United States Initiatives on Energy and Environment in China

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This report summarizes a dialogue about Sino-U.S. energy and environment cooperation organized by the Woodrow Wilson Center and the National Committee on U.S.-China Relations. The meeting brought together representatives from government agencies, corporations, and foundations to discuss the challenges and potential for bilateral cooperation in promoting clean and efficient energy use in China. This document provides a snapshot of the main issues addressed at the meeting, including summaries of the keynote speeches and mini-presentations. Participants presented analyses of specific U.S.-China exchange activities and perspectives on the future of the U.S.-China bilateral and commercial energy cooperation. The Woodrow Wilson Center and the National Committee on U.S.-China Relations cosponsored this meeting. The full summary is on the Environmental Change and Security Project Web site: http://ecsp.si.edu.[1]

First Keynote: U.S.-China Forum on Environment and Development and Cooperative Initiatives

Mr. Leon Fuerth, National Security Advisor to Vice President Gore, began the dialogue with a discussion of the importance of energy and environmental cooperation in bilateral relations between the United States and China. Mr. Fuerth set a backdrop for his talk about practical cooperation with comments about the U.S.-China Forum on Environment and Development, which is a vehicle for pragmatic cooperation between the United States and China.

Recognizing that an exchange of ideas and experience regarding China's internal environmental problems would be helpful, the Chinese government created a formal channel for environmental discussions with the United States. Vice President Al Gore and Prime Minister Li Peng created the U.S.-China Forum on Environment and Development (hereafter the Forum) in March 1997 in Beijing. The goal was to expand cooperation and dialogue on sustainable development and environmental protection through four working groups: 1) Energy Policy; 2) Environmental Policy; 3) Science for Sustainable Development; and 4) Commercial Cooperation. These working groups have played a key role in developing new cooperative initiatives and projects.

Former Energy Secretary Fredrico Peña and State Planning Commission Vice Chairman Pei Yang signed the Energy and Environment Cooperation Initiative in 1997 during Jiang Zemin's visit to the United States. The Cooperation Initiative focuses on energy and environmental science, technology, and trade. Target areas include urban air quality, rural electrification, clean energy sources, and energy efficiency.

The United States and China have agreed on an Export-Import Bank $100,000 *clean energy program* to accelerate the deployment of clean U.S. technologies in the areas of energy efficiency, renewables, and pollution reduction. Ex-Im Bank funds will finance U.S. environmental exports, potentially including a wind-power station in Inner Mongolia. This initial financing would open the door to further lending and funds for other clean energy projects.

Other bilateral initiatives include a series of *Oil and Gas Industry Forum* meetings under the auspices of the U.S. Department of Commerce, which will explore access to information and markets and promote a joint study of natural gas utilization in China to assess the potential for expanding natural gas production. A new *housing initiative* to increase use of environmentally friendly housing materials and design has begun to focus on China's rapid development of new cities in interior districts. The goal of the housing initiative is for the United States to assist China in making plans for municipal development that are ahead of the curve and would put in place systems, structures, and regulations that capitalize on more advanced energy technologies than would otherwise be used. A *U.S.-China Water Management Working Group*, which started as an activity of the Forum on Environment and

Development, integrates issues of energy, environment, science, and commerce in order to identify common water problems facing the United States and China. (*Editor's Note, see 8 March 2000 meeting summary for more details on this water working group*)

Through these initiatives and others, the United States and China are cooperating or considering cooperation to combat climate change; insure continued trade in biotechnology; manage freshwater, coastal, and land resources; develop cleaner production methods and cleaner, more efficient sources of energy; minimize air pollution; and mitigate and reduce natural disasters. China has begun to examine market mechanisms to reduce sulfur dioxide emissions such as domestic emissions trading.

Before closing, Mr. Fuerth stressed that the Forum exists in a context of otherwise mixed and sometimes troubled relations with China. The U.S. government faces differences with China over Taiwan, human rights, non-proliferation, and security matters. In the midst of these differences, however, the very highest Chinese government officials continue their interest in collaborating on environmental protection and energy issues. Bilateral cooperation based on win-win strategies for both countries is possible and practical and should be pursued.

