigns and sparked the placement of battery collection containers in local communities and elementary schools; (2) green life activities—Green-web holds workshops in local communities on environmental protection activities such as water and energy saving, paper reuse, animal protection, and safe use and disposal of chemicals; (3) tree planting—Green-web has organized tree planting at the Deer Garden and other areas in Beijing. They plan to set up a tree planting center this year; and (4) bird watching—Green-web wishes to set up programs to expose urbanites to nature and wildlife and enhance their environmental awareness.

Green Yanbian (Yanbian, Jilin Province)

LI Qiang, gryk612@hanmail.net

Organization Background: This relatively new environmental NGO focuses its activities on environmental education, practical field investigation, and green patrolling. Green Yanbian works with the Green Yanbian student association at Yanbian University in Jilin Province.

Hand-in-Hand Earth Village (Beijing)

http://www.childrenandearth.org.cn http://www.dqc.org.cn

Building Hand in Hand Earth Villages at Schools

Focus: Environmental Education

Partners: Chinese Aid Committee for the Culturally Disadvantaged, National Working Commission for Children, *Chinese Children's Newspaper* (*Shaonian Bao*)

Funding: Hong Kong Asia Agriculture Research and Development Fund; Japanese Embassy; Community Volunteer Fund of the GE Corporation (China); Dow Chemical (China) Investment Co. Ltd.; 2000 Ford Motor Environmental Protection Award; 2001 Earth Award

Schedule: Initiated June 1997, Ongoing

The long-term goal for the Hand-in-Hand Earth Village is to create hands-on environmental educational programs for Chinese grade school students. Hand-in-Hand Earth Village engages the students in environmental protection by creating Earth Villages at their schools and coordinates with teachers at more than 200 schools throughout China to set up recycling activities within each school. In these recycling programs some students run the recycling collection and sorting station, others take on the role as accountants and journalists, and one student acts as a mayor to coordinate all of these activities. Recyclable products collected by the students are sold to recycling companies and the proceeds from these sales are contributed to the construction of Hand-in-Hand Environmental Protection Primary Schools in poverty stricken areas of China. (*Editor's Note: See Jane Sayer's commentary in this issue of the China Environment Series for more information on this NGO*)

Institute of Human Ecology, China (Beijing)

http://www.ihe.org Dr. Diane CHANG, ihe@163bj.com

Organization Background: The Institute of Human Ecology (IHE) focuses on facilitating communication on environmental and ecological issues amongst government agencies, industry developers, and academic institutions. IHE provides a forum to broadcast cross-sector environmental and sustainable development initiatives, which helps provide useful information for developing policies, regulations, and new concepts in the field.

Pesticide Eco-Alternatives Center of Yunnan Thoughtful Action (Yunnan Province)

http://www.panchina.org

China Pesticide Action for NGOs Development

Focus: NGO Capacity Building

Partners: Yunnan Entomological Society

Funding: Rockefeller Brothers Fund

Schedule: Targeted Initiation 2002 (Currently in planning stage)

This program aims to help improve the skills and abilities of pesticide NGO activists, as well as promote the development of a coalition of individual pesticide campaigners and NGOs throughout China. A China Pesticide Issues Forum is being planned to bring together the key NGO activists concerned about pesticide issues. This forum will meet once or twice a year and publish summaries of the meetings in both Chinese and English.

Pesticide Alternatives—Research, Training, and Demonstration Projects

Focus: Agricultural Training

Partners: Yunnan Entomological Society, Pesticide Action Network of North America (PANNA), Pesticide Action Network of Asia Pacific (PANAP)

Funding: PANAP, PANNA, Rockefeller Brothers Fund

Schedule: Ongoing

This program directly aims: (1) to advance and extend ecologically and economically sound alternatives to chemical pest control; (2) to balance pest populations by reducing pesticide use in agricultural practices; (3) to protect biodiversity, and eventually enhance the capacity of natural ecosystems. The technical training and services set up by this project will focus on the implementation of ecologically-based alternatives and integrated pest management (IPM) systems through community-based farmer field schools and green demonstration villages. The objectives of providing training on alternative and ecologically-sound agriculture is to help farmers learn how: (1) to use insect biodiversity protection; (2) to adopt biological control methods and IPM systems; (3) to produce non-toxic or less-toxic safe agricultural products; and (4) to realize the potential of economic profits from non-toxic agricultural products.

Policy Development and Advocacy
Focus: Agricultural Research, Environmental Policy
Partners: Yunnan Entomological Society, PANNA, PANAP
Funding: Rockefeller Brothers Fund
Schedule: Targeted Initiation 2002 (Currently in Planning Stages)

This program aims to explore and study policies and strategies of pesticide issues and organic agriculture development in order to provide recommendations to Chinese policymakers and governmental agencies.

Public Education and Campaigns Against Pesticides
Focus: Environmental Education, Health Research
Partners: Yunnan Entomological Society, PANNA, PANAP
Funding: PANAP, PANNA, Rockefeller Brothers Fund
Schedule: Ongoing

This program will focus on educating the public about the adverse effects of pesticides on food safety, human health, biodiversity, and the environment. This program also will stress the importance of creating market demands for organic food and establishing stronger regulations for pesticide residues on agricultural products and pesticides. This program will promote general green education, for pesticide issues have not yet received enough attention from the news media, the government, or the public in China. Focusing on consumers, farmers, and students, the Pesticide Eco-Alternatives Center (PEAC) will apply community-based participatory educational methods to realize its goals, including an interactive Web site, mass media advocacy, and information distribution. A pesticide action network of China to collect and publish pesticide information and data is greatly needed in China. The Yunnan Entomological Society has constructed a Web site as partially preparation for such a national/transnational network.

PRODUCE GREEN FOUNDATION (HONG KONG)

http://www.producegreen.org.hk

Organization Background: The Produce Green Foundation promotes green lifestyles through the concept of organic farming. Produce Green Foundation has set up two organic farms (with a total area of 360,000 square) feet in the New Territories of Hong Kong—one farm is in Fanling and one in Hok Tau. The latter farm is opened to visitors everyday and fresh organic vegetables are available for purchase. In addition to maintaining the farms, the foundation also has published books, periodicals, and pamphlets on gardening, food, and green living.

SAUNDERS GULL PROTECTION ASSOCIATION OF PANJIN (PANJIN, LIAONING PROVINCE)

LIU Detian, *PanJin Daily*, Xinglongtai District, Panjin City, Liaoning Province

Organization Background: Focusing on saving and protecting endangered black-month gulls this organization: (1) encourages its members to conduct scientific study and participate in academic exchanges on the black-mouth gulls; and (2) spreads and shares scientific knowledge of the black-mouth gulls through information networks and cooperating with other organizations both within China and abroad.

SOUTH-NORTH INSTITUTE FOR SUSTAINABLE DEVELOPMENT (BEIJING)

http://www.snisd.org.cn

Ongoing Projects (See CES 4): Demonstration Project to Commercialize Biogas Technology in Baima Snow Mountain Nature Reserve, Yunnan Province Promoting Green Electricity in Beijing and Surveying the Potential Consumer Demand for Green Electricity

New Projects: In this issue of the *China Environment Series* see international NGO inventory entries for Natural Resources Defense Council (Fuel Cell Vehicle Development and Commercialization), Atlantic Council (Clean Air for China and India), and Center for Resource Solutions (Green Market Development) for projects in which the South-North Institute for Sustainable Development is a key partner.