Leon Fuerth

Second Keynote: Trends and Potential in China's Energy Markets

Howard Pierce, former head of ABB's China operations and current President and CEO of ABB, Inc., spoke to the group about trends in China's energy markets. One of the most interesting messages left by Mr. Pierce was that we, as China observers, are faced with the daunting challenge of understanding several China realities, not just one. Looking at context is critical. For example, conditions in Beijing and the Special Economic Zones contrast dramatically with those in inland cities. The truth is that there are several highly disparate economies operating simultaneously in China, and there is significant variety in energy markets throughout the country.

Mr. Pierce discussed what he described as a current watershed in China's energy markets, especially as they relate to foreign investment and opportunities. In 1978, the electrical generating capacity in China was 57 gigawatts and over 30 percent of the population lacked access to electricity. Blackouts and brownouts were common; energy quality and reliability were poor. In 1978, 70 percent of China's energy needs were met by coal and 30 percent by hydropower. Because of the high coal use urban pollution from industry was appalling. As China's economy has continued to grow demands for energy have drastically increased. To address energy shortfall, China has invested in building energy capacity. Subsequently, fossil energy was almost exclusively standardized in 300- and 600-megawatt steam plants using ABB combustion engineering boiler technology and Westinghouse electric turbine generator technology.

China continues burning poor quality coal with virtually no pollution control devices in place. In addition to domestic manufacturing, many large-scale plants were imported primarily using multilateral or bilateral financing schemes. More recently, as these external financing sources dried up for China, the government intended to open up the industry through foreign invested joint venture IPPs (independent power producers) and even Build-Operate-Transfer (BOT) schemes. These efforts have been only partially successful. As many projects stalled, the central government refused to give sovereign guarantees at almost any level and the rates of return were judged too low by investors because of the prevailing low level of tariffs forecasted for 15-20 year plans. Furthermore, the foreign venture aspect of these IPPs was handicapped by very limited local Renminbi (RMB) financing. This lack of local funds persists today and has slowed the central government's pump priming.

Today, the Chinese State Power Corporation can proudly claim to have increased capacity nearly five times since 1978 to almost 300 gigawatts. The system is now reliable and almost free of blackouts, despite the fact that GDP has grown 25 times (in Renminbi investment) during the same period. Electricity accounts for one-third of energy use compared to one-sixth in 1978. Residential electricity use has grown from under 6 percent of total electrical energy use to 12 percent today. In addition to an increase in capacity,

there has also been an improvement in quality. Sophisticated industries can operate without fear of blackouts. Urban pollution has increased, but it is much less than what one would expect. Major ameliorating factors have been a decrease in household pollution by substituting gas for coal stoves in cities, and by decreasing industrial pollution by closing many small boilers and hooking plants to the local grids. From the perspective of a Western industry observer, these trends are impressive.

Although greatly stretched, the rail system has managed to transport enormous amounts of coal. Coal production has soared since 1978 even beyond what is required to maintain a 70 percent market share of power generation. There is now a surplus of capacity in the industry, and the potential exists for a destructive price spiral that could be prevented only by government intervention in the market through a quota system (limiting production to 900 million tons per year), and a price support mechanism. Many of the large coalmines are subcontracting part of their low-priced annual contracts to smaller and cheaper local mines, which are often not in compliance with Chinese safety standards. Also, there are significant differences in wholesale tariffs between different regions. For example, one-kilowatt hour costs two cents in Guangxi, but five cents in Shanghai.

Despite massive investment in new projects, hydropower has fallen from 30 to 23 percent of generating capacity, with the remaining 7 percent spread among nuclear, oil, gas and renewables. Rising oil consumption pushed China from a net exporter of oil to a net importer. Even though China's oil production will hit 140 million tons this year, production will still be 30-40 million tons short of demand. This oil shortage is a significant factor in China's balance of trade and hard currency, as well as goals for energy sufficiency. Nevertheless, power supplies are inconsistently spread out and power surpluses exist in many industrialized areas for several reasons:

- The economic slowdown in Asia;
- The shift from heavy to light industries, which use less power;
- The under-exploitation of energy capacity, primarily due to inadequate distribution systems; and,
- The development of energy transmission and distribution systems has lagged behind the investment in generation. Specifically, power distribution is deficient in areas that need it or where source substitutions should be made.

Future Foreign Investment Potential

By 2010, the installed capacity in China is expected to double again to about 570 gigawatts. In the minds of many, the current energy surplus challenges this assertion. However, Chinese coal will continue to dominate this expansion, the Chinese government will continue to invest heavily in hydropower, and the government also will continue to develop nuclear power very selectively. While China's nuclear industry claims future growth will become five percent of the installed base, Mr. Pierce thinks this is unrealistic, with two percent a more feasible target given the limitations of highly capital-intensive projects.

Air pollution technology investments will increase as China tightens and gradually enforces its air pollution emission standards. Additionally, in the near future, the Chinese government will push gas-fired generation, primarily for environmental reasons. Chinese State power authorities claim that gas will rise from 2 percent to about 8 percent as the source of electricity. Natural gas will be supplied by a 4000-kilometer pipeline from Xinjiang to Shanghai, and by a liquefied gas pipeline planned for the south and east (Shenzhen and Shanghai). Both of these natural gas infrastructure projects will be seeking foreign investment at equity levels.

In the near future, the foreign supply of new energy investments will be limited to high-tech coal plants (e.g., super-critical plants and circulating fluidized bed plants), large nuclear plants, and high-tech air pollution control systems. Big growth areas for foreign investment will be in advanced gas pipeline technology, equipment, and large combined cycle plants. Foreign investment is unlikely to become any more attractive than it currently is unless Chinese decision-makers adopt high powered and high efficiency state-of-the-art turbines.

Other future opportunities for investment will be in the area of national electric power grids. The Three Gorges Dam will be the hub of a national grid that by 2020 will tie China's fourteen independent grids together. Mr. Pierce predicted that foreign investors would have a significant opportunity to supply high-tech transmission systems and network control systems.

Oil and gas production is another area for future opportunities that could be opened up by China's WTO entry. While coal technology power plants and power generating equipment have been central in foreign investment and joint ventures in China for the past 20 years, the next 20 years will open up

opportunities for oil, gas, and combined cycle plant producers. The Chinese energy market soon will be characterized by continued growth, and environmental imperatives will push a switch from coal to greater reliance on gas. Moreover, China's continued desire to be self-sufficient will also greatly shape the evolving energy picture. These trends will be pushed by China's entry into the WTO and the United States passage of permanent normalized trade relations. These energy trends, however, will be hampered by a continuing lack of domestic funds to match foreign investment.

Third Keynote: Energy Foundation Efforts in China

The address by Mr. Douglas Ogden, Vice President of the Energy Foundation, presented an overview of the Foundation's support of energy efficiency and renewable energy activities in the United States and China. The Energy Program is a partnership of the Packard, Mertz-Gilmore, McKnight, and Rockefeller Foundations and the Pew Charitable Trust. Each year the Energy Foundation receives $20 million for the Energy Program—$15 million of which is devoted to U.S. energy activities with the remaining $5 million targeting sustainable energy initiatives in China. The primary rationale behind the China energy program is that China is the fastest growing carbon emitter and the world's most carbon dependent economy. While it ranks as the second largest emitter of greenhouse gasses today, it is expected to surpass the United States within the next two decades.

The China Energy Program is Chinese-led and focuses its grant making within China. China's energy patterns have led to a staggering deterioration in air quality in the last 15 years. In fact, air quality is below world health standards by a factor of ten. Mr. Ogden and others at the meeting agreed that the Chinese leadership understands this problem very well and has eagerly embraced efforts by the Energy Foundation and other institutions to address energy problems. The U.S.-China Policy Advisory Council was created by the Energy Foundation as a forum through which to exchange ideas and information about problems and solutions. Former Minister of Energy Mr. Huang Yicheng, who currently heads the China Energy Research Society, leads the Council. The Energy Foundation's Beijing office employs program officers for each of the program's five sectors: 1) low carbon development paths; 2) energy conservation; 3) electric utilities; 4) renewable energy; and 5) a transportation program. Mr. Ogden closed his remarks by emphasizing that China is looking for leadership from the United States in energy efficiency and renewable technologies.