Tai O Culture Workshop (Hong Kong)
G/F, 54 Wing On Street, Tai O, Lantau, Hong Kong

Organization Background: The Tai O Workshop serves as a gathering place for local residents on Tai O Island where members can participate in promoting their island's traditions, culture, and sustainable development through various research and cultural exchange activities.

Tibetan Antelope Information Center
http://www.taic.org

Ongoing Projects (See Green NGO and Environmental Journalist Forum Report at http://ecsp.si.edu): Information Dissemination, Volunter Activists

Volunteers Association of Environmental Protection of Yueyang City (Yueyang, Hunan Province)
WANG Zhoujian, Yard of WuLi Gateway Sanatorium for the PLA officers of Yueyan, Hunan Province

Organization Background: The core activities of the Volunteers Association of Environmental Protection of Yueyang has been: (1) establishing the Green Schools, Green Families and Green Communities projects; (2) organizing celebrations on environmental holidays; and (3) promoting public awareness to decrease their consumption by following the reduce, reevaluate, reuse, recycle and rescue principles. They also have founded another organization called Friends of Wetlands in Yueyang.

Volunteer Mothers for Environmental Protection Association (Xi'an, Shaanxi Province)
WANG Mingying and BAN Li, sxmmhb@163.net

Organization Background: The Xian-based Volunteer Mothers for Environmental Protection Association has for the past four years carried out a wide range of regular activities including: (1) Million Mothers, Family Tree-Planting; (2) Pick up a Green Hope project in 100 schools throughout China; and (3) created a nature conservation center and six demonstration projects on woodland protection. This NGO also operates training programs for rural women to develop sustainable agriculture and green community building.

WWF Hong Kong
http://www.wwf.org.hk

Organization Background: An independent part of the global WWF network, WWF Hong Kong has been working since 1981 to implement a wide range of focused conservation and environmental education programs in Mai Po Marshes and the Inner Deep Bay in the northwestern area of Hong Kong. Both of these areas have been a haven for migratory birds for many decades. More recently, WWF Hong Kong officially launched the East Asian Forest and Trade Network—EcoWoodAsia to promote timber from independently certified forest such as certification under the Forest Stewardship Council.

Mainland Chinese Government Organized NGOs (GONGOs)

Beijing Energy Efficiency Center
http://www.beconchina.org

Ongoing Projects (See CES 4): Barrier Removal for Efficient Lighting Products and Systems in China, China Energy and Carbon Scenarios Project, China Motor System Energy Conservation Program, Electric Power Conservation Incentive Mechanism and Policy Research in China, Strategic Partnership: Energy Efficiency Programme in China

China Energy Conservation Development Outline
Focus: Energy Policy

Partners: State Development and Planning Commission (SDPC)
Funding: Energy Foundation
Schedule: Initiated 2001, Targeted Completion 2002

In order to better carry out the requirements of the Tenth Five-Year Plan and to balance the management of the market economy reforms with sustainable development, SDPC decided to formulate the China Energy Conservation Development Outline. This outline will be used to guide China's energy conservation work from 2001 to 2015. The Energy Foundation has given this project the financial support and the Beijing Energy Efficiency Center (BECon) is providing the technical supports to this project.

Research on the Policy and Methodology for Enterprise Energy Audit

Focus: Environmental Law
Partners: State Economic Trade Commission (SETC)
Funding: Energy Foundation
Schedule: Initiated 2001, Targeted Completion 2002

The goals of this project are: (1) to promote the establishment and implementation of the China Energy Conservation Law, related regulations and standard systems; (2) to investigate the national policies and management frameworks for energy audits; (3) to improve the awareness of industrial and building energy conservation; and (4) to develop China's enterprise energy audit methodology and standard computer programs for energy audits. To reach these goals, the BECon team will provide national administrators with policy fundamentals to carry out the enterprise energy audit system. BECon also will provide key energy consuming enterprises with efficient tools for undertaking scientific analysis of energy consumption. In addition, BECon will conduct demonstrations and technical support for enterprise energy audits for the energy saving service organizations. Currently, this project has produced a progress report and a workshop has been held in Nanjing to further disseminate the enterprise energy audit system to local energy use management organizations.

CHINA ENERGY CONSERVATION ASSOCIATION

http://www.ceca-setc.org.cn

Developing Chinese Regulatory Infrastructure Project

Focus: Energy Efficiency Policy
Partners: The Energy Foundation, Lawrence Berkeley National Laboratory (LBNL), Chinese State Economic and Trade Commission (SETC)
Funding: The Energy Foundation, The Packard Foundation
Schedule: Initiated 1999, Ongoing

The research work for the first phase of this project has been completed, and the second phase is currently being implemented. The goal of this project is to improve the energy efficiency in key energy-intensive industry sectors in China through governmental policy instruments. The goal of Phase I was to evaluate industrial energy-efficiency policies in other countries so to assess similar policies in China and make recommendations for policy modifications. Phase II is intended to organize a team of industrial energy-efficiency policy experts to develop implementation measurements for part of the Energy Conservation Law, which were highlighted in Phase I of this project. Phase II also will develop a pilot program plan to test the concept of voluntary energy-efficiency agreements in the steel sector in Shandong Province.

CHINA ENVIRONMENT AND SUSTAINABLE DEVELOPMENT REFERENCE AND RESEARCH CENTER

Environmental Library and Information Center

Focus: Environmental Education
Funding: Asian Development Bank, Mitsubushi Foundation, Japan Foundation, NEC, Centrum für Internationale Migration
Schedule: Initiated 2000, Ongoing

China Environment and Sustainable Development Reference and Research Center (CESDRRC, which is affiliated with the Center for Environmental Education and Communication within China's State Environmental Protection Administration) set up a public library and information center for environmental research in 2000. In March 2002, two German experts from Center for International Migration (Centrum für Internationale Migration, an organization financed by the German Ministry for Economic Development) joined CESDRRC to assist with environmental education and research programs.

Environment Research Sponsorship and Training

Focus: Environmental Education
Partners: Researchers from German Organizations: CIM and ASA-Carl Duisberg-Gesellschaft (ASA-CDG)
Funding: CIM, German Heinrich-Böll-Foundation, ASA-CDG
Schedule: Ongoing

Examples of research and training programs sponsored and coordinated by CESDRRC include: (1) an organic food consumer guide for Beijing to be published in early 2002; (2) a monthly newsletter (since April 2001), public lectures, and workshops on various topics; (3) training courses for environmental educators focusing on environmental management for schools, news media competence, and education on water issues to be held in May and October 2002; (4) a study tour for environmental educators to Germany in June 2002; (5) consultant work on environmental education for other Chinese institutions (e.g., EU-China Liaoning Integrated Environmental Protection Programme); (6) environmental lectures for schools and universities; and (7) environmental English courses.

China Forum of Environmental Journalists (Beijing)

http://hjjx.zhb.gov.cn

Organization Background: The mission of the China Forum of Environmental Journalists is to: (1) unite environmental journalists across the country; (2) enhance education and publicity for environmental protection; (3) contribute to raise people's environmental awareness; (4) carry out academic exchange and cooperate with international journalist organizations (e.g., Asia-Pacific Forum of Environmental Journalists), NGOs, and environmental journalists, as well as environmental journalists in Hong Kong, Macao, and Taiwan.

Chinese Society for Sustainable Development (Beijing)

CHEN Kun, chenkun@acc21.edu.cn

Organization Background: Major activities of the Chinese Society for Sustainable Development (CSSD) include: (1) drafting and implementing China's Agenda 21; (2) establishing five special committees stressing five key areas for sustainable development in China (water, human settlement, ecology and environment, agriculture, and natural disaster reduction and prevention); (3) providing consultant services for the scientific communities on sustainable development in China; (4) networking internationally (e.g., participation in NGO forums at UN environmental meetings and conferences); (5) operating training courses for decision-makers and students; and (8) publishing education periodicals, (e.g., *CSSD News Letters*, *CSSD Journal: Chinese Population, Resources and Environment*, *CSSD Annual Essay Collection for Sustainable Development in China*).

Hangzhou International Network on Small Hydropower (Hangzhou, Zhejiang Province)

http://www.inshp.org

Green Villages

Partners: Renewables for Development, Various Local Governments
Focus: Renewable Energy, Rural Development
Funding: Total 55 million RMB [bank loans (30%), Chinese central government (10%), provincial governments (10%), county governments (10%), villages (20%), foreign sources (20%)]
Schedule: Ongoing

This project is a rural environment protection project conducted by the International Network on Small Hydro Power (IN-SHP) in poverty-stricken areas in western China: (1) Gannan and Zhangye regions in Gansu Province; (2) Zhengyuan and Wenshan regions in Guizhou Province; (3) Ya'an region in Sichuan Province; (4) Jiuxiu County in Guangxi Zhuang Minor Nationality Autonomous Region; and (5) Chengzhou and Huaihua regions in Hunan Province. The focus of the project is the exploitation of small hydropower resources, which is expected to: (1) substitute wood/grass energy with electricity; (2) accelerate the overall development of mountain, water, forestry resources; and (3) improve transportation in small river basins and thereby develop the local economy and protect the rural environment. IN-SHP will select 10 pilot villages from these regions to conduct the program, which aims to combine small hydropower exploitation with environmental protection and economic development. The clean, environment-friendly renewable energy will be used to replace the environment-unfriendly fossil fuel with small hydropower.

PART V. BILATERAL GOVERNMENT ACTIVITIES

(Editor's Note: Unless otherwise indicated, all currency is in U.S. dollars)

Australia-China Environmental Cooperation

AUSTRALIAN AGENCY FOR INTERNATIONAL DEVELOPMENT (AUSAID)

http://www.ausaid.gov.au/

Alxa League Environmental Rehabilitation and Management Feasibility and Design Study in the Inner Mongolia Autonomous Region of China

Focus: Environmental Management
Executing Agencies: AusAID and contractors: ACIL Australia and AACM International & Agriculture
Partners: Ministry of Foreign Trade and Economic Cooperation (MOFTEC), Chinese Ministry of Finance (MoF)
Funding: A$1,400,132
Schedule: Initiated 1999, Completed March 2000

Conducted over a period of nine months this environmental rehabilitation and management study aimed to propose strategies to control and halt desertification in the Inner Mongolia Autonomous Region, and eventually restore ecological balance to degraded land areas through environmental management measures. In addition to creating the environmental management plan, the study covered elements of water use, energy supply, and public education.

UN Development Programme (UNDP)/Global Environment Facility (GEF) Renewable Energy Project

Focus: Energy Policy, Energy Training
Executing Agencies: MOFTEC for AusAID
Partners: Ministry of Finance for UNDP, Chinese State Economic and Trade Commission (SETC)
Funding: A$4.5 million
Schedule: Initiated 1998, Targeted Completion 2003

This project will promote the widespread adoption of renewable energy technologies (RET) in China by removing a range of barriers to increase market penetration of the technologies. The institutions and policies created within this project aspire to strengthen China's capacity to shift from supply-oriented technology to demand-driven, investor- and consumer-friendly approaches. The project will develop market-based institutions and instruments and increase investments in RETs. Providing first-hand knowledge of instruments and institutions, the project will support pilot activities for five promising technologies, namely: (1) rural electrification by solar and wind hybrids; (2) wind farm development; (3) biogas production; (4) bagasse co-generation; and (5) solar water heaters.

UNDP/GEF Wetlands Resources Management Project

Focus: Biodiversity Management
Executing Agencies: AusAID and contractors
Partners: China State Forestry Administration
Funding: A$2.5 million
Schedule: Initiated 1999, Targeted Completion 2004

This management project's main objective is to develop China's national capacity to integrate wetland conservation into the development process. The overall project will contribute to the protection of globally important wetlands. Australia's proposed contribution will fund the development of sustainable alternative livelihoods for impoverished communities in four wetland sites. This will include: (1) development of sustainable harvesting practices; (2) secondary sector processing of products; (3) improved zoning and land-use planning; and (4) involvement of local people in resource management and ecotourism. Appropriate micro-credit facilities will be designed in tandem with the alternative livelihoods packages.

Australian Centre for International Agricultural Research

http://www.aciar.gov.au/

Improved Orchard Productivity and Water-Use Efficiency Using Modern Irrigation and Tree Management Techniques in Northern China

Focus: Agriculture Management, Water Conservation
Executing Agencies: Agriculture Victoria
Partners: China Agricultural University
Funding: A$1 million
Schedule: Initiated January 1996, Completed December 2000

With the goal of promoting large crops of good-sized fruit, this project demonstrated various techniques to restrict canopy development in orchards. These techniques included high-density planting (or choice of rootstock) and giving trees minimal water during the flush of shoot growth and generous amounts of water during fruit set. This selective irrigation technique, called regulated deficit irrigation (RDI), can double water-use efficiency and therefore has considerable potential value to fruit cropping enterprises, particularly in regions such as Xinjiang in northwest China where water is scarce. RDI can be used with apples, pears, grapes, plums, and peaches.

New Technology for Productive and Sustainable Reuse of Wastewater for Irrigated Cropping

Focus: Agriculture Research, Water Management
Executing Agencies: Commonwealth Scientific and Industrial Research Organization (CSIRO) Land and Water
Partners: Tianjin Water Conservancy Bureau, China Institute of Water Resources and Hydropower Research
Funding: A$615,000
Schedule: Initiated January 1998, Completed December 2000

This joint study project developed new and simple procedures for treating wastewater on land so that it can be productively reused. The main technology under study in this project was FILTER (filtration and irrigated cropping for land treatment and effluent reuse). Under this project, FILTER, which was developed in Australia, was tested for use in China and Australia. The project aimed to facilitate wide-scale use of FILTER and similar wastewater treatments, optimize their application, and develop computerized wastewater management packages.

Regional Water and Soil Assessment for Managing Sustainable Agriculture

Focus: Agriculture Management, Water Research
Executing Agencies: CSIRO Land and Water
Partners: Chinese Academy of Sciences
Funding: A$1 million
Schedule: Initiated January 1997, Completed June 2001

Through the development of guidelines and tools applicable at the local level, this project aimed to improve water-use efficiency and reduce related land degradation in defined agricultural areas in China and Australia. The research findings from this project are being conveyed to farmers and relevant organizations in both countries. Researchers used and developed the integrating concept of "water-use efficiency" to assess and rank the productivity of dry land farming systems in both countries. This information then was utilized to create computer models, which allow the technology and the timing of irrigation to be matched with crop water requirements. The use of such models will help farmers in both countries maximize water-use efficiency and minimize the environmental hazards associated with irrigation.