Opportunities for Bilateral Energy Cooperation

The mini-presentations that followed the keynote speakers provided valuable information and insights on China's energy policies and prospects for cooperative activities. Representatives from the U.S. Department of Energy, U.S. Department of Commerce, U.S.-China Business Council, U.S. Environmental Protection Agency, and the National Science Foundation shared their views and experiences. Presenters underscored the need to develop natural gas, promote energy efficiency and financing, and to encourage the private sector's role in energy. Governmental, academic, scientific, nongovernmental, commercial, and financial cooperation offers an important chance to find solutions to energy challenges facing both nations. Possible benefits of bilateral energy cooperation include:

- Increased use of energy-efficient technologies currently available;
- Moving to cleaner, more efficient combustion of fossil fuels;
- Increased use of higher quality fuels, including electric power;
- Expanded research, development, and demonstration of technologies;
- Mutually beneficial and collaborative transfers of capital, knowledge, and technology; and,
- Collaborative economic and environmental initiatives that benefit both national interests and those of the global community.

In order to promote cooperation between China and the United States, the two nations must find ways to institutionalize the opportunities and initiatives listed above.

Impact of China's Environmental Policies on Foreign Investment

The discussion below evaluates opportunities and challenges faced by foreign companies wishing to enter into environmental technology and energy efficiency markets in China. This topic is timely, not only because of China's imminent entry into the World Trade Organization (WTO), but also because Chinese central government and party officials are no longer denying or ignoring the extent of China's environmental degradation. This has led to moves to further empower the State Environmental Protection Administration (SEPA) and reinvigorate the implementation of China's

existing environmental legislation. Opportunities for private foreign investors in China's environment and energy sector will increase, as China seeks to alleviate the impact of economic development on natural resources.

Business Opportunities: Exports, Technology Transfer, and Direct Investment

The American private sector has a substantial interest in commercial opportunities in environmental technology and energy efficiency in China. The Chinese market for energy efficiency goods and services could exceed $200 billion, particularly as China becomes a net oil importer. Promising sectors include: 1) monitoring and analytical equipment; 2) domestic equipment industry; 3) water treatment facilities; 4) emission-control equipment; 5) air-pollution control equipment; 6) natural gas pipeline infrastructure; 7) agricultural runoff and organic waste technologies; 8) energy-efficient building materials; 9) biodegradable packaging materials; 10) alternative energy sources; 11) waste management; and 12) clean coal and gas development.

Challenges to Foreign Investment in China's Environment and Energy Sectors

Potential financial sector problems that hinder foreign investment in energy and environmental sectors include:

- *Hard currency constraints*: These constraints mean that some firms will find opportunities in China only through direct investment, not through exports to China;
- *Financing*: Projects that require large initial capital, e.g. in renewable energy, will likely require funding from multilateral and bilateral sources. American equipment suppliers offer competitive prices, but their financing terms are neither as good nor as flexible as their European counterparts.
- No *municipal bond markets* exist yet in China;
- Chinese governmental policies sometimes require purchases of *domestic equipment*, which complicates projects funded by multilateral financial institutions and bilateral concessionary finance programs that require foreign purchases; and,
- *U.S. aid programs inoperative*: USAID/US-AEP, Trade Development Agency, and the Overseas Private Investment Corporation are not operative in China.

Intergovernmental and political hindrances to foreign investment in China include: 1) fragmented regulatory responsibility; 2) local protectionism; 3) state-owned enterprise restructuring; 4) side effects of government restructuring; 5) market fragmentation; and 6) inadequate domestic infrastructure and market networks.

Benefits of China's WTO Accession to Foreign Environmental Imports

China's WTO accession should help foreign equipment suppliers compete in China. The drop in Chinese tariffs on foreign products and the requirements for the Chinese government to follow international competitive bidding procedures and abolish policies that favor domestic production are key changes that will open up Chinese markets for foreign imports. Foreign companies will also be able to distribute and service their own equipment. This means the phase-out of geographic, quantitative, and certain equity restrictions.