Use of Entomopathogenic Nematodes in China to Control Chive Midges

Focus: Agriculture Research
Executing Agencies: CSIRO Entomology
Partners: Chinese Academy of Agricultural Sciences, Zhongshan University
Funding: A$90,000
Schedule: Initiated January 2000, Completed June 2001

Pests such as rice stem borers and chive midges threaten important crops in China. This project aimed to use nematodes as a commercial alternative to chemical insecticides to control these pests. The research built on previous efforts in which nematodes were successfully used to control apple moths and street tree borers in northern China. The scientists selected strains of the

Steinernema feltiae nematode and searched for other species that are capable of attacking rice stem borers and chive midges. Project researchers then conducted field trials on rice and chives in China and Australia.

Water and Nitrogen Management to Increase Agricultural Production and Improve Environmental Quality
Focus: Agriculture Management, Water Management
Executing Agencies: Australian Department of Natural Resources and Environment
Partners: University of Melbourne, China Agricultural University, Chinese Academy of Sciences
Funding: A$875,000
Schedule: Initiated January 1998, Completed December 2001

China's agriculturalists and planners face the challenge of meeting the food demands of the country's 1.2 billion people. In order to improve agricultural productivity to meet this demand China can: (1) increase in fertilizer input; (2) improve the efficiency of fertilizer use (especially nitrogen); and (3) improve the management of water for irrigation. This study project quantified water and nitrogen and potassium losses from the soil-plant systems to the environment in order to develop systems modeling and study practices for crop, water, and nutrient management. In addition, the Australian partners created training programs and generated information and policy advice on water and nitrogen management for their Chinese counterparts.

Canada-China Environmental Cooperation

CANADIAN INTERNATIONAL DEVELOPMENT AGENCY (CIDA)

http://www.acdi-cida.gc.ca/

Biodiversity Protection and Community Development in Inner Mongolia Autonomous Region
Focus: Biodiversity Management, Environmental Capacity Building
Executing Agencies: CIDA and contractors
Partners: China's State Environmental Protection Administration (SEPA), Local Environmental Protection Bureaus
Funding: C$6 million
Schedule: Initiated 2000, Targeted Completion 2005

The project aims to enhance the capacity of Chinese government agencies to manage nature reserves in Inner Mongolia, as well as to integrate biodiversity protection with poverty relief development efforts. In order to accomplish these goals the project contains elements of skill development (e.g., ecological monitoring and ecotourism planning) and community participation.

Canada-China Cooperation Project in Cleaner Production
Focus: Pollution Control, Environmental Policy
Executing Agencies: CIDA and contractors: PricewaterhouseCoopers, SNC Lavalin, ESSA Technology
Partners: SETC, SEPA
Funding: C$10.5 million
Schedule: Initiated 1996, Targeted Completion 2003

The project targets China's severe environmental degradation and industrial pollution problems by supporting the implementation of cleaner production regulations in light and chemical industries. In two pilot projects in state-owned enterprises in Anhui Province emphasis will be placed on: (1) targeting pollution prevention from the source; (2) conserving raw materials and energy; (3) eliminating toxic raw materials; (4) reducing the quantity and toxicity of emissions and waste; and (5) decreasing the pollution impact of a product along the entire life cycle of its production. For more information see the project Web site: http://www.chinacp.com/

Cooperation in Climate Change
Focus: Energy Research, Energy Efficiency Capacity Building
Executing Agencies: CIDA
Funding: C$3.75 million
Schedule: To be determined

Over a period of 3 to 5 years the project will focus on institutional development and stakeholder capacity-building in order to reduce greenhouse gas emissions in China. Research programs will be set up in sectors such as carbon sequestration and multilateral funding preparations. Cooperation in lowering greenhouse gas emission will fund training courses, seminars, workshops, study tours, collaborative research, Web site development, and equipment provision. The ultimate goal of the project is to help China's research institutes strengthen their capacity to devise technologies and policies on climate change.

Environmental Training for Integrated Monitoring and Management in the Coastal Zone of Hainan Province

Focus: Environmental Management, Conservation Training
Executing Agencies: CIDA, University of Waterloo, University of Guelph, Wilfrid Laurier University
Partners: Nanjing University
Funding: Total: $2,512,334, CIDA: $1,254,986
Schedule: Ongoing

Under the Canada-China Higher Education Program, Canadian and Chinese universities have been collaborating to address pressing needs to enhance Chinese capabilities in integrated coastal zone management. Areas of collaboration in this project will include: (1) human resource development; (2) institutional strengthening; and (3) the improvement of information management in the context of Chinese national and provincial development strategies. A monitoring system will be established in the subtropical island province of Hainan to identify specific development and pollution impacts on the coast. The monitoring system will help prepare local officials to respond to the growing need to manage pressures on coastal resources.

Exploring Crop Development and Biodiversity Enhancement: Maize in Southwest China

Focus: Agriculture Capacity Building
Partners: Chinese Academy of Agricultural Sciences
Funding: C$74,500 -115,000 (Ford Foundation is a co-funder)
Schedule: Initiated 2000, Completed 2001

Maize is an important food and feed crop in China. The remote southwest region constitutes the center of maize genetic diversity in China. However, the region has benefited little from past research on crop and hybridization research. This project aimed to promote better cooperation between the formal government seed system and the informal seed management methods of farmers through a participatory plant breeding approach. Researchers defined the potential role of traditional knowledge systems in crop development and biodiversity enhancement and recommended ways that the formal system could help farmers (particularly women) and improve local seed varieties while maintaining local land and seed management practices.

Hebei Dryland Project

Focus: Agriculture Management, Agriculture Research
Executing Agencies: CIDA, Agriculture and Agri-Food Canada
Partners: Chinese Ministry of Agriculture, Hebei Academy of Agriculture and Forestry Science
Funding: C$4.9 million (Phase I); C$4.94 million (Phase II)
Schedule: Initiated 1989, Completed 1996 (Phase I); Initiated 1996, Completed 2002 (Phase II)

This 13-year project worked to improve rural welfare by promoting environmentally sustainable and economically viable agriculture practices in the lowland plain of Hebei Province. In this drought-prone area of China, CIDA and its partners have focused on: (1) developing ecologically sound dryland management technology; (2) improving water-use efficiency; (3) protecting soil and water quality; and (4) increasing farming profitability. Phase I emphasized increasing production and initiating research in dryland management. Phase II is focused on enhancing the application of Global Information System (GIS) in land-use planning and land resource analysis. CIDA provided agricultural scientists, training, research fellowships, and equipment for this project.

Study on Sustainable Management Policy of China's Nature Reserves

Focus: Conservation Management, Biodiversity Policy
Executing Agencies: CIDA, Parks Canada
Funding: N/A
Schedule: Initiated 1999, Completed 2000

This study examined and proposed changes to China's policy on nature reserves in order to address the tension between conservation and development needs. Field surveys were conducted on 12 Chinese nature reserves and Canadian national parks

to facilitate input from the Canadian experience into a set of common policies to be implemented throughout China. The recommended policies aimed to bring about harmony between biodiversity, conservation, and economic growth.

Sustainable Resource Development in the Tarim Basin

Focus: Energy Management
Executing Agencies: CIDA, Jacques Whitford Environment Ltd., PricewaterhouseCoopers, Dalhousie University, Roche Ltd. Consulting, Southern Alberta Institute of Technology
Partners: China National Petroleum Corporation (CNPC)
Funding: C$7.55 million
Schedule: Initiated 1997, Completed 2001

Assisting the CNPC and local governments, this project developed an ecologically sustainable energy exploration practice to help alleviate the desertification problem within the Tarim Basin area. A particular focus was placed on optimum allocation and use of water resources. Activities included the creation of comprehensive environmental management and monitoring programs.