In terms of environmental and energy sector investments, trading rights for environmental technology products will be phased in, except for certain crude oil and processed-petroleum commodities. China's entry into the WTO should also ease many of the current barriers by foreign firms to the provision of environmental services, though the licensing approval process may not become any easier. Environmental service opportunities will include sewage, solid waste disposal, cleaning services for exhaust gases, noise abatement, natural and landscape protection, and other environmental pollution services. Foreign service suppliers may also provide environmental consultation services through cross-border delivery (no commercial establishment in China is required). Within the environmental sector, services that will be excluded will be environmental monitoring and pollution source inspection services. Notably, foreign service suppliers outside of environmental consultation services must operate in China via a joint venture.

U.S. Foundations in China

In addition to the Energy Foundation, the Asia Foundation, the National Science Foundation, the Rockefeller Brothers Fund, the Henry Luce Foundation, and the W. Alton Jones Foundation are supporting environmental and energy work in the People's Republic of China.

[1] The summary and meeting notes were compiled and edited by Marilyn Beach, Doug Murray, and Jennifer Turner.

Environmental Protection in China's Tenth Five-Year Plan

14 April 2000

Zhang Qingfeng, Chinese State Environmental Protection Administration and World Bank

Robert Crook, World Bank

China is the target of 80 percent of theWorld Bank's lending and research in the East Asia, and a significant amount of the World Bank's China activities have focused on environmental protection and energy efficiency issues. As early as 1992, the World Bank conducted its first comprehensive environmental sector study in China. This initial report helped clarify the kinds of financial, policy and technological support the World Bank could provide to promote environmental protection goals in China. In the spring of 2000, the World Bank's Environment and Social Development Unit, East Asia and Pacific Region office—together with China's State Environmental Protection Administration (SEPA)—began a joint report on China's future environmental needs. The main goal of the study is to produce papers that SEPA officials will use to shape their proposal for environmental protection provisions in China's Tenth Five-Year Plan (2001-2005). The World Bank will publish a report based on this study in the summer of 2001.

Co-Chairperson Ann Weeks, U.S.-China Business Council

Environmental Goals in the Ninth Five-Year Plan

Dr. Zhang, who is the first SEPA official to be "lent" to the World Bank's Environment and Social Development Unit, began his talk outlining China's progress on environmental goals that were part of the Ninth Five-Year Plan (FYP). During this period, the Chinese government promulgated numerous environmental laws and regulations, as well as revised the Criminal Law to stipulate that certain types of damage to the environment and natural resources can be prosecuted as a crime. Finally, Chinese policymakers began to discuss environmental management regulations for construction projects that ultimately will lead to the creation of a stronger Environmental Impact Assessment Law in 2002.

Dr. Zhang also described how SEPA made progress in numerous special water pollution control projects, regional air pollution zones, and the Bohai Blue Sea Action Plan. In terms of industrial pollution control the Chinese government shutdown over 65,000 small, heavily polluting enterprises during the Ninth FYP. Moreover air quality improved in 20 large cities that phased out leaded gasoline, but among China's 47 priority cities only seven met the national air emission standards in 2000. SEPA's Ninth FYP conservation initiatives included: a) the creation of a natural forest protection program; b) guidelines for a new National Ecological Conservation Plan; c) the establishment of 1000 natural reserves covering 7.64 percent of the country; and d) the construction of 112 ecological pilot areas. Despite the progress made during the 9th FYP period, environmental pollution and conservation problems continue to be severe in China.

Potential Environmental Protection Targets for the Tenth FYP

Dr. Zhang outlined the 2005 environmental protection targets that SEPA is considering, but he noted that most likely these targets would change during the final inter-ministerial negotiations. SEPA hopes that the Tenth FYP will:

- Reduce the emission of main pollutants such as SO_2 and total suspended particulates by 10 percent compared to 2000;

• Alleviate water quality deterioration in the seven river basins, major lakes, and key coastal areas;
• Designate more environmental model cities and more counties as ecological sustainable development areas;
• Raise the rate of national forestry coverage from 14 to 19 percent;
• Increase the percentage of land designated as nature reserves from 10 to 13 percent;
• Control desertification and soil erosion;
• Increase investment in environmental pollution control to 1.5 percent of GDP;
• Increase the number of key cities for environmental protection from 47 to 100;
• Promote cleaner energy sources (renewables, coal technology, and natural gas);
• Promulgate the Environmental Impact Assessment (EIA) Law, which would require all important macro-economic policies and key regional development projects to complete EIAs; and,
• Centralize township village industrial enterprises in order to facilitate centralized pollution treatment.

Financial and Administrative Capacity for Environmental Protection in China

Both speakers acknowledged that the above list of targets and goals is quite ambitious for SEPA, which is indeed a very small agency. All of SEPA's goals and priorities for the Tenth FYP will have to be incorporated into discussions with other ministries in China and not all will be included in the final plan. One point of optimism for SEPA and other environmental agencies in China is that the State Council and the Communist Party are beginning to emphasize environmental protection needs. While political will is a necessary ingredient in implementing more effective environmental policies, an equally important need will be for efficient environmental financing mechanisms and more cooperative intergovernmental management of pollution and conservation problems.

In terms of financing, SEPA hopes to push requirements that each level of the Chinese government to increase environmental protection investments. One option to help supplement local resources for environmental investments would be to improve the implementation of the polluters-pay policies—e.g., requiring that industries pay for emissions permits and increasing price of wastewater treatment, water, heat and gas fees. SEPA would also like to cooperate with other central government ministries to set up a national environmental investment fund. Other environmental finance options include: a) employing bond and stock markets to promote environmental investment; b) attracting more foreign capital to environmental infrastructure investment; and c) encouraging the privatization of environmental service industries such as sewage treatment. This latter option will work only if the Chinese government succeeds in increasing and collecting water fees.

Zhang Qingfeng

Administratively, SEPA has no ability to deliver on perhaps 90 percent of its objectives, due in great part to its limited staff (240). Mr. Crook noted that SEPA has increased its administrative capacity through collaboration with various ministries, particularly for biodiversity and conservation work. For urban pollution issues, SEPA and its local environmental protection bureaus (EPBs) must cooperate with urban construction bureaus (UCBs). Although these two bureaus have many conflicting interests, in recent years, EPBs and UCBs have begun to cooperate on sewage fee collection and hazardous waste management centers. Turf battles and competition for funding make horizontal cooperation among Chinese government bureaus difficult, but seeking ways to improve intergovernmental cooperation would enable better coordination of environmental policies.

The U.S.-China Business Council and the Working Group on Environment in U.S.-China Relations cosponsored this meeting.

Environmental Nongovernmental Organizations in Mainland China and Taiwan

31 May 2000

Chen Man-Lin, The Homemakers' Union and Foundation

Lu Hongyan, Environmental Volunteer Association of Sichuan University

Shi Lihong, Green Plateau Institute for Ecological Conservation and Development

This meeting featured three nongovernmental organization (NGO) speakers who participated in the *Elisabeth Luce Moore Leadership Program for Chinese Women 2000: Environment and the Community.* With support from The Henry Luce Foundation, the Institute of International Education has initiated a program for women leaders of NGOs and community groups in Mainland China, Hong Kong, and Taiwan. The program brings them to the United States for month-long, fully-subsidized visits with American counterpart women leaders to promote the exchange of ideas and stronger networks among Chinese and U.S. women working on issues of common concern.

At this meeting each participant gave a presentation on her work in environmental NGOs. Chen Man-Li explained how the Homemakers' Union and Foundation has been a major force in expanding environmental education, awareness, and citizen activism in Taiwan. The two other speakers founded small environmental organizations in southwestern China. In 1995, Lu Hongyan established the Environmental Volunteer Association of Sichuan University, which aims to enhance environmental awareness and engender responsible action within the university community. In 1999, Shi Lihong founded the Green Plateau Institute for Ecological Conservation and Development. The mission of this new organization is to preserve endangered species and old-growth forests in northwest Yunnan Province. While the formation and range of permitted activities of environmental organizations has been much greater in Taiwan than in Mainland China, on both sides of the Taiwan Straits environmental groups appear to face similar challenges in raising funds and motivating participation of local citizens in their environmental activities.