Tarim Basin Desertification and Water Management

Focus: Water Management, Conservation Capacity Building
Partners: Tsinghua University, Xinjiang Academy of Agricultural Sciences
Funding: C$221,570 in grant
Schedule: Targeted Completion 2002

Under CIDA's Community-Based Natural Resource Management Program, Chinese universities are working with CIDA to develop mechanisms for implementing a range of institutional innovations dealing with water resource management in the Tarim Basin area. The project partners also assess the feasibility and socioeconomic impact of these new institutions at both basin-wide and local level. Two central elements of the project are capacity building in participatory methods among stakeholders and a study of water pricing. Research results are expected to lead to changes in policies, new water management organizational structures, and experiments in farming and agriculture practices to conserve water.

Dutch-China Environment Cooperation

DUTCH GOVERNMENT, MINISTRY OF FOREIGN AFFAIRS

http://www.minbuza.nl/english/homepage.asp

Capacity Building for the Rapid Commercialization of Renewable Energy

Focus: Energy Capacity Building, Energy Conservation Policy
Executing Agencies: UNDP, UN Department of Economic and Social Affairs (UNDESA)
Funding: NLG 5,313,000, €2,393,000
Schedule: Initiated 1998, Targeted Completion 2003

In conjunction with two United Nations programs, this project aims to promote the use of renewable energy sources in China. By removing market barriers to renewable energy technology, the project intends to support nationwide market penetration of related technologies and stimulate a more widespread reliance on renewable energy.

Cleaner Production in Township and Village Enterprise (TVE) Businesses

Focus: Environmental Management
Executing Agencies: IVAM Environmental Research Institute, University of Amsterdam
Partners: China National Cleaner Production Center
Funding: NLG 1,850,000, €833,300
Schedule: Initiated 1998, Completed 2001

Through application of cleaner production practices, this project aimed to improve environmental performance and monitoring in four important TVE sectors (cement, pulp and paper, food processing, and iron casting industries) in Anhui and Yunnan Provinces.

Environmental Technology Promotion in Tanning Industry
Focus: Environmental Management
Executing Agencies: TNO Netherlands
Partners: Bureau of Townships in the Huai River Basin, Anhui Province
Funding: NLG 4,695,000, €2,114,800
Schedule: Initiated 1998, Completed 2000

Through the application of integrated clean chrome leather technology, this project sought to improve environmental performance of clusters of tannery industries in Anhui Province.

Forest Conservation and Community Development
Focus: Conservation Capacity Building
Partners: Department of Forestry in Yunnan Province
Funding: NLG 28,765,800, €12,957,6000
Schedule: Initiated 1997, Targeted Completion 2002

The project aims to enhance institutional capacity in forest protection of Yunnan and develop rural community activities to reduce pressures on nature reserves and other protected areas.

EU-China Environmental Cooperation

EuropeAid Co-operation Office

http://europa.eu.int/comm/europeaid/index_en.htm

EU-China Cooperation on Control of Vehicle Emissions
Focus: Air Policy
Funding: €838,344
Schedule: Initiated 1999, Targeted Completion 2002

This project focuses on the creation of comprehensive emission standards and regulations to alleviate the progressing air pollution problems in China. The ultimate goal of the project is to introduce economic levers to effectively control the emission levels from vehicles.

EU-China Environmental Management Cooperation Program
Focus: Environmental Capacity Building
Funding: EU: €130 million, China: €5.9 million
Schedule: Initiated 2001, Targeted Completion 2005

The project includes elements of public education, technical training, as well as the operation of environmental management systems in pilot enterprises. The EU and its Chinese partners will also create and disseminate domestic and international environmental databases and networks.

EU-China Honghe Environmental Protection and Poverty Alleviation Project
Focus: Conservation Policy
Funding: EU: €1.18 million, China: €750,000
Schedule: Initiated 1998, Completed 2000

By enhancing intra-agency cooperation in nature conservation and rural development this protection project integrated environmental protection with poverty alleviation in the Honghe river area.

EU-China Jiangxi Sandy Wasteland Development Project
Focus: Agriculture Management
Funding: EU: €4 million, China: €2.4 million
Schedule: Initiated 1993, Completed 1998

The project targeted subtropical sandy wasteland in Jiangxi Province for development and effective erosion control measures. New agricultural initiatives were introduced to improve the living standards of the rural community through the redevelopment of the wasteland areas.

EU-China Liaoning Integrated Environmental Programme
Focus: Environmental Capacity Building, Environmental Management
Funding: EU: €37 million, China: €11.5 million
Schedule: Initiated 1999, Targeted Completion 2003

The project aims to enhance the policymaking, management, and implementation of environmental policies in Liaoning Province. Two other components of the project are: (1) to improve public awareness of environmental problems, and (2) to finance research on water sanitation and air pollution treatment projects in Liaoning. In order to tackle pollution issues at their roots, funding is provided to facilitate clean production, waste reduction, recycling, and adoption of renewable energy resources in Liaoning's industrial sector.

German-Chinese Environmental Cooperation

GERMAN AGENCY FOR TECHNICAL COOPERATION (GTZ—DEUTSCHE GESELLSCHAFT FÜR TECHNISCHE ZUSAMMENARBEIT)

http://www.gtz.de

Energy Efficiency and Modernization of Power Distribution
Focus: Energy Efficiency Management, Energy Efficiency Training
Partners: MOFTEC, Chinese State Power Corporation
Funding: 1.52 million euros (grants)
Schedule: Initiated 1999, Targeted Completion 2002

A testing and service center is planned under the project to: (1) test energy-efficiency performance of locally produced pumps and motors; (2) provide consulting services to the authorities for standardization and regulations for energy efficiency motors, and (3) establish two low voltage net pilot projects in Hebei Province. The project provides experts, training, equipment supplies, and other forms of technical support.

Pesticides Quality and Residue Control
Focus: Agriculture Management, Agriculture Training
Partners: MOFTEC, Ministry of Agriculture Institute for the Control of Agrochemicals
Funding: 4.50 million euros (grants)
Schedule: Initiated 1995, Targeted Completion 2002

Production standards and quality of pesticides are problematic in China, which is one of the most important pesticide manufacturers in the world. With the goal of improving the quality and lowering the environmental impact of Chinese pesticides, this project combines advisory service and human resource development with supply of lab equipment and professional materials to China's national pesticides testing and evaluation agency.

Rehabilitation of Small Scale Hydropower Stations in Tibet Autonomous Region
Focus: Energy Management, Energy Training
Partners: MOFTEC, Tibetan Water Resources Bureau
Funding: 5.11 million euros (grants)
Schedule: Initiated 1995, Targeted Completion 2002

This Tibet-based project makes possible direct participation of the local population in the design, management, and operation of rehabilitated and environment-friendly small hydropower plants. Informal training courses, study tours, and locally produced equipment are provided for local craftsmen and technicians as well as rural entrepreneurs.

Resource Protection in Nature Reserves of Sichuan Province

Focus: Conservation Training, Capacity Building
Partners: MOFTEC, Chinese State Forestry Administration
Funding: 2.20 million euros (grants)
Schedule: Initiated 1997, Ongoing

The project seeks to reconcile nature conservation in Sichuan's Giant Panda Habitat Reserve with economic well being of the rural population. The German Agency for Technical Cooperation (GTZ) and its Chinese partners are making efforts to identify efficient agricultural production methods and develop ecological tourism with an emphasis on sustainability. Training and GIS equipment also are being provided through an integrated capacity-building program.

Sustainable Agriculture (Demonstration Villages)

Focus: Agriculture Research, Agriculture Training
Partners: MOFTEC, Chinese Local Forestry Departments, County Governments
Funding: 2.05 million euros in grants
Schedule: Initiated 1999, Targeted Completion 2003

GTZ is dispatching equipment to Datong city and 10 counties to promote sustainable and ecologically sound land use by the rural population and to build the capacity of government authorities to combat soil erosion. Target groups will be trained to develop and implement a sustainable land use model in the 10 counties, supported by a participatory monitoring and evaluation system.

Watershed Management and Resource Protection at Miyun Lake

Focus: Water Management, Conservation Training
Partners: MOFTEC, Chinese State Forestry Administration, Beijing Forestry Board
Funding: 3.58 million euros (grants)
Schedule: Initiated 1998, Targeted Completion 2004

The project targets the watershed of Miyun reservoir, a source of over 50 percent of the drinking water for the city of Beijing. Within the watershed, GTZ and its Chinese partners are providing advisory services related to land use planning, forestry management, watershed management, and natural resource economics. Funding is provided for procurement of training and laboratory equipment, as well as human resource development to build local capacities.

Kreditanstalt für Wiederaufbau

http://www.kfw.de

Beijing Solid Waste Disposal Project

Focus: Environmental Management
Partners: MoF, Chinese Export-Import Bank, Beijing Environmental Sanitation Administration
Funding: Germany: 19.94 million euros (grant), China: 20.96 million euros
Schedule: Initiated 1994, Completed 2000

This project provided two indoor waste dumpsites, transfer stations, waste disposal vehicles, and a new composting plant for two inner city districts of Beijing. This is in line with the city's new focus on waste management policy to promote environmental protection.

Environmental Program Energy I

Focus: Energy Efficiency, Energy Management
Partners: MoF, Chinese Export-Import Bank, China Development Bank
Funding: 25.56 million euros (soft loans), 51.13 million euros (market-rate loans)
Schedule: Initiated 2000, Targeted Completion 2004

To ensure environmentally compatible expansion of energy supply in China, the project aims to reduce environmental hazards and increase efficiency in production, transmission, and distribution of energy. The target group consists mainly of public companies such as power suppliers and coal producers, as well as state-owned manufacturers. A credit line is opened to finance

long-term capital investments in pollution reduction or energy-efficiency technologies such as dust filters, flue gas desulfurization plants, and turbine modernization.

Rehabilitation of Thermal Power Stations

Focus: Energy Management, Air Quality Management
Partners: MoF, Chinese Export-Import Bank, Chinese Power Companies
Funding: Germany: 85.39 million euros (grant), China: 75.67 million euros
Schedule: Initiated 1998, Targeted Completion 2002

China is the world's largest coal consumer and tops the list of CO_2 and SO_2 emitting countries. In response to these emission problems, this project supports construction of flue gas desulfurization plants in major Chinese cities to reduce the high SO_2 emission level and the dust load.

Urban Sewage Disposal along the Huaihe River

Focus: Water Management
Partners: MoF, Chinese Export-Import Bank, Municipal Governments in Huaihe River Basin
Funding: 30.68 million euros (soft loans)
Schedule: Initiated 1997, Targeted Completion 2005

Funds are made available under the project to construct communal sewage treatment plants in the Huaihe River Basin, one of the most threatened waterways in China. These funds will be sustained via cost-covering tariffs.

Urban Sewage Treatment in the Yangtze River Areas

Focus: Water Management
Partners: MoF, Chinese Export-Import Bank, Municipal Governments in Yangtze River Basin
Funding: 25.56 million euros (soft loans)
Schedule: To be determined

The project aims to reduce the damage to the environment from untreated sewage in the Yangtze River Basin, which should also lower the risk of water-induced diseases in cities along the river. Funds will be made available for the construction of communal sewage treatment plants, in particular pumps, control systems, and valves. The municipalities will finance local costs for project activities.

Water Supply Project in Anhui Province

Focus: Water Management
Partners: MoF, Chinese Export-Import Bank, Municipal Water Supply Companies
Funding: 20 million euros (grant)
Schedule: Initiated 1994, Completed 2000

Designed to help improve the supply of safe drinking water and prevent water-induced diseases, this project sought to simultaneously protect the natural resources in three cities in Anhui Province. Funding was provided to construct modern water works and water purification plants, which included electromechanical equipment such as pumps and control systems.

Windpark Program

Focus: Energy Management
Partners: MoF, Chinese Export-Import Bank, Chinese Provincial Wind-Power Companies
Funding: 5.88 million euros (soft loans) , 5.88 million euros (market-rate loans)
Schedule: Initiated 1995, Ongoing

To encourage use of clean alternative energy sources—in line with China's own energy policy—and reduce the use of coal, the program is helping to bring into operation two windparks at seven locations in Zhejiang and Hainan Provinces, regions of high-energy consumption levels. The completed windparks will have a total capacity of 60 megawatts (MW).

Japan-China Environmental Cooperation

Japan International Cooperation Agency (JICA)

http://www.jica.go.jp/

Acid Rain Prevention Project

Focus: Air Quality Training
Funding: N/A
Schedule: Initiated 2000, Targeted Completion 2004

The project consists of acid rain prevention technology training courses in Japan for Chinese environmental agency and industry personnel. Thirty percent of the cost for this training will be borne by the Chinese government. In 2000 alone, 151 Chinese received training.

Afforestation Project in Sichuan

Focus: Biodiversity Management, Conservation Training
Funding: ¥675 million
Schedule: Initiated 2000, Targeted Completion 2005

The project supports local afforestation activities in three cities (Xichang, Xide, and Zhaojue) along the Anning River in Sichuan Province.

Environmental Conservation in the Coal Industry in Shandong Province

Focus: Conservation Training
Funding: N/A
Schedule: Initiated 1997, Targeted Completion 2002

Through training of Chinese industry personnel, this project supports the transfer of modern clean coal technology to Shandong Province, a major coal-producing area in northern China.

Environmental Degradation Survey of the Pearl River Delta

Focus: Conservation Research, Water Research
Funding: N/A
Schedule: Initiated 1999, Completed 2001

At the request of the Chinese government, the Japanese International Cooperation Agency (JICA) helped launch a targeted survey of marine pollution in the Pearl River Delta with the aim to develop and implement water quality improvement plans.

Environmental Regeneration for the Taihu Lake Area

Focus: Conservation Research, Water Research
Funding: ¥200 million
Schedule: Initiated 2001, Targeted Completion 2006

This five-year project supports the implementation of biotech purification technology for integrated sewage treatment in the Taihu Lake area. Project funds cover the costs of equipment and the employment of six water experts.

Japan-Chinese Cooperative Seedling & Breeding Technology Project

Focus: Biodiversity Management, Conservation Training
Partners: Hubei and Anhui Provincial Governments
Funding: ¥735 million
Schedule: Initiated 2001, Targeted Completion 2006

The project supports dissemination of advanced breeding technology and high-quality seedlings in various Chinese southern provinces with an emphasis on fostering sustained local technical capacities, partly through longer-term assignment of experts.

Land Reclamation in the Loess Plateau
Focus: Environmental Management
Funding: ¥107 million
Schedule: Initiated 1999, Completed 2001

The project provided technical instruction and supervision to help reclaim and redevelop wasteland in the Loess Plateau, as well as forestry and hydrological surveying.