Homemakers' Union and Foundation

The Homemaker's Union and Foundation (HUF) was founded in 1987, the same year that martial law was lifted in Taiwan. As one of the oldest non-profit organizations in Taiwan, HUF aims to unite women to help improve the natural environment and promote environmental education. This nongovernmental organization has 5,000 members and is run by approximately 100 volunteers and seven paid staff.

As one of HUF's earliest staff members, Chen Man-Li has been involved in its environmental education work and dialogues with the Taiwanese government and local communities. In the early years, HUF focused considerable attention on how to involve citizens in decreasing the amount of garbage they produce. Garbage generation is so great in Taiwan that in cities garbage is collected every day. In an attempt to stem such waste generation, HUF members approached the Taiwanese government to encourage the creation of recycling programs; but in the late 1980s the government lacked funding and staff for such programs. Therefore, HUF went to communities and schools to encourage them to recycle, and HUF staff members and volunteers helped connect communities to private recycling companies. HUF also carried out waste reduction education programs such as campaigns to encourage people to carry their own chopsticks, use cloth bags, and refrain from using disposable cups and plates. In addition to educating citizens, HUF has held dialogues with the Taiwanese government and big businesses to encourage them to purchase recycled materials

Besides recycling work, HUF members have also set up a small pilot project to promote composting of kitchen wastes. Currently, one-third of the solid waste produced in Taiwan is kitchen waste. The pilot project involves 600 families. These families are encouraged to separate out their kitchen waste, which is subsequently collected by HUF and delivered to a composting area. The Taipei City government has also begun conducting

two pilot projects to collect kitchen wastes and HUF is urging other municipal governments to adopt such a composting program throughout Taiwan.

Because of their concern for water pollution and the lack of resources in Taiwan to build up comprehensive wastewater treatment facilities, HUF is also undertaking a small-scale waste reduction project to recycle cooked oil to make soap. HUF also has united with other groups on issues of nuclear power, air, and water pollution. While most of the past activities of the Homemakers' Union and Foundation have focused on local environmental issues in Taiwan, the group wishes to create cooperative activities with international environmental groups.

Chen Man-Li (left) and Shi Lihong

Green Plateau

To provide context for her organization's work, Shi Lihong began her talk by describing the work of an environmentalist—Xi Zhinong—who worked to save one of the most endangered species in China—the Yunnan snub-nosed monkey. The monkeys' main habitat in the Tanian mountain range in Yunnan Province has been greatly fragmented by road construction and human settlements. The impact of this forest depletion is clear in a 1980s survey showing that less than 1500 snub-nosed monkeys remained in the Tanian mountain area.

Xi Zhinong's work in Yunnan was initially one as documentary photographer. In 1992, he began making a film of the history of the snub-nosed monkeys. After spending three years following the snub-nosed monkey in this mountainous area of southwest China, he learned in 1995 that the local officials in Deqing county—a poor and remote county in this area—had given permission to a logging company to cut over 100 square kilometers of the forest. The area targeted for logging was the home of the biggest group of snub-nosed monkeys. In an attempt to prevent the logging, Xi Zhinong went to the county, prefecture, and provincial level government officials, explaining the impending danger such logging would bring to the fragile snub-nosed monkey community. The government officials at all levels were not open to his requests to halt the logging, for Deqing County needed the eight million Yuan revenue such logging would generate. The situation appeared hopeless until Xi Zhinong was introduced to Tang Xiyang, a leading conservation writer in China. Mr. Tang wrote a letter to the State Council arguing for the protection of the monkeys. This letter also was shared with national newspapers and a leading conservation NGO in China, Friends of Nature. Suddenly, this remote, poor county received national attention, which led top-level officials to mandate that Deqing County halt all logging and receive 11 million Renminbi per year from the Central government. This was perhaps the first victory of a grassroots environmental organization in China.