Research Project on Preventing Desertification
Focus: Biodiversity Management, Conservation Training
Funding: ¥300 million
Schedule: Initiated 1997, Completed 2000

The project supported research into experimental tree planting in desertified areas in Xinjiang, including providing materials and dispatching experts.

Research on Secondary Afforestation in Beijing
Focus: Biodiversity Management
Funding: ¥1.01 billion
Schedule: Initiated 2000, Targeted Completion 2005

In view of the tension between nature conservation and the growing need for timber for China's growing economy, this project supports effective expansion and sustainable use of secondary forests by way of research and pilot project implementation.

Seedling Breeding in Hunan
Focus: Biodiversity Management
Funding: ¥659 million
Schedule: Initiated 1996, Completed 2001

The project provided technical support and training to build up a technological basis for breeding of high-quality plant varieties and biodiversity conservation.

Waterway Planning and Construction in Liaoning Province
Focus: Conservation Research, Water Research
Funding: N/A
Schedule: Initiated 2001, Ongoing

The Chinese government is proposing to develop the Hunhe River waterways in Liaoning Province in order to alleviate water supply problems in China's industrial heartland. JICA is sponsoring this project to assess the environmental impact of the proposed waterway changes and to design countermeasures.

JAPANESE BANK OF INTERNATIONAL COOPERATION (JBIC)
http://www.jbic.go.jp/english

Benxi Environmental Improvement Project
Focus: Environmental Research, Energy Management
Partners: Benxi Municipal Government
Funding: ¥8,507 million
Schedule: Initiated 1997, Completed 2001

In order to improve the environmental quality in Benxi City (Liaoning Province) the Japanese Bank of International Cooperation (JBIC) provided loans to construct efficient gas, heat, electricity, and water supply facilities in the city. The loans also helped to furnish factories with pollution control and environmental monitoring equipment.

Chengdu Water Supply Project
Focus: Water Management
Partners: Chengdu Municipal Government
Funding: ¥7,293 million

Schedule: Initiated 1999, Ongoing

In order to meet the ever-worsening water shortages and to prepare Chengdu for the city's future water demand this project supports the expansion of the Sixth Water Purification Plant in the city.

Chongqing Water Supply Project

Focus: Water Management
Partners: Chongqing Municipal Government
Funding: ¥6,244 million
Schedule: Initiated 2000, Ongoing

Under this project, JICA and the Chongqing municipal government are constructing a water supply facility in the upstream basin of the Yangtze River in the southwestern part of Chongqing. The goal of this water supply project is to meet the mounting water shortage and to prepare for the future water demand in Chongqing.

Gansu and Xinjiang Water-Saving Irrigation Projects

Focus: Water Management
Funding: ¥6,000 million (Gansu); ¥14,400 million (Xinjiang)
Schedule: Initiated 2000, Ongoing

The project activities are designed to prevent desertification in Gansu and Xinjiang by: (1) increasing the covering of vegetation; (2) improving the living standards of farmers by increasing crop yields; and (3) helping to ease the drying of the Yellow River (Gansu) and the Tarim River (Xinjiang) by lowering water intake from the river system. These goals will be achieved by paving mud canals, installing sprinklers and other water saving irrigation equipment in current irrigation districts in Gansu and Xinjiang.

Guangxi Water Supply Project

Focus: Water Management
Partners: Guangxi Autonomous Region Government
Funding: ¥3,641 million
Schedule: Initiated 1999, Ongoing

In order to respond to the growing water demands in two fast growing mid-sized cities in China—Nanning and Guilin—this project is working to construct water supply facilities to enhance each city's water supply capacity.

Guiyang, Dalian, and Chongqing Environment Model City Projects

Focus: Air Quality Management
Partners: Guizhou Provincial Government, Dalian Municipal Government, Chongqing Municipal Government
Funding: ¥14,435 million (Guiyang); ¥8,517 million (Dalian); ¥7,701 million (Chongqing)
Schedule: Initiated 1999, Ongoing

As part of the Japan-China Environment Model City Initiative, these projects involve numerous pollution control activities in three cities. In order to reduce air pollution from power plants, JBIC and its Chinese partners are installing monitoring systems and constructing low sulfur clean coal production facilities (at Guiyang and Chongqing). In Dalian the project is constructing clean production steel and cement plants. These actions were proposed by a joint expert committee in an effort to improve the air quality in each city.

Heilongjiang Songhua River Basin Environmental Improvement Project

Focus: Water Management
Partners: Heilongjiang Provincial Government
Funding: ¥10,541 million
Schedule: Initiated 1998, Completed 1999

The project led to the construction of sewage treatment plants and sewage pipeline networks in major cities in the Songhua River Basin. With the JBIC loan the Heilongjiang provincial government installed wastewater treatment equipment in the plants discharging pollutants into the Songhua River above the environmental standards. The loan also was used for the procurement of machinery and equipment needed for the construction of sewerage and factory wastewater treatment plants.

Hohhot and Baotou Environmental Improvement Project

Focus: Environmental Management
Partners: Government of Inner Mongolia Autonomous Region, Chinese Export-Import Bank
Funding: ¥15,629 million
Schedule: Initiated 1996, Completed 1998

The purpose of the project was to improve air and water quality in Hohhot and Baotou cities in Inner Mongolia. The JBIC loan was used for the procurement of environmental protection machinery, and equipment, as well as to finance long-term loans for the implementation of the eligible sub-projects. The specific project activities included the expansion of the gas and heat supply system in Hohhot and Baotou cities and the procurement of environmental monitoring and research equipment in Baotou City. Additionally, the JBIC loan led to the extension of long-term loans through the Chinese Export-Import Bank to nongovernmental organizations that are working to improve environment investment in both cities.

Huai River Henan Water Pollution Control Project

Focus: Water Management
Partners: Henan Provincial Government
Funding: ¥2,175 million
Schedule: Initiated 1997, Completed 2000

A JBIC loan was used for the procurement of machinery and equipment needed for the construction of sewage and factory wastewater treatment plants and sewage pipeline networks in the major cities in the Huai River Basin. Wastewater treatment equipment was prioritized in the plants discharging pollutants above the environmental standards in order to improve the water quality and reduce the pollution of Huai River in Henan Province.

Jilin Song Liao River Basin Environmental Improvement Project

Focus: Water Management
Partners: Jilin Provincial Government
Funding: ¥12,800 million
Schedule: Initiated 1998, Completed 1999

The JBIC loan for this project was used to procure machinery and equipment needed for the construction of sewage and factory wastewater treatment plants in the major cities in the Song Liao River Basin.

Kunming Water Supply Project

Focus: Water Management
Partners: Kunming Municipal Government
Funding: ¥20,903 million
Schedule: Initiated 1999, Ongoing

The project is constructing a water supply facility, in concert with construction of a dam planned upstream on the Zhangjiu River in the northern part of Kunming. This water supply facility is necessary to respond to the ever-worsening water shortage in the area and to prepare for the future water demands in Kunming.

Lanzhou Environmental Improvement

Focus: Water Management
Partners: Lanzhou Municipal Government
Funding: ¥7,700 million
Schedule: Initiated 1996, Completed 1997

The purpose of the project was: (1) to help abate air pollution from coal burning; (2) to improve the water quality of the Yellow River; and (3) to ensure safe drinking water supply in Lanzhou City in Gansu Province. The project loans therefore were used to extend a gas pipelines and to construct more efficient heat-supply lines in Lanzhou. The project also led to the construction of wastewater treatment plants and the expansion of existing water treatment plants.