This victory for grassroots organizing lost Xi Zhinong his job in Yunnan, but he was then invited to work for CCTV in Beijing. It was in Beijing that Xi Zhinong met and married Shi Lihong in 1996. Together they have been involved in environmental organizations and "green" news reporting in Beijing. After two years of journalism and broadcasting work in Beijing, Xi Zhinong and Shi Lihong returned to Deqing County to work with the community on sustainable development issues.

Poverty is severe in Deqing and is one of the major causes of environmental degradation in that area. Despite logging bans, commercial logging continued, but only composed 30 percent of total consumption of the forest. The remaining logging stems from local people cutting trees for firewood and timber for the construction of homes. Traditionally, people in this area have been dependent on agriculture and animal husbandry; but with the population growth over the past decades, such livelihoods and timber consumption are unsustainable.

In Deqing County, Shi Lihong and Xi Zhinong tried to establish an NGO called Yunnan Mountain Ecology Conservancy, but officials in the local prefecture refused their application, saying the prefecture was not "ready for an NGO." Xi Zhinong and Shi Lihong therefore created an NGO by registering as a private research institute in Beijing. This NGO was dubbed Green Plateau and its mission

is both to preserve and protect local species, as well as to promote the livelihood of the local people in Deqing County.

Environmental Volunteer Association at Sichuan University

In 1995, Lu Hongyan, a full-time lecturer at Sichuan University in the environmental science and engineering department, established a student environmental organization called the Environmental Volunteer Association (EVA). This group represents the first student environmental group in Chengdu, Sichuan Province. The mission of EVA is to nurture students' environmental literacy and help college students both to become informed decision-makers and to take responsible actions to support sustainable development in the future.

In 1987, the first Chinese student environmental group was formed in Beijing. In 1998 the number of green student groups had grown to 23. A clear upward trend for such groups is revealed in the near tripling in their total to 62 in 2000. Beijing contains the majority of the student groups with 37 and the remaining 26 groups are scattered in large cities throughout China (six in Dalien, six in Chengdu, four in Shanghai, three in Haerbin, two in Kunming, one in Hangzhou, one in Naning, one in Chunqing, and one in Lanzhou).

While the sheer number of groups has increased, all face numerous challenges in carrying out activities and creating sustainable organizations. One of the largest challenges green student groups face is the need to raise funds. A survey of 26 student environmental groups in China conducted by EVA in 1999 revealed a diverse array of funding for such groups. Companies and businesses in the locale appear to be the major supporters of the student environmental groups. In return for these funds and supplies, the groups help advertise for the companies. The complete breakdown in funding sources for student groups is: 30 percent local companies; 18 percent colleges; 17 percent local community and social organizations; 16 percent private donations; 12 percent governments (central and local); 5 percent membership fees; and 2 percent program participants.

Chinese green student organizations face the same challenges as those faced by environmental student groups in other countries. Four key challenges highlighted by Lu Hongyan include: 1) high turnover of student population (causes instability in the organizations leadership and membership and making it difficult to maintain the programs) ; 2) lack of skills as to how to write proposals and how to raise funds for the group; 3) limited collaboration with non-student environmental groups both nationally and internationally; and 4) scarcity of funds to support group's activities.

The EVA aims to create solutions to some of these challenges inherent in student environmental organizations. Lu Hongyan discussed some potential areas her group may target in the future. First, she commented that creating more networks for student environmental groups could promote a sharing of organizational experiences among groups. In 1996, a Green Student Forum was created as the first student environmental network in China. This Beijing-based network receives support from Friends of the Earth, Hong Kong. This network has brought together the 37 green student groups in Beijing, but has limited contact with student groups in other cities in China. Lu Hongyan remains uncertain as to the best role for student environmental networks in China to push the student environmental movement. Another and perhaps greater priority for EVA would be to implement internal and external training programs to improve environmental education on university campuses and to build the capacity of student green groups. Some of this training could be done in university classrooms. For example, Sichuan University, following Lu Hongyan's encouragement, has recently agreed to require all of its university students to take environmental education classes in order to graduate.