Liuzhou Environmental Improvement Project

Focus: Environmental Research, Energy Management
Partners: Lanzhou Municipal Government, Chinese Export-Import Bank

Funding: ¥10,738 million
Schedule: Initiated 1996, Completed 1999

The purpose of the project was to improve air and water quality and urban sanitation in Liuzhou City, Gangxi Autonomous Region. Therefore, JBIC loans were used to construct a plant and facilities for natural gas supply and build a covered waste dump. The project also enabled the Chinese Export-Import Bank to extend long-term loans nongovernmental entities to undertake environmental projects in Liuzhou City.

Shaanxi Loess Plateau and Inner Mongolia Loess Plateau Afforestation Projects

Focus: Biodiversity Management
Funding: ¥4,200 million (Shaanxi); ¥3,600 million (Inner Mongolia)
Schedule: Initiated 2000, Ongoing

These afforestation projects are designed to: (1) contribute to stable social and economic conditions in the Shaanxi Loess Plateau and Inner Mongolia Loess Plateau regions; (2) raise living standards in the region as well as in downstream areas of the Yellow River; and (3) contribute to an overall improvement of China's natural environment. These goals will be achieved by: (1) improving the region's forestation rate; (2) preventing soil erosion, and (3) raising agricultural income through planting 100,000 hectares of protection forests, timber forests, and fruit tree groves.

Shandong Tai'an Pumped Storage Power Station Project

Focus: Energy Management
Funding: ¥18,000 million
Schedule: Initiated 2000, Ongoing

In response to surging peak loads of energy power in Shandong Province's electricity power stations, this project is designed to supply electric power efficiently while giving due consideration to environmental concerns. These goals will be achieved by building a 1000 MW pumped storage power station in Shandong Province, where air pollution is growing worse.

Shenyang Environmental Improvement Project

Focus: Environmental Management
Partners: Shenyang Municipal Government
Funding: ¥11,196 million
Schedule: Initiated 1996, Ongoing

The purpose of the project is to improve air and water quality in Shenyang City, Liaoning Province. The project loan is being used to renovate the copper smelting and acid making system in Shenyang Smelter, which produces the highest level of polluting emissions in Shenyang City. The project also is extending centralized power stations for heat and electricity supply, which shall reduce the number of small inefficient boilers.

Suzhou Water Environmental Improvement Project

Focus: Water Management
Partners: Suzhou Provincial Government
Funding: ¥6,261 million
Schedule: Initiated 1999, Completed 2000

The project led to the construction of a wastewater treatment plant, water-conducting, and other water facilities in Suzhou City, Jiangsu, where water pollution has become worse amid unfolding industrialization and urbanization in recent years.

Xiang River Basin Hunan Environmental Improvement Project

Focus: Water Management
Partners: Hunan Provincial Government
Funding: ¥11,853 million
Schedule: Initiated 1997, Completed 2000

The project constructed sewage treatment plants and sewage pipeline networks in the major cities along the Xiang River in order to reduce pollution load in Hunan Province. This project also expanded natural gas supplies to cities in order to prevent air pollution and mitigate the effect of acid rain in the basin. Lastly, environmentally sound garbage disposal facilities were constructed in the cities.

Yingkou Water Supply Project
Focus: Water Management
Funding: ¥2,504 million
Schedule: Initiated 2000, Ongoing

This project is designed to address current water shortage in Yingkou, which is becoming more serious every year because of economic development and population growth. These water conservation goals will be achieved by building water purification plants with a total daily treatment capacity of 120,000m^3 and water distribution facilities in coordination with the construction by the municipal water department of a new dam on the Biliu River exclusively for water supply purposes. These facilities will promote a stable supply of clean water and improve living conditions in Yingkou.

Zipingpu Multi-Purpose Dam Construction Project
Focus: Water Management
Funding: ¥32,199 million
Schedule: Initiated 2000, Ongoing

Water supplies in Chengdu City are tight and this project therefore is designed to stabilize and balance the supply and demand for water in the city. The project aims: (1) to ensure water for irrigation, residential, industrial, and environmental uses; (2) to create clean energy through hydroelectric power in response to rising demand for electric power within the province; and (3) to implement flood prevention measures. These goals will be achieved by building a multi-purpose dam in the upper reaches of the Minjiang River in Sichuan Province.

Korean-Chinese Government Environmental Cooperation

KOREAN INTERNATIONAL COOPERATION AGENCY (KOICA)
http://www.koica.go.kr

Continuous Technical Cooperation
Focus: Biodiversity Management, Conservation Training
Partners: Various Chinese Central and Local Environmental Bureaus and Agencies
Funding: N/A
Schedule: Initiated 1991, Ongoing

Since 1991 the Korean International Cooperation Agency (KOICA) has operated a continuous training program for Chinese environmental administrators in the form of training course and expert field visits, covering topics ranging from forestry protection to marine environmental cooperation. Over 100 Chinese environmental workers and government officers received training and technical support over this time.

Ecological/Environmental Preservation in Inner Mongolia
Focus: Environmental Management
Partners: Government of the Inner Mongolia Autonomous Region
Funding: $4,980,000 (loan)
Schedule: Initiated December 2000, Ongoing

This KOICA project aims to integrate economic and environmental agenda by building an eco-friendly farm for medicinal herbs in the semi-arid, poor areas of Inner Mongolia.

Forestry Project for Western China
Focus: Biodiversity Management
Partners: Chinese central government
Funding: $5,000,000
Schedule: Initiated 2001, Targeted Completion 2005

This 5-year project supports afforestation activities in China's western provinces that have been threatened by soil erosion and resource depletion. This project helps to ensure the sustainability of China's West Development Strategy.

Korea-China Project for Forest Protection and Water Resources Management in Miyun
Focus: Environmental Policy, Biodiversity Research
Partners: Chinese Environmental Protection Administration, Beijing City Government
Funding: $1,000,000
Schedule: Initiated 2001, Targeted Completion 2003

This pilot project supports joint research, planning, and implementation of forest protection and water resources policies in suburban Beijing, with direct impacts on the improvement of air and water quality in the capital area.

Meishe River Development Project in Henan Province
Focus: Water Management
Partners: Henan Provincial Government
Funding: $4,950,000 (loan)
Schedule: Initiated December 2000l, Ongoing

This project seeks to redesign the overall development and conservation plan for the Meishe River area to reverse and prevent surface water pollution.

Solid Waste Disposal Project in Anshun City
Focus: Environmental Management
Partners: Anshun City Government
Funding: $2,500,000 (loan)
Schedule: Initiated December 1996, Ongoing

This infrastructure project is focused directly on the construction of solid waste disposal facilities in Anshun City.

New Zealand-China Environment Cooperation

New Zealand Official Development Assistance

http://www.mft.govt.nz/nzoda/nzoda.html

Huangpu Upper Catchment (Shanghai) Water Quality Improvement
Focus: Water Management
Partners: Shanghai Environmental Protection Bureau
Funding: NZ$500,000
Schedule: Initiated August 2001, Ongoing

This pilot project is funded under the New Zealand Government's Asia Development Assistance Facility. The object of this project is to create sustainable improvements to the quality of water drawn from waterways linked to the upper reaches of the Huangpu River for drinking and other domestic purposes, thereby improving the living conditions of communities living in this area. As a pilot initiative the outcomes of this project are intended to feed into wider work of future World Bank-sponsored water quality interventions.

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